TELEPHONE ASSISTIVE DEVICES: PROVISION FOR HEARING-IMPAIRED CLIENTS AND TRAINING FOR HEARING HEALTH CARE PROFESSIONALS

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ABSTRACT

This study used an action research methodology to assess the telephone communication difficulties experienced by hearing-impaired persons as well as their knowledge and use of telephone assistive devices (TADs), and the knowledge and use of TADs by hearing health care professionals (HHCPs) in their practices. Thirty-six hearing-impaired adults residing in the Western Cape, between the ages of 26 and 78 years, who struggle to use the telephone, were interviewed and given hands-on experience with appropriate TADs. Evaluations of the TADs indicate that all subjects select similar devices, irrespective of degree and configuration of hearing loss; or presence and type of personal amplification used. Only 9 subjects are currently using TADs and the predominant reason for this lack of use is limited information available as well as inadequate information offered specifically by the HHCPs. These results were used to develop a training package for the HHCPs, and was provided for 28 HHCPs in two centres. All HHCPs were sent post-training questionnaires to determine whether there was an increase in their knowledge of TADs. A statistically significant shift occurred in knowledge on several aspects relating to TADs. Evaluations from the HHCP training and information from the hearing-impaired subjects were used to design an information brochure, to be disseminated to the participating HHCPs, professional organisations and to training institutions. Implications of the study are discussed.

Keywords:

action research, hearing-impaired, telephone assistive devices (TADs), hearing health care professionals (HHCPs), training, brochure.

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1. INTRODUCTION

A hard-of-hearing person is defined as "a person with a hearing impairment, ranging from mild to profound, who communicates with spoken words" (Hallberg, Passe & Ringdahl, 2000, p.7). A hearing loss can also be described in relation to the onset of the loss. Pre-lingual deafness/hard-of-hearing is defined as deafness/partial deafness whose onset was prior to the acquisition of a first language. The deafness may have occurred at birth or as a result of disease or accident prior to the development of language. Alternatively, post-lingual deafness/hard-of-hearing refers to persons who have lost hearing after speech and language acquisition as a result of disease, trauma or aging. Post-lingual deafness/hard-of-hearing is also referred to as an acquired hearing loss. According to the 1994 mid-year estimates by the Central Statistic Services of South Africa, the total population of Deaf, hard-of-hearing and extremely hard-of-hearing[1] people in South Africa, is just over four million (SANCD, 1995).

A common complaint made by hearing-impaired persons to Hearing Health Care Professionals (HHCPs)[2] is that they can hear something, but are unable to understand the message. This may be due to the nature and configuration of their hearing loss. Hearing-impaired persons with sensori-neural hearing loss may be able to detect incoming speech fairly well due to their preserved low and mid frequency hearing. However, damage to the cochlea begins at the basilar portion, where high frequency information is decoded. The loss of important high frequencies in speech results in difficulty for hearing-impaired listeners to detect and discriminate between high frequency consonants (for example, discriminating between: shin, sin, chin and fin in running speech). This would thus interfere with speech understanding. In addition, environmental factors present in any listening situation such as noise (e.g., air conditioning, heating ducts, various kinds of equipment or other occupants and activities) and reverberation (i.e. sound

[1]The term Deaf refers to those who use a signed language as their primary means of communication. It is also used as an identification of members living in the Deaf community. On the contrary, deaf, hard-of-hearing refer to hearing-impaired persons living within and identifying with hearing society, who use speech to communicate.

[2] The term HHCP will be used throughout the text to refer to audiologists and hearing aid acousticians. For the purpose of this research, audiologists, who hold a university degree, provide a service to those with hearing disorders. They are trained to identify, screen and assess hearing disorders through the use of a full diagnostic test battery (behavioural and electroacousic measurements). They provide therapeutic services such as assessing for and dispensing hearing aids and other assistive devices as well as counselling clients and their families. Hearing aid acousticians, who hold a technical diploma, treat persons over the age of twelve who require hearing amplification and assistance. They conduct audiometric real ear and hearing aid fitting measures (Health Professions Council of South Africa, 2000).

reflected off the surfaces of a room creating an echo) further reduce the hearing-impaired person's ability to understand speech (ADA Accessibility Guidelines, 2001).

The aims of HHCPs in managing clients with hearing impairments are to improve receptive communication in different areas and situations. Compton (1993, 1995, 2000) has identified these situations as: face-to-face communication at home, school, work, on social occasions, in situations of quiet and in noise, in group conversations, in large-area listening situations, in a moving vehicle or on a noisy street, during travel, in accessing electronic/broadcast media, telephonic communication and the reception of alerting signals (e.g., telephone, doorbell, smoke alarm, alarm clock).

Listeners with sensori-neural hearing loss complain of difficulties understanding speech over the telephone (Crandell & Smaldino, 2002). According to Compton (2000), telephonic communication is probably the biggest concern for clients, after one-to-one communication and watching television. The telephone has become the "primary electronic medium for interpersonal communication" (Hopper, 1992, p. xi). It is now considered an essential part of modern everyday life and has many functions: it allows an individual to communicate with family, friends and acquaintances; it allows a person to obtain advice and information (e.g., from banks, shops or airlines); it permits people to make and receive emergency calls; and it assists and is often vital in the workplace. However, for the person with a hearing loss, telephone conversations can become a difficult experience if they cannot understand the speaker.

HHCPs have focused predominately on the assessment of the nature and extent of a hearing impairment to the detriment of the assessment and management of the disabling and handicapping effects of that hearing impairment (Meadows Beyer & Northern, 2000; Metz, 2000). Although audiometric data can describe the person's hearing status in terms of degree and configuration of loss, it cannot reveal how a person will succeed in his or her personal and professional communication environments. In other words, the degree of hearing loss would allow a HHCP to make general statements about a person's hearing function and probable needs. However, it will not provide sufficient information on the specific effects of a loss (Katz & White, 2001). Often, hearing aids are recommended and fitted before the audiologist has enquired about the specific reasons that person has come for help.

Two hearing aid technologies are available for hearing-impaired persons: conventional analogue and digital technologies. Both use the microphone to convert acoustic signals (sound from the

environment) into small electrical signals. The key difference between the two is the handling of the electric signals from the microphone. Analogue hearing aids use screwdriver potentiometers for the shaping and output limiting of the electric signals before they are sent back to the receiver to be converted back into an acoustic signal. Electric signals in digital aids, however, are "sampled" a number of times per second (10 000 times/sec). This allows the analogue to digital converter to turn electric signals into digital equivalent. The digital signal is then operated on by the microprocessor and is then converted back into an analogue electric signal by the digital to analogue converter. Before the receiver converts the electric signal back into acoustic energy (as in analogue aids), an anti-imaging filter smoothes the signal so that it sounds natural again. The advantages of digital over analogue hearing aids are that the signal can be tailored and processed more precisely; digital aids can be finely adjusted to suit the hearing impaired person's hearing loss more accurately and digital aids include noise cancelling systems and feedback suppression systems.

Despite the advances in hearing aid technology (directional or omni-directional microphones, compression and linear circuit types, frequency-shaping, earmould plumbing and programmability) (Compton, 2000) and digital technology (Hoch & Glaser, 2002), many hearing-impaired people still experience residual communication difficulties (Compton, 2000; Crandell & Smaldino, 2002; Hoch & Glaser, 2002; Loovis, Schall & Teter, 1997; Morris, 1998; Ross, 1997, 2001; Smaldino & Hull, 1997; Trychin, 1994; Warner-Czyz, 2000; Wilcox, 2002) and even once fitted with a hearing aid, it is well documented that they struggle to use the telephone (Bloom, 1996; Compton, 2000; Hoch & Glaser, 2001, 2002; Ross, 2001; Trychin, 1994; Tye-Murray, 1998). Another form of personal amplification, cochlear implants, have made a great difference to the lives of many profoundly hearing-impaired adults. However, some may still have mild rehabilitative needs post surgery and adjustments to the device. Some of these needs include using assistive listening devices with the implant and training to maximize communication in difficult listening situations such as with background noise and using the telephone (Zwolan, 2002).

Hearing aids function by increasing the intensity of the auditory signal, however, at the same time, they are not able to differentiate the signal (speech) from the unwanted noise. In other words, they are unable to improve the speech-to-noise ratio (ADA Accessibility Guidelines, 2001). Acoustical environments that allow good communication for normally hearing listeners may not be the same for hearing-impaired persons. This population often exhibit an excessive sensitivity to noise and reverberation (Nabelek, 1994 in Bakke, Levitt, Ross & Erickson, 1999;

Ross, 1992). Because of their hearing loss, they lose much of the linguistic and acoustic redundancy found ordinarily in speech, and this, in addition to environmental factors such as noise and reverberation, often results in poor communication ability. Trychin (1994) reports that over 90% of the author's clients own and use hearing aids, but still experience communication problems. This is due either to difficulty in hearing speech, or to acoustic feedback caused by putting the telephone receiver next to the hearing aid microphone (Palmer, 2001), which makes listening difficult.

Research shows that hearing-impaired persons face several obstacles in the workplace due to their hearing loss (Erdman, 2000). Difficulty with the telephone has been found to be significant (Hoch & Glaser, 2001; Round, unpublished; Thomas et al., 1982). Jackson (1997) also found that individual's inability to use the telephone restricted their opportunities for personal achievement, and was seen to impact negatively on both the individual's ability to cope and perform at work, as well as on his/her employment satisfaction. Individuals are forced to rely completely on their auditory discrimination and the limited electroacoustic characteristics of telephones (Smith, 1974 in Homes & Frank, 1984), which is difficult for hearing-impaired persons. It has been shown that persons with a hearing loss who can effectively communicate on the telephone, have a higher chance of improving their status in the workplace (i.e. a greater possibility of promotion exists) (Morris, 1998).

The use of cellular telephones with hearing aids has also been researched (Compton, 2001; Fleming, 2001; Kozma-Spytek, 2002a, 2002b; Wilcox, 2002). Findings have shown the same results as for hearing aid users communicating on landline telephones. Hearing aid users have difficulty communicating on cellular telephones due to interference heard as a distorted buzz (Compton, 2001; Fleming, 2001; Kozma-Spytek, 2002b; Wilcox, 2002). In a study of hearing aid users who had tried to use a digital cellular telephone, many found it either unusable or received only a poor signal. Only a quarter of these subjects were able to use a cellular telephone successfully, either by turning off their hearing aid, removing them from the ear(s) or by using an inductive loop designed for the cellular telephone (Fleming, 2001). The interference and difficulties described have been found irrespective of the type of cellular telephone and (digital) hearing aids used (Compton, 2001; Fleming, 2001). These factors result in the user experiencing difficulties hearing speech, in feelings of annoyance and in a resultant disinterest in cellular telephones.

Research has shown extensive evidence to support the fact that the disabling effects of a hearing impairment can be reduced by the use of assistive technologies over and above hearing aids (Ross, 2001). In general, an assistive listening device (ALD) is any device or system used with or without a hearing aid that can help a hearing-impaired person during face-to-face communication, broadcast media (e.g. radio, television), telephone communication and in the awareness and identification of environmental sounds and situations (Compton, 1993). The purpose of an ALD is to provide additional or more direct auditory assistance, in situations where hearing aids cannot be expected to function as well as the more specialised devices (Mahon, 1985). In addition, with new developments in in-the-ear and in-the-canal hearing aids a bigger demand has been placed on assistive listening devices (ALDs), especially during telephone communication (Montano, 1994).

Historically, the term assistive listening device (ALD) has been used to describe both auditory and non-auditory devices. However, not all communication involves the act of listening and not all people with a hearing loss can benefit from auditory technology. Therefore, it would be more appropriate to refer to this type of technology as "assistive devices" or "communication devices for deaf and hard-of-hearing people" (Compton, 1993). Schum & Tye-Murray (1995) use the term 'systems' rather than devices, since the word system describes all the alerting and hearing-augmentation methods hearing-impaired people employ. Alerting devices have been defined as "any device (or system) designed to act as (a) signal indicator and warning system" (McCarthy, Campos, Balkany & English, 1987, p. 462).

With specific reference to telephony, rapid advances in technology allowing the hearing-impaired population to be alerted to a telephone call and/or to communicate over the telephone, have occurred over the last few decades (Compton, 2000; Tye-Murray, 1998). These technologies are referred to as 'telephone assistive devices' (TADs). One type of TADs available for those hearing-impaired people who can use their residual hearing are termed auditory TADs. These either increase the intensity of the telephone's ring or change the frequency of the ring to better match the configuration of the hearing loss. Alternatively, TADs enhance speech over the telephone by increasing the intensity of the conversational partner's voice. The latter devices include built-in amplifiers; replacement handsets (these are the easiest and most efficient way of amplifying speech on the telephone. The limitations of these handsets are that they can only be used with modular telephones whose handsets are detachable, as well as telephones that do not have the dialkeys in the handset); in-line amplifiers (although very useful, these are not compatible with non-modular telephones. In order for these amplifiers to be used,

the handset of the telephone must be separate from the dialling mechanism and the ringer, so they are not compatible with portable telephones and those with the dialling mechanism in the receiver (Kozma-Spytek, 2002a). Line-powered amplifiers receive their operating power from the telephone line. In general, these types of amplifiers are cheaper than built-in or replacement handsets, but are less convenient); and portable amplifiers (initially, this telephone aid was the only option possible for persons using behind-the-ear (BTE) hearing aids. The advantages of these amplifiers are that they give enough amplification for those with mild to moderate hearing losses.) A neck loop is available for cellular telephones that creates an induction link between the hearing aid and cellular telephone. This allows for direct audio input from speaker to listener (Nokia, 2000; Transistor, 2002). Other advances include the new 'Touchless Telecoil', available abroad, which allows the hearing aid user equipped with telecoil circuitry to use a telephone without having to adjust their hearing aid from the M to T positions. This is especially beneficial for those users who have limited manual dexterity (Yanz, 2001). With the miniaturization of hearing aids, many are not equipped with telecoils or do not have strong enough telecoils (Crandell & Smaldino, 2002).

For those hearing-impaired persons who do not have sufficient or cannot make use of their residual hearing, non-auditory TADs are available. Flashing lights or vibration units operate to alert the user to an incoming call. Text telephones are available to allow conversational partners to communicate, using a small keyboard device attached to a standard telephone. A text-relay or link-up system uses operators as intermediaries in order to extend telecommunication possibilities; hearing individuals, using a landline telephone communicate directly with the operator via speech. The message is then typed by the operator and sent to the text telephone, ready for the hearing-impaired person to read (Hirst, Baldwin & Jones, 1991) or vice versa, but these systems are only available abroad. Cellular telephones can alert hearing-impaired persons to incoming calls or short message service (SMS), by using the vibration mode available on certain models.

Despite the many advantages of text-information transmission through telecommunication devices for the deaf (TDDs), text lacks the richness that occurs in face-to-face conversations and in voice telephony. Vocal quality and inflection, facial expressions, body language and immediacy are lost when speech is converted into a textual form (Westmyer, DiCioccio and Rubin, 1998 in Woodcock & Aguayo, 2000). However, research on the affect, emphasis and comment in text telephone conversations (Glaser, 1999), revealed that TDD users do include a wide range of affect in their conversations and are able to display humour, irony, anger, surprise

and confusion. Also, punctuation, spelling, regional "dialects", slang and exclamation have been found to create the impression of spoken or signed face-to-face interaction. In South Africa today, TDDs called 'Teldems', are readily available through Telkom at a low monthly rental. However, due to a lack of public awareness, these 'Teldems' have not been used to their full potential and there is no relay facility available. They are not widely available in public places, businesses, hospitals, police stations and banks. While the Teldem lacks several features found on TDDs abroad, such as different type sizes, it has common features such as an answering-machine mode, flashing-light connections, a memory facility for telephone numbers and a file mode allowing the user to type and edit messages before phoning, saving time and cost.

Other technological advancements, that have promoted and enhanced long-distance communication, are available to both hearing and deafened persons. These include facsimiles (fax), the Internet/electronic mail (e-mail) and pagers. Fax and e-mail messages have been used to send and verify important information (Compton, 2000) in a relatively quick period of time. Videophones are currently available for business conferencing, but are not available to standard telephone users because of their high costs. Future developments in long-distance real-time telecommunication systems include video-telephony, speech-recognition systems and voice-to-text converters. Videophone interpreting is now available through the Telephone Interpreting Service for South Africa (TISSA) and provides a communication solution that is both cost-effective and easy to use. This allows for improved communication and equal access to services for the Deaf in South Africa (TISSA, 2002). Although TISSA was designed for South African sign language (SASL) users, it is also useful for hearing-impaired persons who use speech to communicate. This would allow them to see the speaker's facial expressions and be able to lip read some of the conversation.

Many overseas authors have reported on the restricted use of technological devices for the hearing impaired despite emphasising how they may alleviate, and in many instances eliminate, most communication problems (Bloom, 1996; Crandell & Smaldino, 2002; Flexer, Wray,Black & Millin, 1987 in Leavitt, 1989; Forde in Bloom, 1996; Leavitt & Freeburg, 1987 in Leavitt, 1989; Ross, 1997). Despite the efforts of many HHCPs abroad, there has not been widespread use of rehabilitation technology for hearing-impaired persons. Leavitt (1989) demonstrates how audiologists can develop comprehensive audiological rehabilitation for hard-of-hearing and deaf persons by taking into account some of the reasons behind the limited use of this technology. Several overseas studies have identified factors that account for this and relate to both the hearing-impaired population and the HHCPs.

The inadequate uptake of assistive technology (ALDs and TADs) by the hearing-impaired, include, a lack of knowledge and a lack of hands-on experience by the hearing-impaired population themselves (Alpiner and McCarthy, 1993; Jackson, 1997; Leder, Spitzer, Richardson et al., 1988; Mahon, 1985; Radcliffe, 1994; Ross, 1996, 1997, 2001; Spitzer, 1997, 2000; Warner-Czyz, 2000; Weinstein, 1996); the cost of the technology; psychological factors such as acceptance of the hearing loss as well as acceptance of using additional devices to their personal amplification; and age of the hearing-impaired user.

Similarly, in a survey, adult cochlear implant recipients were asked to complete the sentence, "I would have more assistive listening, visual support and alerting systems if.....". Responses given were if: they needed them; they could afford them; there were home-trials available; they were given information and personal demonstrations; and the devices provided improved speech clarity (Schum & Tye-Murray, 1995).

The age of the user also affects the use of ALDs. The elderly population are less familiar with technology than the young generation. They are less proficient in being able to handle high-tech equipment and are more likely to reject assistive technology (Bloom, 1996). The need for low-tech alternatives and education, therefore, is appropriate for the elderly population and should be considered during the rehabilitation process.

Hearing-impaired persons feel uncomfortable using technology that pays attention to their hearing loss without any form of psychological support such as a hearing-impaired support group. This may be because of the physical size of many of the devices, which are much larger than hearing aids themselves. Because of this, they become more visible symbols of hearing loss, which many people with hearing loss try to hide. Since the majority of hearing aids advertised are small, completely-in-the-canal (CIC) aids, the message that smaller is better has been conveyed. This sets up expectations in hearing-impaired people or the public for small devices or technology. It may result in them resisting the uptake of bigger but more effective TADs later in the rehabilitative process.

"Hearing-impaired patients may not realise that there are solutions to their problems, and therefore many not bring them up" (Madell, 1994, p.743). The reason for this seems to be that HHCPs are still not aware of the devices and so do not include them during discussions and in rehabilitation sessions with the client (Alpiner & McCarthy, 1993). Many persons with a hearing loss are hesitant to admit that they want more information about ALDs and the

audiologist does not always realise that the person needs this information. This may be due to the limited case history information taken during the initial consultation as well as a lack of regular questioning by the HHCP during the management of the client. This, therefore, highlights the importance of detailed questioning by audiologists in determining difficult areas of communication.

Studies have shown that the limited knowledge of assistive technology by the HHCPs is a critical factor in their limited use by the hearing-impaired (Crandell & Smaldino, 2002). Technical and theoretical knowledge in the dispensing of ALDs is not covered during academic training and only in a limited form in HHCPs' practical experience (Compton, 1994). Other factors include lack of available time to include and sell these in the rehabilitation process (Mahon, 1985); too much time spent on the fitting of hearing aids resulting in insufficient time to counsel and fit assistive technology (Crandell & Smaldino, 2002; Morris, 1998); cost of the devices to the HHCPs (Leavitt, 1989); a lack of capital to purchase and stock additional devices other than hearing aids (Mahon, 1985); the lack of profitability derived from these devices (Killingsworth, 1989); the need for on-going technical training (Morris, 1998), resulting in limited recommendations and fittings of these devices. Compton (in Bloom, 1996, p.13) sums up the most common concern felt amongst dispensers: "too much time for too little profit." So for many dispensers of hearing aids, the provision of assistive technology might mean more work for less money. However, the cheaper cost of some ALDs can be advantageous to an audiological practice. A hearing-impaired person, who is hesitant to purchase a hearing aid because of the cost, may be willing to consider a lower-priced device that would be able to offer some help. This is particularly relevant in the South African context given the income of most of the citizens of this country[3].

A survey of various dimensions of hearing aid dispensing practices was conducted (Malinoff, Kisiel, Kisiel & Dygert, 1990 in Ross, 1997). Various facilities and individuals were asked to rank the factors they felt were most significant in providing improved services to their hearing-impaired clients. Audiological rehabilitation and assistive devices were ranked last. It was also found that only a tiny percentage of their income was obtained from assistive technology.

[3] Hearing-impaired persons in South Africa who cannot afford private hearing health care are only treated at tertiary health care institutions. There, they may be fitted with donated (second hand) hearing aids or if allegeable, be fitted with a state subsidised analogue hearing aid. Audiological rehabilitation in South Africa is not offered at primary or secondary health care institutions.

Therefore, it was assumed from the results that services that were not income producing were often ignored or found to be unimportant.

Although TADs have been developed and are readily available overseas, due to the slow growth in telecommunication technology in South African, many of the TADs are not as yet available to the majority of hearing-impaired persons here. Factors which have contributed to this include those discussed above as well as those specific to the South African context. These include: economics; limited social provision; limited services by the telecommunication-service provider (Telkom); limited knowledge of available TADs by the hearing-impaired population (Hoch & Glaser, 2001, 2002); and limited service provision by HHCPs (Reid, unpublished; Hoch & Glaser, 2002.) According to the White Paper on Integrated National Disability Strategy (1997), participation in society as equal citizens requires that people with disabilities must have access to appropriate and affordable assistive (listening) devices.

The South African Telecommunication Act 103 of 1996 (amended in 2001), which governs the telecommunications industry in South Africa, details its primary objectives. These include the promotion of Universal Service, defined as "all households in a country having a telephone, so that all individuals can make a telephone call from home" (p.2). Other objectives include services such as fax/modem capacity, operator services, call-line identification, emergency services, itemised billing, call forwarding, voice mail and telecommunication services that are affordable. This also includes advocacy to heighten awareness of telecommunications; the promotion of innovation and the development of telecommunication services which are responsive to the needs of users and consumers; and ensuring that the needs of the disabled (including deaf and hearing-impaired persons) are taken into account in the provision of telecommunication services. A second objective is Universal Access, defined as "all individuals having reasonable access to a telephone that they can use" (p.2). This includes accessibility, usability and affordability of services for disabled people. (Discussion paper, 1996). Despite policy statements on Universal Service and Access in South Africa, there are only 4.1 million landline telephones installed in South African homes (Telkom Annual Report, 2001). These figures do not reflect adequate service provision or access to the total population.

These definitions are not law, but a process to define these issues is in progress. The Universal Service Agency (USA), a statutory body established by the 1996 Telecommunications Act, as amended, is in the process of developing such recommendations for the Ministry and the Regulator. The Regulator, or the Independent Communications Authority of South Africa

(ICASA), is responsible for the drafting of all regulations for the telecommunications and broadcasting industries. All incumbent licensees in South Africa (Telkom, Vodacom, MTN and Cell C) are required to ensure that their handsets cater for the needs of the disabled including hearing. They are required to comply in the following with respect to hearing. All handsets are supposed to be able to be used in conjunction with a hearing aid. This, however, is not yet the case as standard telephone handsets and cellular telephones are not equipped with inductive couplers.

In a South African study, the knowledge base of HHCPs with regards to all ALDs, including TADs was investigated (Reid, unpublished). Results indicate that clients do enquire about products, but to a limited extent. In order for successful use of assistive devices, the primary incentive should come from hearing-impaired persons themselves. Thus, the hearing-impaired population, whether children, adults or the elderly, must be informed by the HHCP about available ALDs and their advantages and limitations, so that they can themselves become motivated to investigate and use these devices. Reid (unpublished) found that although some HHCPs had knowledge of ALDs, many reported that they had little knowledge of ALDs and could not inform their clients. In addition, Ross (1997) states that having knowledge does not necessarily imply that they use this knowledge in practice. It appears that HHCPs still cannot show the value of ALDs to their clients. In contrast, Morris (1998) states that they do not have to be knowledgeable about ALDs in order to suggest or fit new technologies. Reid (unpublished) found that less than half the respondents were capable of demonstrating the use of ALDs and of providing price quotations, while the rest were unsure.

Many clients may perceive the use of ALDs as off-the-shelf items and prefer to purchase them through catalogues rather than to visit a HHCP who would not only expect to make a profit from the product, but also charge for the service of education and counselling (Bloom, 1996). From Reid's (unpublished) study, less than ten per cent of ALDs are ordered from overseas. Some ALD parts are imported from overseas and this makes their price unaffordable for South Africans.

Ross (1997, p. 103) reports that "the central issues now are not that hearing-assistance technology does not exist, but that too many audiologists are not significantly informed about the full range of available devices nor how to economically dispense them to clients within our current service delivery practices." Results from Reid (unpublished) demonstrate that nearly all the respondents were interested in further training in the use of ALDs, needed more information

regarding the available range of ALDs, would profit from articles in professional journals regarding the most recent developments in the area of ALDs and finally, would be interested in attending seminars/workshops on ALDs. In addition, they were willing to participate in a community-based programme aimed at the introduction of ALDs to the community, as well as in the consultation and provision of the devices (Reid, unpublished).

HHCPs are responsible for recommending and correctly fitting these devices in order to maximise the communication skills of those with hearing loss, in all communication settings (Health Professions Council of South Africa, 2000). In addition, they must ensure the successful use of this technology through continuous assessment and counselling. The assessment should include details such as the person's hearing level, speech recognition in quiet and in noise; their lifestyle; their social and occupational demands; their motivation to use hearing aids and/or ALDs; the individual's, as well as their significant others', acceptance of the ALDs (Lightfoot & Vaughn, 1997; Tye-Murray, 1998); and the availability of the device. Other factors include the effectiveness of the technology, affordability, operability, reliability, portability, versatility, mobility, durability, compatibility, cosmetic appeal, previous experience, the need for non-auditory telecommunication systems, the need for alerting devices, and cultural issues. Assessment of these factors should be done prior to the selection and fitting of personal hearing aids in order to correctly order the appropriate type of circuitry. According to Morris (1998), "a hearing aid that can't interface with ALDs or telephones is only half a hearing aid" (p.62).

According to Tye-Murray (1998), a general rule that can be used by HHCPs is that the more severe the hearing loss, the bigger the attraction and requirement for ALDs. The telephonic ability of 200 hearing-impaired people with moderate and severe hearing losses was assessed (Stoker, 1981 in Homes & Frank, 1984). Results showed that no one method of telephone listening was preferable. The researcher then advocated the need to assess each individual's listening ability to achieve the best results. Certain variables must also be taken into consideration during the assessment and recommendation of TADs. HHCPs should serve as the key resource in providing information to clients about ALDs, since they are the logical first point of contact. If this does not occur, not only may many hearing-impaired clients be deprived of successful communication, but they may also react with anger and/or irritation towards these professionals.

Hearing aids do not solve all hearing-impaired persons' communication problems even with advances in technology. According to Compton (in Bloom, 1998, p.17): "Today's ALD

technology is less about products performing new tasks and more about products performing tasks better. ALDs are less bulky, easier to use and more versatile than their predecessors; they provide clearer speech discrimination than ever before and they offer compatibility features that respond to a technology-driven lifestyle." Despite this boom in technology, many HHCPs, both locally and abroad, are unaware of available devices and how to provide them for their clients in the most economical fashion. Similarly, most hearing-impaired individuals themselves are aware of the use of hearing aids for hearing losses, but are unaware of available assistive technology. If no recommendations are made for this technology, they will most often leave the appointment and the service without ever being told about other possible solutions (Ross, 1997). The role of dispensers should not be to sell hearing instruments, but to restore human communication and social involvement (Whelan, 2001).

In summary, South African research (Hoch & Glaser, 2001,2002; Reid, 1999) shows that many hearing-impaired persons in this country report difficulties communicating on the telephone, despite the use of personal amplification. Although the technology to assist them in improving their telephonic communication is currently available in the form of TADs, the uptake has been limited. Several factors have been identified, of which two are most pertinent: hearing-impaired persons are not aware of the available technology; and the HHCPs, who are responsible for the recommendation and provision of this service, lack the knowledge themselves. Too much emphasis has been placed on the fitting of hearing aids, while the benefits of using assistive technology has been given little attention. HHCPs should be viewing TADs as an integral part of the rehabilitative plan for their clients, along with hearing aids, but not as "add-ons" to hearing aids (Crandell & Smaldino, 2002). Results from a South African study addressing the knowledge base of audiologists found that: they do not have a full knowledge of ALDs; and they are unable to demonstrate the use of, and obtain information of prices for this technology to their clients. However, they were interested in improving their knowledge via training, workshops and printed material.

In the light of these findings, the current study addresses the lack of knowledge of both the hearing-impaired population and the HHCPs. According to Sutherland (1995), increasing consumer acceptance of this technology can be achieved through education (including their strengths and limitations) and training in the use of these devices. This will be achieved by investigating and collecting the TADs available in South Africa and providing a sample of hearing-impaired persons with hands-on experience in using the devices. The HHCPs themselves will be provided with information through training. This will include the information

and evaluation of the TADs by the hearing-impaired subject group. In addition, written information in the form of a brochure will be supplied to all participating HHCPs. This will allow them to be better informed and equipped to provide a more comprehensive audiological service to their hearing-impaired clientele. This will be done in order to encourage the use of TADs in South Africa.

2. METHODOLOGY

2.1. AIMS OF THE STUDY

The aims of the study were:

2.1.1 To investigate the availability of TADs in South Africa;

2.1.2 To provide hearing-impaired persons with information regarding TADs and hands-on experience with the devices and systems;

2.1.3 To evaluate the usefulness of TADs to the hearing-impaired clients;

2.1.4 To develop TAD-candidacy guidelines for hearing-impaired persons to be used by the HHCP;

2.1.5 To inform and train HHCPs in the use of available TADs for hearing-impaired persons;

2.1.6 To evaluate the usefulness of the information and training on TADs for the HHCPs.

2.1.7 To design an information brochure for both the HHCP as well as the hearing-impaired population regarding: the availability; advantages and limitations; use; TAD-candidacy guidelines; and TAD selection criteria;

2.1.8 To disseminate this information to the participating HHCPs, to professional organisations and to training institutions.

2.2. SUBJECTS

The sample in this study consisted of two groups: 1) 36 hearing-impaired adults with varying degrees of hearing loss; and 2) 28 HHCPs. Fifty potential hearing-impaired subjects were identified. Of those, four did not have difficulty communicating over the telephone and 10 reported that it was not convenient for them at this time due to various reasons including illness, house renovations and overseas holidays. Forty-two HHCPs in Cape Town and 30 in Johannesburg were identified. Of those, 36 did not reply to the invitation and 15 could not attend the training due to prior commitments and overbooked schedules.

2.3. SUBJECT SELECTION CRITERIA

Two distinct groups of informants participated in the study and all subjects complied with the following subject criteria:

The Hearing-Impaired Subject Group

2.3.1. Age

Subjects were between 26 and 78 years of age. This wide age range was selected in order to have a representative sample of hearing-impaired persons in the workplace and to take into consideration that the major aetiology for deafened adults relates to ageing - presbycusis (Bess and Humes, 1995), amongst other acquired aetiologies. Age was not felt to be a restriction for TAD use.

2.3.2 Age of Onset

All subjects had post-lingual hearing losses. No limit was set on the exact age of onset of hearing loss, but all had acquired full development of language and oral skills prior to onset. Thus, the subjects were all hearing people who have lost their hearing.

2.3.3 Oral Communication

All subjects had to use speech as a primary means of communication. This ensures the potential and the need to use the standard telephone.

2.3.4 Gender

No restrictions were placed on the gender of the subjects, as both males and females experience hearing loss and may require telecommunication devices in their home and/or workplace.

2.3.5 Employment

Subjects could either be currently employed, retired or recently unemployed due to the effect of the hearing loss on their communication ability. These options allowed the researcher to view the need and use of telecommunication devices among working subjects, as well as the current necessity and use of these devices among retired subjects in their homes. Unemployed subjects who had left work because of their hearing loss were included in the study, as the use of TADs would improve their telephone communication and thus, assist them in gaining employment.

2.3.6 Language and Literacy Skills

Subjects will be either English or Afrikaans speaking. These are the two languages spoken by the researcher. In addition, the questionnaire is only available in English and Afrikaans. Limiting interviews to these languages prevents the use of an interpreter, which is beyond the scope of this study.

2.3.7 Type, Degree and Laterality of Hearing Loss

Subjects had to present with an acquired, bilateral, sensori-neural hearing impairment. The degree of hearing loss in either ear will not be specified. Difficulty[1] in using a standard telephone, with any degree of hearing loss, is the critical factor for selection.

2.3.8 Residential Area

Subjects will be located in the Western Cape, but no restrictions will be placed on the specific area in which a subject lives. However, by accessing subjects who attend private HHCPs and who subscribe to medical-aid schemes, the subjects in effect would fall into the middle class socio-economic status (SES).

The Hearing Health Care Professional (HHCP) Group

2.3.9 Qualification

All subjects had to be qualified as either an Audiologist or a Hearing Aid Acoustician. These are the HHCPs that hearing-impaired persons are most likely to approach with their telephone communication difficulties and who are best suited to provide comprehensive rehabilitation to persons with hearing impairments.

2.3.10 Registration with the Health Professions Council of South Africa (HPCSA)

All subjects had to be registered with the Health Professions Council of South Africa (HPCSA) to ensure that their level of education and training has been determined and that they are competent, according to the professional board, to execute their scope of practice.

2.3.11 Clinical Experience

Subjects had to have a minimum of one year's post qualification clinical experience. This allows the HHCP to have experienced working with hearing-impaired persons in a clinical setting, to understand the difficulties experienced by hearing-impaired clients.

2.3.12 Workplace Location

Subjects had to be working in the Western Cape or Gauteng regions of South Africa, as these were the two geographical areas in which the training took place.

[1] This term will be used to indicate a range of difficulty from complete inability to marked difficulty in initiating and maintaining a telephone conversation

2.4. ETHICAL ISSUES

2.4.1 Informed Consent

Written consent was obtained from each hearing-impaired subject (see Appendix 1(a) and 1(b) and HHCP practitioner (see Appendix 1(c) and 1(d)), prior to the interview and training package respectively.

2.4.2 Storage of Materials

The materials, including audiotapes and response sheets, were locked away when not in use by the researcher. The audiotapes were destroyed at the end of the research process.

2.4.3 Risks to the Trial Subjects

The risks to the trial subjects, both HHCPs and hearing-impaired clients, were to be negligible or non-existent.

2.4.4 Confidentiality and Anonymity

It was clearly stated in the consent form that all information received and used would remain confidential and that anonymity would be guaranteed throughout the study. In addition, all personal biographical information about the subjects would not be quoted in the dissertation.

2.5. MATERIALS AND EQUIPMENT

2.5.1 Materials

The data was obtained using two questionnaires (one for the hearing-impaired subjects and another for the HHCP).

The questionnaire for the hearing-impaired subjects (from here known as QHI, see Appendix 2) is a combination of available published questionnaires as well as materials developed by the current researcher. Internationally published questionnaires used included:

1) Hearing Handicap Scale (High, Fairbanks & Glorig, 1964)
2) Profile questionnaire for rating communicative performance in a home and social environment (Sanders, 1975)
3) Component Scale for Assessing Use of Telecommunication Devices and Feelings about Telecommunication (Spitzer, Leder & Giolas, 1993).
4) The Hearing Handicap Inventory for the elderly (HHIE) (Ventry & Weinstein, 1982).

5) Communication Needs Questionnaire (Compton, Lewis, Palmer & Thelen, 1994).

Locally developed questionnaires include:

1) Remote Telecommunication for Deaf and Deafened People in the Western Cape, South Africa (Hoch, 2000).
2) Questionnaire on Assistive Listening Devices (Reid, unpublished).

Questions relating to the hearing-impaired persons use of and feelings towards telephone communication were used. Questions were also added or adapted from other questionnaires in order to make the questionnaire relevant to the South African population and situation. The questionnaire was divided into six categories: (1) biographical details; (2) use of the telephone; (3) satisfaction with telephone use without telecommunication devices; (4) use of telecommunication devices; (5) satisfaction of telephone use with telecommunication devices; and (6) satisfaction with current service delivery for hearing impairment. The questionnaire was translated into Afrikaans (see Appendix 3) by the current researcher to get a more representative sample from the Western Cape. The questionnaire for the HHCP (from here known as QHHCP see Appendix 4), consisted of items drawn from a locally available unpublished questionnaire (Reid, unpublished) as well as items developed by the current researcher.

2.5.2. Equipment

After an extensive survey, the following TADs were found to be available in South Africa and were used in the study:

1) T80 Telephone Amplifier (Logia)
2) Auriald, TE 2002 (Teknimed)
3) Portable telephone amplifier, TE 2001 (Teknimed)
4) AT&T portable telephone amplifier (HASS)
5) Phone Amp (Telkom)
6) Telephone ringer with flasher (Telkom)
7) Hear-a-phone (HASS)
8) CLARITY Telephone (HASS)
9) CLARITY portable high-frequency amplifier (HASS)
10) Nokia inductive loopset LPS-1
11) Ericsson T-Hook
12) Teldem text telephone (Telkom)

Auriald, TE 2002 (Teknimed)

Phone Amp (Telkom)

CLARITY Telephone (HASS)

Teldem text telephone (Telkom)

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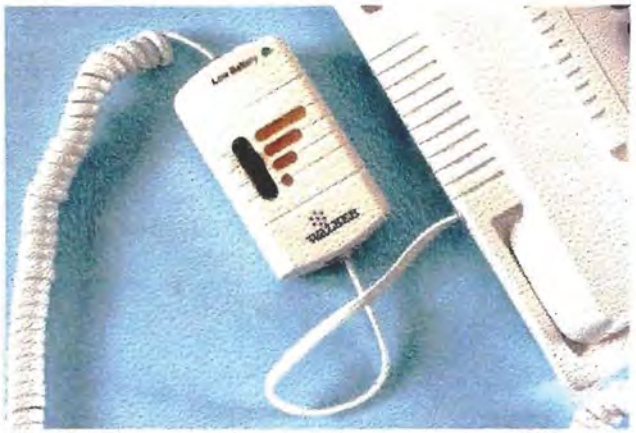
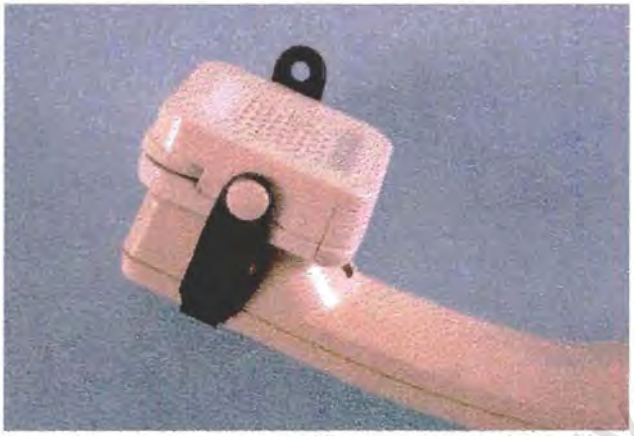
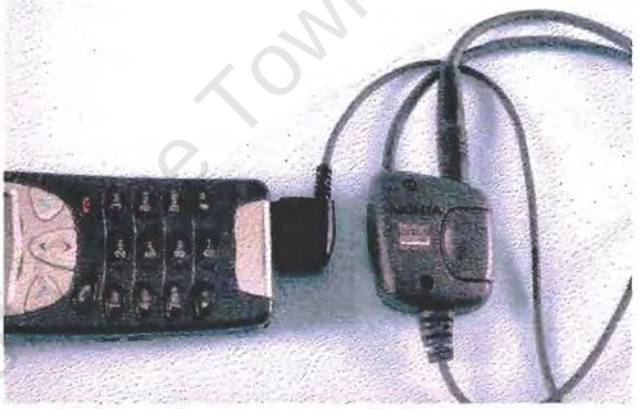


CLARITY portable high-frequency amplifier (HASS)

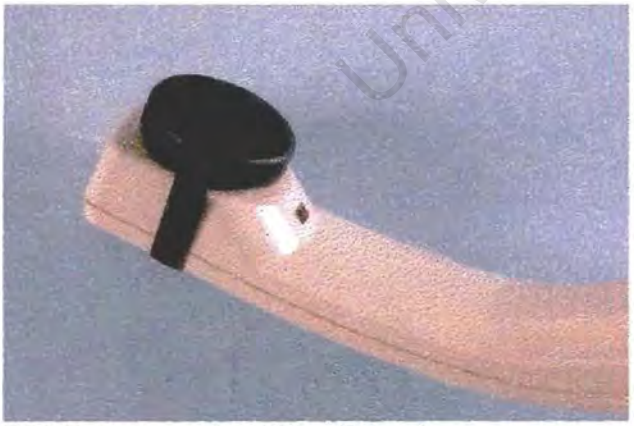
Telephone ringer with flasher (Telkom)



Portable telephone amplifier, TE 2001 (Teknimed)



Nokia inductive loopset LPS-1



T80 Telephone Amplifier (Logia)

Ericsson T-Hook

Interviews were recorded using a Sony TCM-939 audiocassette recorder.

2.6. PROCEDURE

2.6.1 Research Design

An action research methodology was chosen for this study as it encompasses the aims of both action and research simultaneously. In other words, action in order to bring about change, for example in a particular community, and research to increase the understanding of both the researcher or the clients (subjects), or both (Dick, 1993, 1997). There are some forms of action research whereby the main emphasis is on action, with research as a fringe benefit, while others where research forms the primary focus and action is then just a consequence. For the purpose of this study, the predominant emphasis was on "action" (through the "hands-on" experience of TADs by the hearing-impaired and the training package by the researcher for the HHCPs). "Research" in this study consisted of the evaluations of the TADs by the hearing-impaired subjects and the evaluation of the training by the HHCP through the use of post-training questionnaires. The results of the "action" was increased understanding on the part of the subjects (increased knowledge of available TADs by the hearing-impaired and the HHCPs). This form of action research allowed for change and learning to occur as outcomes for those who participated.

Action research occurs by using a cycle or spiral process which interchanges between action and critical reflection, and in later cycles, allows for refinement of methods, data and interpretation from understanding achieved in the earlier cycles (Dick, 1993, 1997). Each cycle consists of at least four primary elements: the first stage is planning or intention, followed by action, observation and finally reflection or critique. Action research thus offers the flexibility and responsiveness that are required for effective change, and it also provides a check on the adequacy of the data collected as well as on the conclusions made (Dick, 1997). Other requirements or elements of action research are that it is primarily qualitative, as it allows for an increase in responsiveness to the situation. Another requirement is that such research involves participation and can then create better commitment and thus action. In conclusion, action research can be summed up as the study of a social situation, that involves the participants themselves acting as researchers, with the aim of improving the quality of action within it.

For this study, three main components formed three action-research cycles. Firstly, after collecting the TADs and designing the QHI (planning), information was collected from the hearing-impaired subjects after their hands-on experiences with the TADs (action). Responses from the hearing-impaired subjects and their evaluations of the TADs were observed, analysed and reflected upon (Cycle 1). This information was then used to develop the training for the HHCPs (planning). The training was executed (action) and responses were observed, analysed and reflected upon (Cycle 2). Evaluations about the training from the HHCPs (Cycle two) as well as information from the first Cycle, were used for Cycle 3, of which the first two elements were carried out: designing the information brochure (planning) and disseminating it to the participating HHCPs, to the professional organisations and to training institutions (action).

2.6.2 Data Collection

The data collected in this research project consists of two main components, namely:

1. responses to a questionnaire by the hearing-impaired subjects (QHI); and
2. responses to the post-training questionnaire by the HHCPs (QHHCP).

2.6.3 Procedure: The Hearing-Impaired Subject Group

A list of the TADs available in South Africa was collated and collected from the respective suppliers and manufacturers. Private audiological practices in the Western Cape were approached. All potential subjects were then contacted telephonically and asked whether they would participate in the study. If subjects themselves were unable to communicate telephonically, an intermediary was contacted. After obtaining their permission, the researcher met with each of the subjects alone or with a family member or caregiver. The subjects were provided with a consent form to complete. They were then interviewed in their home language using the QHI. Each hearing-impaired subject was given hands-on experience with a range of TADs judged appropriate for that person by the researcher, taking the person's hearing, type of hearing aid(s)[2] and present or previous ownership of a specific TAD brought by the researcher[3] into consideration. The TADs were taken to the person's home or office in order to create a more realistic set-up, since many hearing-impaired persons are familiar and more comfortable with the use of their own telephones. The clients were able to experience as many of the available TADs

[2] Hearing aid users without the telecoil component could be shown but not given hands-on experience with hearing aid compatible TADs (equipped with built-in telecoil).
[3] Subjects who had owned and used as well as those who currently use any of the tested TADs were not given hands-on experiences with those particular devices (although they were questioned about their use in QHI).

as may be useful and no time limit was set on the sessions. After each telephone call, the hearing-impaired subjects were asked to describe their experience with the particular device(s).

The interviews ranged from 40 minutes to two and a half hours. After all the interviews had been completed, they were transcribed verbatim. The data was organised onto a response sheet (see Appendix 5), and analysed both quantitatively and qualitatively. Qualitative results from the hearing-impaired subject group were used to develop the training package for the HHCP and formed the basis for the training.

2.6.4. Procedure: The HHCP subject group

The names of HHCPs were obtained from the South African Speech, Language and Hearing Association (SASLHA) and from the Audiologists in Action (AIA) organisation. Each HHCP was contacted either telephonically, via e-mail or by fax, and was sent an invitation to attend the training. The training was provided for the HHCPs both in Gauteng and the Western Cape. The training included information regarding: the range of TADs available in South Africa; candidacy issues; how to use the TADs; and how to evaluate their clients' use of the TADs (see Appendix 6). In addition, the training included practical experience with the devices/systems and allowed the HHCPs to experiment with and experience the range of TADs available. An audio-visual presentation was used. Each training session lasted approximately one and a half hours. Post-training questionnaires (QHHCP) were issued to all HHCPs via e-mail or by post, three and a half weeks after the training. The questionnaire had three primary aims: to determine whether the training was helpful in increasing the knowledge of the HHCP with regards to TADs, whether it was helpful in improving audiological rehabilitation for the hearing-impaired as well as to determine whether it is necessary to include additional information in further training. All responses from QHHCP were transposed onto a response sheet (see Appendix 7) for quantitative and qualitative analysis. Finally, an in-depth brochure for both the hearing-impaired users as well as for the HHCPs was designed, based on the information and results obtained from the two questionnaires described.

2.7. ANALYSIS

All data collected from the interviews with the hearing-impaired subjects, the hearing-impaired subjects' evaluation of the TADs and the post-training questionnaire (QHHCP) was interpreted and organised through a coding process. Coding, according to Corbin & Strauss (1998), consists of conceptualising and reducing the data, elaborating categories and relating through several

prepositional statements. Responses from the open-ended and closed-ended questions were analysed, concepts were identified and categorised into themes for analysis. Patterns and relationships in and amongst the categories were identified, scrutinised and data contradicting general trends in the findings were analysed and reported. Patterns were identified both within the hearing-impaired subject group and the HHCP subject group. This allowed the researcher to identify similarities and contradictions reported in the findings by both subject groups. Quantitative analysis of data (including rating scales and pre- and post-training questions) from both the hearing-impaired subject group and the HHCP group was performed. Likert Scale questions were used (Babbie, 1998; Strauss & Corbin, 1998) because they allow the researcher to find out the relative intensity of different items in the questionnaire, i.e. to calculate the average index score for each question (Babbie, 1998). Statistical tests used to analyse quantitative responses from these scales included the Chi-Square test and the one-tail t test. The Chi-squared test of analysis was used in order to compare samples of observations in terms of the similarity with which the observations are distributed among several discrete and mutually exclusive categories. One-tail t tests were used to allow the researcher to determine whether there were any differences in observations between the two subject groups (Group 1 & 2).

2.8. PILOT STUDY

Prior to the main study, a pilot study was conducted using the interview questionnaire on a hearing-impaired subject and a HHCP, who met the selection criteria. This was carried out in order to ensure that the questions and their intended meanings were clear, appropriate and effective in eliciting the desired information. The interview for the hearing-impaired subject was conducted in a quiet setting and followed the design of the interview questionnaire. All responses were recorded with the subject's consent. After the interview, all responses were transcribed verbatim. The QHHCP was sent before the training via e-mail to the chosen HHCP for completion. The data was transposed onto a response sheet.

The transcribed responses from the hearing-impaired pilot study revealed that the interview questions were effective in eliciting the desired information. However, it became apparent that many important ideas and issues came up before, during and after the interview, that were not directly addressed in the questionnaire. Consequently, an open-ended question in which the subject could add any additional information was necessary. Also, probe questions used by the researcher during the interview elicited very important information. Probe questions were then added to the questionnaire. The responses to the questionnaire and the probe and open-ended

questions were all transcribed verbatim and all three were used for qualitative analysis. The format of the questionnaire did not require any changes and the questions used were well structured and sequenced.

The transposed responses from the HHCP revealed that the questionnaire was also effective in eliciting the desired information. Similar to the hearing-impaired pilot study, it was necessary to include additional space at the end of the questionnaire for further comments, queries and questions. This allowed the HHCP to voice opinions and include extra information if necessary. The format of the questionnaire did not require any changes and the questions used were well structured and sequenced.

3. RESULTS AND DISCUSSION:THE HEARING-IMPAIRED (HI) SUBJECT GROUP

The subjects in the study consisted of 22 male and 14 female hearing-impaired persons with hearing losses ranging from moderately severe to profound, and aged between 26 and 78 years. Twenty-six were hearing aid users, eight were cochlear implantees and two subjects were currently awaiting amplification (hearing aids). The subjects' residential areas were spread fairly evenly across the Cape Peninsula. Thirty-five subjects had completed 12 years of education, one had completed Standard 8 and 31 subjects had post-school qualifications. Half the subjects were employed, 15 were retired and three were currently unemployed due to the effect of the hearing loss on their communication ability.

It was assumed by the researcher that hearing aid users, cochlear implantees and those awaiting amplification (hearing aids) would render different results from each other on the basis of the severity of their hearing loss, and the presence and type of personal amplification. After the data from the questionnaires and interviews were analysed by category and grouped for topics and themes, it was apparent that for the most part, there were no perceived or statistically significant differences in results based on the presence and type of personal amplification used. In addition, the two subjects awaiting amplification tended to echo the responses of hearing aid users, and so were placed in that group during the analysis. Hence, the results below are reported for the subject group as a whole (n=36), unless otherwise stated. Where there were differences in the results, these are reported specifically as Group 1 (hearing aid users and those awaiting amplification, n=28) and Group 2 (cochlear implantees, n=8).

3.1. Biographical Information

The subjects' audiograms were obtained from their HHCP. The degree of the hearing losses was classified into three categories (moderately-severe, severe and profound hearing loss) based on their pure tone averages (PTAs) (Silman & Silverman, 1991) (see Figure 1.). The PTAs used were calculated using three frequencies (500Hz, 1000Hz and 2000Hz) or two (500Hz and 1000Hz) frequencies when a severely sloping hearing loss was present (Gustav Mueller & Hall, 1998). The figure illustrates that there was an even spread across the categories. Although it is useful to categorise a hearing loss based on the degree, it does not indicate the configuration of

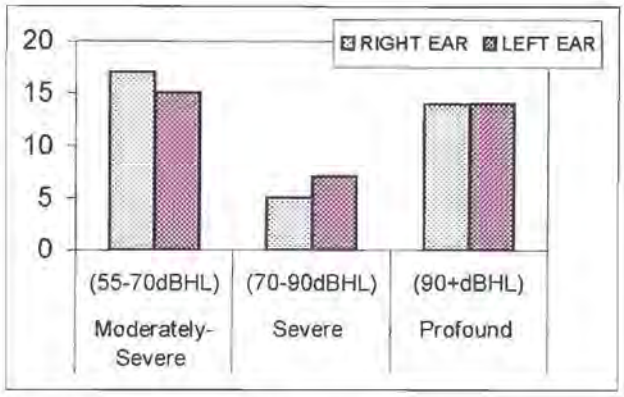
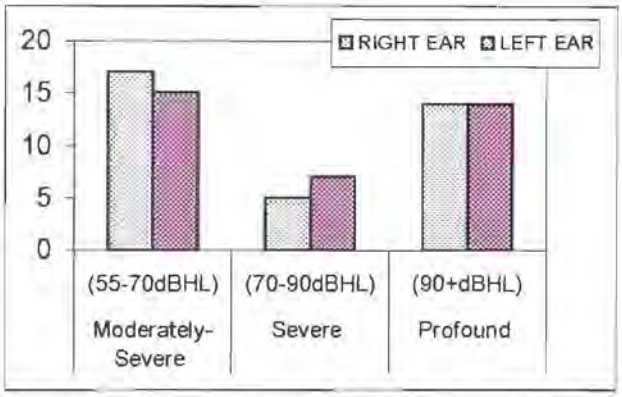


Figure 1. Degree of hearing loss.

the loss, which often determines the person's ability to discriminate speech. In addition, it is also a crucial factor in the subjects' ability to use the telephone. The majority of the hearing aid users had high frequency sloping losses. In order to be implanted, the subject had to have a profound or a severe-to-profound sensorineural hearing loss bilaterally (Gustav Mueller & Hall, 1998). This selection criterion is also used in the Tygerberg Hospital Cochlear Implant Programme from where the names of these subjects were obtained. The subjects' degree and configuration of hearing loss and their use of TADs are compared later in this section.

Half of the subjects who wore hearing aids were BTE users while the other half wore ITEs. Only half of the hearing aids had built-in t-switches and only one of the cochlear implant subjects had a telecoil. Cochlear implants with built-in telecoil are new in South Africa and thus very few implantees have been fitted with these as yet. All subjects using personal amplification struggled to use the landline and cellular telephone irrespective of the number of years they had used the amplification. This reinforces the current contention in the literature that personal amplification cannot solve all communication difficulties experienced by hearing-impaired persons (Bloom, 1996; Compton, 2000; Crandell & Smaldino, 2002; Hoch & Glaser, 2001, 2002; Loovis, Schall & Teter, 1997; Morris, 1998; Ross, 1997, 2001; Smaldino & Hull, 1997; Trychin, 1994; Tye-Murray, 1998; Warner-Czyz, 2000; Wilcox, 2002).

Only six subjects reported living alone. For those subjects living with family, all the family members had normal hearing, except for one. This then indicates that although these subjects are hearing-impaired, they live in the hearing world. Living arrangements are explored to ascertain whether using a TAD would affect other family members who might be hearing. One subject, who was interested in a TAD that would amplify the telephone ring, said that "*It would be nice to make the ring louder, but I don't know how it would affect my wife*". Hence, when selecting



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TAD(s), one should take into account the hearing status of those living with the hearing-impaired person.

Over 90% of the subjects researched had received tertiary education. Half of the subjects were currently employed and fifteen were retired. Three subjects were currently unemployed due to the communication difficulties experienced as a result of their hearing loss, specifically on the telephone. In addition, the subjects in the study belonged to the middle-class socio-economic status (based on the fact that they were attending private practitioners) and thus could access money for funds to purchase TADs. Hence, this small subject group are not representative of the hearing-impaired population in South Africa as a whole, taking into account the country's high levels of illiteracy and unemployment. However, it is representative of the client group who tend to be educated, employed or retired, have access to funds and who are served by private practitioners.

Two of the three subjects who were currently unemployed described how their difficulty communicating on the telephone had been a significant factor in their decision to resign from their positions. One, a plans examiner said that "*When I was at work, a lot of the telephone was guesswork. People would phone with a plan or an erf number and I would never get the plan number right. It became worse and worse; I mean I'm not going to give everybody that phones my long hearing history.*" Although 15 subjects were retired, many reported that they were still active in their community or were assisting friends and family members in their businesses. Hence, the subjects' employment status did not relate to telephone use. HHCPs should be assessing every client complaining of difficulties on the telephone irrespective of their employment status.

Group 1 (hearing aid users and those awaiting amplification) was asked what they remembered and/or understood about the information provided on the t-switch. Only a third of them reported that they were provided with information about the t-switch for use in conjunction with both the landline and cellular telephone. In other cases, subjects were told that it could be used in places that were wired, for example, theatres and cinemas. Others were told to ignore the t-switch (if the hearing aid came equipped with a telecoil) or were not, according to the subjects, counselled on the ability and advantages of installing a telecoil into the hearing aid. This could relate to the HHCPs' lack of understanding of the telecoil functioning or the availability of telecoil facilities. This reinforces the need for training and information by the hearing aid manufacturers on the functioning of the telecoil circuitry.

Many of those subjects who had hearing aids already fitted with a telecoil and those subjects who reported that they did not receive recommendations to include the telecoil component, did not know what the use of the t-switch did or how it could be used for the telephone. Some chose to disconnect or remove it from the hearing aid since it was often confused with other switches. Hearing aid users reported that if information about TADs was provided, it was often given after the hearing aid fitting and during the hearing aid follow up. This, therefore, did not allow the subject to decide whether it would be beneficial to include a t-switch in the hearing aid, since the aid (especially an ITE) has already been manufactured according to the specifications of the HHCP. Adding a t-switch would require additional cost and time, which could be saved if done at the time of manufacture. Many subjects reported annoyance that they were not counselled on the availability of the t-switch in their hearing aids. This was relevant not only with their use of the telephone, but also other ALDs. These findings correlated with findings by Morris (1998) who reported that some clients become resentful when their HHCP did not include this component in their hearing aids and are now not able to use the telephone with their hearing aids.

Figure 2 indicates the type of rehabilitative services offered to the subjects. Only two cochlear implantees received telephone training. None (in Group 2) received any TADs, but they were all instructed and provided with the attachments that came with the implant. Only 11 of the subjects in Group 1 (n=28) were given any of the above mentioned services as opposed to six in Group 2

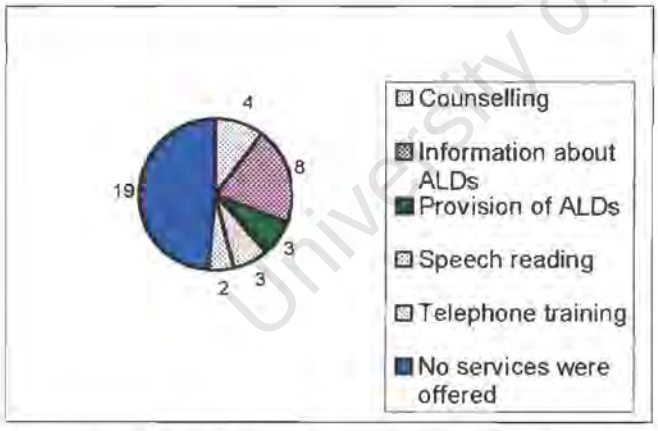

Figure 2. Rehabilitative services offered to the subjects.

(n=8). All but three of the subjects who were offered the above services, made use of them. This included counselling, speech reading and/or telephone training sessions or purchasing TADs. The lack of rehabilitative services to hearing aid users indicates the incomplete audiological management of the clients. It also reinforces the literature that HHCPs focus primarily on hearing aid fittings to the detriment of the hearing handicap caused by the hearing loss (Crandell

& Smaldino, 2002; Malinoff, Kisiel, Kisiel & Dygert, 1990 in Ross, 1997; Morris, 1998). Since telephone communication is one of the most common complaints amongst hearing-impaired persons, HHCPs should offer these rehabilitative services to all clients, whenever it is needed.

3.2. Use Of The Telephone

Only two of the 36 subjects did not have a landline telephone at home. This was because one recently moved into his home and did not have a telephone connection yet, whereas the other made use of her cellular telephone and did not need a landline telephone. Although these results confirm findings that post-lingually deafened adults are just as likely as the general population to own a telephone (Barnett & Franks, 1999), they may not hold true for the South African population as a whole, but do for this educated middle class subject group.

Of those subjects who owned landline telephones at home, 22 were using Telkom models, one cochlear implantee had adapted a Telkom telephone to use with his speech processor and 11 subjects were using telephones from various other manufacturers. These included portable and speakerphones. All subjects using telephones other than Telkom models reported having better telephonic communication than with Telkom telephones. This could be due to the perceived improvement in clarity provided by the telephone handsets. Portable phones were useful because the subjects could remove the telephone from a noisy area to a quieter part of the house. Some of the portable telephones also had a speaker-mode installed. One subject with bilateral, profound hearing loss would use the portable telephone on speaker mode held close to her ear. The volume was then sufficient for her to have adequate telephone communication, although the feature of privacy was lost. Portable telephones were also helpful for those who had difficulty hearing the telephone ring from the next room. These subjects, although having to carry the telephone around with them, were guaranteed to always hear the telephone ring. Speakerphones were also advantageous if the subjects were uncertain about the accuracy of the information received on the telephone; a spouse or family member could be used to confirm the information by listening to the conversation over the speaker. Using a speakerphone also allowed the users to achieve binaural listening (Kozma-Spytek, 2002a) as opposed to using the telephone receiver on one ear, usually their aided or better ear.

Many subjects reported that they preferred the old-style Telkom telephones (Protea telephones; Lorea telephones; and Erica telephones, see Appendix 8) to the new ones on the market, as they found the speech, as well as the quality of the line, clearer. This may be due to the change in the

telephone microphones from carbon granular microphones to linear electromagnetic ones. The new electromagnetic microphones provided optimum transmission levels and lower maintenance costs. However, these advantages were to the detriment of speech clarity achieved by the carbon microphone telephones. One disadvantage of the old-style telephones (whose cord could not be detached from the base and handset of the telephone) is that attachments, such as the 'Phone Amp', cannot be attached to the telephone receiver. HHCPs should identify the type of telephone used by their client in order to assess its compatibility with various TADs.

Of all the employed subjects (n=18), only one did not have a landline telephone at work. The majority of these subjects were using Telkom models and only two made use of telephones developed by other manufacturers. The general perception amongst employed subjects was that the telephone was a vital tool at work. This differed to the subjects' use of the telephone at home where they could chose to ignore it, limit their use or have a family member use it for them. The frequency of telephone use at work depended on the type of work the subjects did. Many of the subjects were employed in positions that relied on them doing business on the telephone. The subjects who reported that they never use the telephone described how they would circumvent their extreme difficulties by using alternative forms of communication such as facsimile, e-mail or by relaying the message via a colleague. A subject who reported that *"with all the background noise, strangers on the phone and the hundred and one people around me, I get so nervous and struggle so much, I don't bother anymore."* A cochlear implantee who has recently retired described how he was interested in doing some part time work, but *"you cannot go to an interview and say, sorry, I can't use the phone; you will have to use it for me."*

Across all the subjects, 8 subjects did not own cellular telephones. Here, the two groups differ in their use of the cellular telephone. The trend amongst subjects in Group 2 who owned cellular telephones was that they use the telephone for emergency purposes and to send text messages only. The majority of subjects in Group 1 used their cellular telephones for speech as opposed to only two in Group 2. This indicates that these cochlear implantees have more severe communication difficulties on the telephone when compared with hearing aid users. One possible reason for this could be related to the severity of the hearing loss, as all four hearing aid users discussed above had profound hearing losses bilaterally. Reasons for not owning a cellular telephone according to both groups included cost, not being able to hear it ring and not being able to hear speech. Hence, lack of ownership of cellular telephones was predominately related to the communication difficulties experienced.

The level of difficulty experienced on the cellular telephone would directly influence the frequency of use as well as the reason for using it (socially, text messages or emergency). Subjects would use the identi-call on the phone to decide whether to answer the call or not. One subject described that *"if it's my cell phone ringing, I look at the number and see if I know who it is. If it's a private number, I don't answer it; I let it ring and take a message."*

The frequency of landline telephone use amongst the subjects in this study was determined by several factors: the need, personality type, type of employment, whether there was someone else to use it for them and their degree of difficulty on the telephone. Some subjects indicated that they would only use the telephone at home if they were forced to and not by choice. The gender of the subjects was also identified as a factor. Male subjects tended to use the phone less often at home than their female counterparts, often due to different social roles rather than only because of their hearing loss. The frequency of telephone use at home also depended on whether the subject was employed or not. Employed subjects would often do their telephoning from work rather than from home. This is related to economic factors rather than those surrounding their hearing loss. Cochlear implantees tended to rely on their partners to make their calls, since they struggled on the telephone more than subjects with a hearing aid(s).

The majority of the subjects (n=32) reported that with their personal amplification, they could hear the telephone ring if they were in the same room as the telephone. However, without the use of personal amplification, the majority of subjects (n=26) reported that they had difficulty hearing the telephone ring even when they were in the same room. When the subjects were using personal amplification and were not in the same room as the telephone, half of the subjects reported experiencing difficulty hearing the telephone ring. This was found to be more serious for those living alone than for those living with family, who could rely on other members to alert them to an incoming call.

The subjects' ability to hear the telephone ring depended on several identified factors; the location of the telephone in relation to the subject, the type of telephone, the pitch of the ring, the ring volume, the presence of background noise, the use of amplification (hearing aid(s)) and the number of telephones in the house. The ring of Telkom telephones was reported by some subjects to be too soft and difficult to hear. In addition, some did not have options to increase the ring volume. Portable telephones were useful as the subjects could carry them around and thereby prevent missing a call. Speakerphones were also reported to be helpful since many of them had switches to increase the ring volume.

Only Group 1 reported difficulties hearing cellular telephones ring. All the subjects in Group 2 who were using cellular telephones for speech or text messages, reported that they did not experience difficulties hearing it ring. For Group 1, several factors were identified that made it difficult for the subjects to hear the cellular telephone ring. These were the pitch of the ring, the ring volume, background noise and the location of the telephone. These were identical to the factors identified with hearing the ring on landline telephones. Many of the currently available cellular telephone ring options have high pitched tones. This results in difficulty for many hearing-impaired people who have high-frequency hearing losses. One hearing aid user described that "*I don't hear the cell ring at all; it's a joke. I have to answer everybody when I get a message. I have been through the whole range of tones, but they are not for hearing-impaired people.*" As a result she, like many of these subjects, resorts to using the vibration mode available on some telephone models. Only four subjects reported that they could not hear either the landline and cellular telephone ring, whereas the rest of the subjects reported either being able to hear the landline, but not the cellular telephone or vice versa.

A quarter of the subjects in total indicated that they could not conduct a landline telephone conversation without difficulty, whereas the rest indicated that their ability depended on how the speaker on the other side conducted the conversation. Of significance, a much higher proportion of cochlear implantees struggled to conduct a telephone conversation as compared to hearing aid users. These results match those obtained by Hoch (2000). They also indicate that implantees may need further telephone training in the use of strategies and techniques. These subjects reported that due to their difficulties, they have resorted to using a landline answering machine, the cellular telephone voicemail or relying on text messages on their cellular telephones.

Subjects using personal amplification (n=34) were asked to indicate where they had difficulties communicating on the telephone (home, work, public telephones and at other peoples' houses) and whether these difficulties were present with/or and without their personal amplification. Results revealed that even with their personal amplification, subjects struggled to hear speech on the telephone. This then concurs with the literature that reports that hearing-impaired persons continue to have telephone communication difficulties even after being fitted with personal amplification (Bloom, 1996; Compton, 2000; Hoch & Glaser, 2001, 2002; Ross, 2001; Trychin, 1994; Tye-Murray, 1998). These results indicate the need for and benefit of TADs. It also indicates the need for the HHCP to assess each client's communication difficulties on the telephone before and after the hearing aid fitting and cochlear implantation.

From the subjects who indicated that they sometimes had difficulties on the telephone, several important factors were identified. These factors determined the degree of communication difficulty experienced on the telephone.

1) Rate of speech: this factor was also connected to the age of the speaker. Many subjects reported that the younger the speaker, the faster they tended to speak, which resulted in communication difficulties.

2) *Volume of speech*: this was especially relevant for those subjects who removed their hearing aids during telephonic communication. The tendency amongst the cochlear implantees was that the volume of the speaker was sufficient and that they did not require additional amplification. These subjects reported that they were able to increase the amplification on their speech processors, but that did not provide any benefit, but resulted in a lack of speech clarity and excessive distortion on the telephone. This factor was also reported by cellular telephone users.

3) *Speaker's vocal clarity:* a lack of speech clarity was the predominant factor that resulted in communication difficulties on both landline and cellular telephones in all subjects. Subjects reported that it was not volume, but speech clarity that determined their communication ability. Since these subjects have differing degrees of sensori-neural hearing losses, it is assumed that the damage to the cochlea (basilar portion where important high frequency information is detected - described previously) would adversely affect their speech discrimination ability. Hence, it was the perceived lack of clarity by the hearing-impaired listeners as opposed to the actual clarity of the speaker on the other side of the telephone line. Reports by the subjects indicated that they were unaware of the reasons for their speech discrimination deficits. This highlights the importance of counselling of the client by the HHCP on the possible reasons for communication difficulties, both regarding face-to-face and telephonic communication.

4) *Familiarity of speakers:* friends and family were easier to communicate with than strangers whose voices were unfamiliar. Familiars were also aware of the hearing-impaired person's difficulties on the telephone, so they would make changes to the rate and volume of their speech in order to accommodate the listener. Professionals were perceived by the subjects to be difficult to understand since they were often pressurised for time and tended to speak rapidly. Whereas familiars would most likely use less complex language with more predictability in the content, professionals would use complex terms in their discussions and shift from one topic to another.

5) *Speaker's accent:* subjects often found it difficult to communicate with speakers who were second language speakers of the subjects' first language. This was particularly predominant in the workplace.

6) *Speaker's vocal pitch:* depending on the configuration of the hearing loss, subjects reported that communication ability was dependant on the gender of the speaker. Subjects with high frequency hearing losses found male speakers easier to understand, whereas those with low frequency losses found male voices especially difficult.

7) *Type of telephone*: subjects reported better communication with speakerphones and portable telephones since they often had built-in amplification and speech was reported to be clearer. The newer Telkom models (e.g., Venus telephones) were perceived to be less clear than the older Telkom telephone models. This was due to the change in microphones as described earlier. The cheaper cost of the new telephone sets was to the detriment of the better speech quality that was available on the older sets. However, the older telephone sets did not have detachable cords to which some TADs attach. In addition, new Telkom telephone handsets no longer use carbon microphones or coil wound receivers that create the inductive field that allows the coupling of hearing aids with telecoil circuitry. Hence, many hearing aid users with built in telecoil cannot use this telecoil facility on the telephone. This denies hearing-impaired persons with the benefits of telecoil such as limiting background noise, direct speech input from the receiver to the listener's ear and the amplification derived from the hearing aid itself.

8) *Presence of background noise*: communication on the telephone was reported by all the subjects as more difficult in the presence of background noise, since there is no visual information to help the subject decipher the content (i.e. lip reading and facial expression). Speech perception in the presence of background noise is particularly difficult amongst those with sensori-neural hearing losses, because of poor frequency resolution abilities.

9) *Knowledge of the topic and caller identification:* subjects reported that their ability to communicate on the telephone depended on whether they knew what the topic was as well as if they knew the identity of the caller.

10) *Use of hearing aids:* just over half the subjects reported removing their hearing aids when communicating on the telephone. The predominant reason was due to the type of hearing aid (s) worn. Subjects with BTE hearing aids found using them with the telephone uncomfortable: "*I*

don't wear my hearing aids because the degree of difficulty on the phone doesn't supersede the discomfort." Feedback was the primary factor for removing hearing aids by ITE users. This could be minimized by the use of foam pads around the telephone receiver. Some subjects found speech over the telephone clearer without their hearing aids, but then found that the volume of the speech did not allow them to hear what the person was saying. One subject described this predicament as "*sitting between two fires.*" Removing the hearing aid(s) was reported as being the least attractive solution because it resulted in a loss of amplification and the hearing aids could be misplaced. The same was found by Palmer (2001), who in addition found that removing the hearing aid(s) might promote the image that the aid(s) is a nuisance and is in the way. This indicates the need to add telecoil facilities into hearing aids. For those hearing aids without t-switches, it indicates the need to train the hearing aid users to use the telephone with their hearing aids.

Those that used the telephone with hearing aids did so to have the benefit of amplification. Those subjects with more severe hearing losses reported that not only did they need the amplification, but they also wanted to hear their own speech whilst talking on the telephone. This was either difficult or impossible without the hearing aid. The same findings were reported with subjects removing their hearing aids when talking on the cellular telephone. The predominant reason for removing hearing aids when communicating on the cellular telephone was due to interference between the cellular telephone and the hearing aids. Those with BTE hearing aids also reported that comfort was a reason to remove their hearing aids. The majority of subjects reported that using their cellular telephones without hearing aids was not satisfactory.

The type of hearing aid (digital or analogue) as well as the type of cellular telephone used (digital or analogue) did not make a significant difference to the level and type of interference experienced (Compton, 2001; Fleming, 2001). One subject in this study described how she was unable to use her analogue hearing aids with an analogue cellular telephone because "*when I tried to use the cell with my old analogue hearing aids, there was so much interference. Now I don't have that problem with the digital aids. That was one plus to getting the digital aids.*" The use of digital cellular telephones with hearing aids was, however, reported to result in interference heard as a buzz or squeal in the hearing aid. This is due to the cellular telephone releasing radio signals that are picked up by the hearing aid and its telecoil circuitry. This together with background noise makes communication difficult (Kozma-Spytek, 2002a, 2002b; Palmer, 2001; Wilcox, 2002). This reinforces the need to use inductive loops for cellular telephone users as they reduce interference. It also allows the user to have the benefit of

amplification derived from their hearing aid. Subjects in Group 2 described the interference as *"a galloping horse sound"* and *"a loud tractor."* They were often able to detect an incoming call and often described speech on the cellular telephone as distorted. However, two cochlear implantee subjects reported that they had not experienced any interference after changing to their current speech processors.

11) *Positioning of the telephone receiver.* For cochlear implantees, positioning of the telephone receiver around the device was particularly difficult and required practice: "*Positioning is a big problem for me. I used to put the phone by the ear, I guess out of habit. It took me ages to find the right spot.*" Positioning of the telephone receiver with BTEs was also a significant factor: "*I have difficulty having to find the position on the phone when I wear the hearing aids, so by the time I find the position, I've lost the beginning of the conversation.*" Subjects also preferred to have direct contact between the telephone receiver and their ears. This indicates the need for HHCPs to train their clients on how to obtain the best placement of the telephone receiver.

12) *Specific content of the message*: particular areas of difficulty experienced included recognising names, hearing certain sounds such as /s/, /t/, /th/, /sh/, /ch/, /j/ and discriminating between sounds such as /m/ and /n/ and certain numbers particularly two, three, nought and eight. One subject, a hearing aid user described that "*the confusion I have on the telephone is numbers 2 and 3, so 083 and 082 sound the same. Names can be a problem too, so I ask them to repeat it. Some letters as well. C can be P, E can be B and unless I recognise the form of the name, I struggle.*" Another hearing aid user, with the same difficulty, suggested that people say the number 0 as zero. The same results were found in a previous study (Hoch, 2000). It is unsurprising that these subjects reported a difficulty in discrimination. The difficulties hearing those high frequency sounds related to the configuration of their hearing losses because the majority of the hearing aid users had sloping losses from mild or moderate to severe and profound.

One significant factor that was repeatedly mentioned was that of volume versus clarity of the speaker. Many subjects, although reporting that increased volume was definitely necessary for good telephone communication, reported that the clarity of the speaker's voice was more important. Similarly, all the cochlear implantees reported that speech over the telephone was loud enough, but lacked clarity. If the hearing-impaired person told the speaker that he/she was hearing-impaired, they would immediately shout, overenunciate or would speak louder at first, but then resort to their normal speech volume, which often affected the perceived clarity of their

speech. These reports indicate the need for public education on the most beneficial ways to talk to hearing-impaired people over the telephone. Also, significant others and other contact people should be included in the rehabilitation programme.

To overcome difficulties, subjects offered several strategies that they were currently using. These included asking the person to call back when there would be a family member to take the call; letting the answering machine of both the landline or cellular telephone take a message; asking the speaker to slow down and/or speak up; and asking the speaker to send a fax or e-mail when possible. One implantee, who had received telephone training, reported using the yes/no strategy whereby he would ask the speaker a question who would then have to reply with a yes/no answer which was understandable by the subject. Another strategy used by the same subject, in order to identify the gender of the subject, was to ask the speaker to say whether he/she was male or female. In this way, he can easily tell male/female apart as they have one or two syllables respectively.

All subjects were asked to rate their difficulties (Figure 3) and satisfaction with (see Figure 4) landline telephone communication. Statistical analysis (one-tailed t test) revealed that for both ratings (level of difficulty and satisfaction with), there were no statistically significant ($t = 0.007$; $p>0.05$; $t = 0.08$; $p>0.05$) differences between Group 1 and Group 2. As a whole group, the majority of subjects found their telephone communication difficult. However, the cochlear implantee group tended to have more difficulty using the telephone, with two of the subjects indicating their use as impossible.

The telephonic communication difficulties of Group 1 were then compared to their satisfaction with their telephone use without TADs. A Chi-Square analysis found that there was a strong

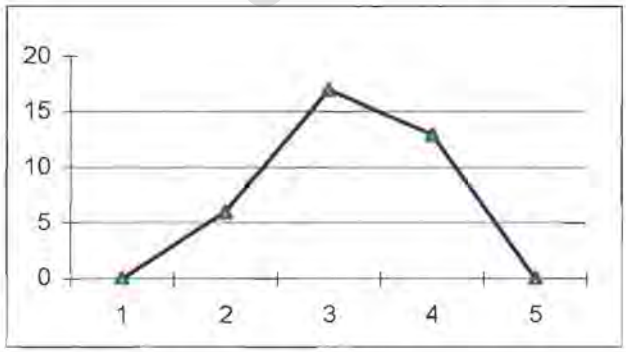

Figure 3. Subjects' rating of landline telephone communication difficulties (n=36).

1 = impossible	2 = extremely difficult	3= difficult	4= adequate	5 = with great ease

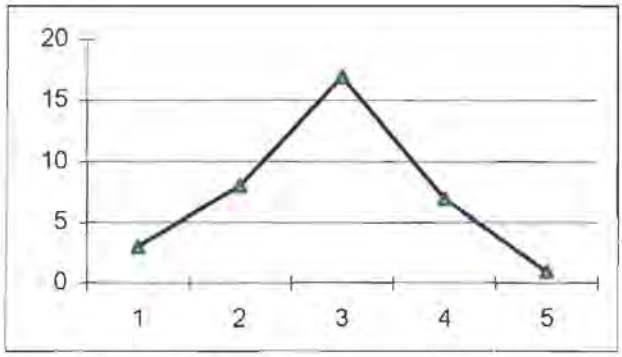

Figure 4. Subjects' satisfaction with their landline telephone communication (n=36).

1 = not at all	2 = mildly satisfied	3= adequately satisfied	4= satisfied	5 = very satisfied

correlation in perception between the communication ability and satisfaction with the telephone use amongst Group 1 ($p = 0.44$). Those with better telephone communication ability were more satisfied with their use and vice versa.

The telephone communication difficulties of Group 2 were also compared to their satisfaction with their telephone use without TADs (Figure 5). A Chi-Square analysis could not be obtained due to the limited number of subjects in this group. The trend revealed that with the cochlear implantee group there appeared to be a difference in their use versus their satisfaction with the telephone. The majority of the subjects found their telephone use difficult (3), but were less satisfied with their telephone use. A possible reason for this could be related to the subjects' expectations

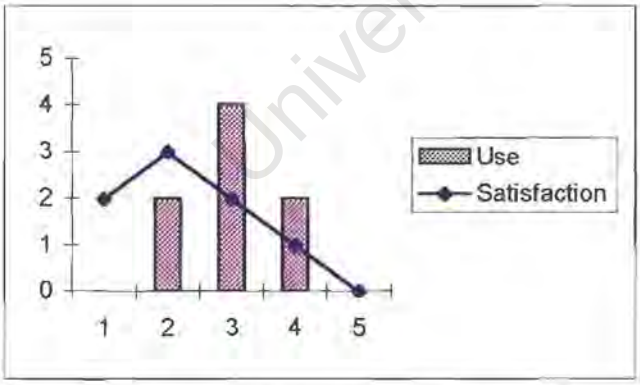

Figure 5. Telephonic communication ability versus satisfaction by Group 2.

1 = impossible	2 = extremely difficult	3= difficult	4= adequate	5 = with great ease

1 = not at all	2 = mildly satisfied	3= adequately satisfied	4= satisfied	5 = very satisfied

of and satisfaction with the implant itself. Although many implantees were very grateful for the advantages that the implant provides, they were still dissatisfied with some of their communication abilities, especially with regards to their telephonic communication.

Similarly to the subjects' landline telephonic communication difficulties, a one-tailed t test was used to analyse the subjects' ratings of their cellular telephone communication and revealed no significant difference in the ratings between the two groups ($t = = 0.1$; $p>0.05$). Therefore, an important finding was identified: the level of communication difficulties experienced on the landline telephone were the same as those experienced on the cellular telephone.

3.3. FEELINGS ABOUT TELEPHONE USE

Subjects in both groups were provided with four statements relating to their feelings about their telephone use and were asked to indicate how strongly they disagreed or agreed with the statements. The statements were: (1) I know that I can use the telephone to obtain the help I need in an emergency; (2) I have great confidence that the information I obtain over the telephone is accurate; (3) I enjoy using the telephone to keep in contact with friends and family; and (4) The telephone is a necessary device in my life.

All subjects were asked to indicate whether they were able to use the telephone in an emergency (Figure 6). The majority of subjects in both groups reported that they have not been in a situation where they have had to make an emergency call, but discussed how their difficulties communicating on the telephone affected their feeling of security and their ability to obtain help in an emergency. A hearing aid user with a bilateral, profound hearing loss reported how she would have to call a family member first who would then have to call the police for her.

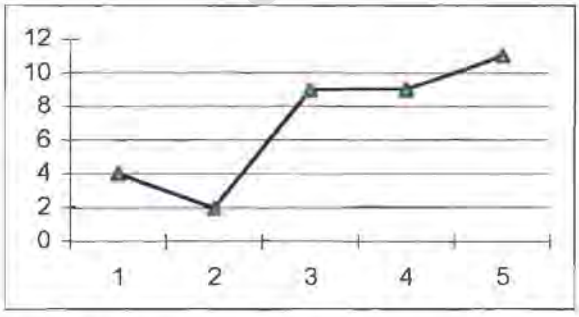

Figure 6. Telephone use in an emergency.

1 = disagree strongly	2 = disagree	3= neutral	4= agree	5 = strongly agree

A cochlear implantee described this scenario as: "*I can't use the phone at all now and it's beginning to affect me, or the both of us, in relation to security. I can't hear the security company phone and if I hear the phone ring, I'm not sure who is on the other side to tell them the code. I used to be able to, but I can't do that anymore to the extent that I don't switch the alarm on anymore if I go out, which obviously makes it dangerous.*" A cochlear implantee, who is unable to use the telephone, described how he could use the cellular telephone to call his wife and let her know if he was safe, although he could not hear her response. However, this was not possible with an emergency service such as the police or ambulance service. An implantee who works for the police department explained that many of the officers talk quickly and are under pressure and this, together with the stress felt by the hearing-impaired person and their difficulties hearing speech over the telephone, makes communication difficult. According to Palmer (2001), even hearing-impaired persons who do not enjoy, or spend time, on the telephone, may still need to use it and that a telephone could be considered a "*safety device that provides peace of mind*" (p 10).

All subjects were asked to indicate how strongly they agreed with the statement that the information they obtained over the telephone was accurate. According to the Figures 7 and 8, the trends amongst the groups differed. Those in Group 2 were less confident that the information they obtained over the telephone was accurate. Only one of the implantees perceived the information he received over the telephone was accurate. His telephone communication at present far superseded his expectations before being implanted and he is satisfied with the accuracy of the information he receives over the telephone. The degree of confidence reported by all the subjects depended on their ability to hear certain sounds and discriminate between certain numbers as well as the rate, volume and clarity of the speaker's speech.

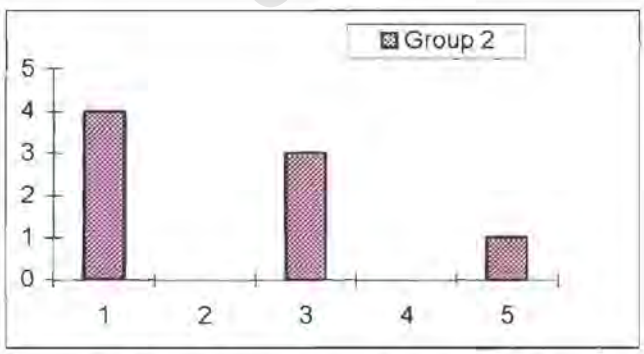

Figure 7. Accuracy of information obtained over the telephone (n=8).

1 = disagree strongly	2 = disagree	3= neutral	4= agree	5 = strongly agree

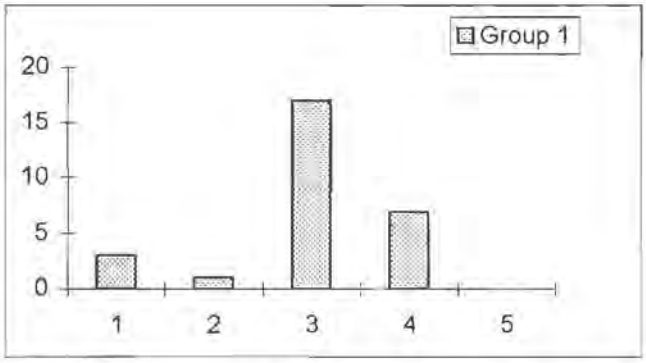

Figure 8. Accuracy of information obtained over the telephone (n=26).

1 = disagree strongly	2 = disagree	3= neutral	4= agree	5 = strongly agree

Subjects were asked to indicate whether they enjoy using the telephone to keep in contact with friends and family (Figure 9). Results indicated that there were no perceived differences between Groups 1 and 2, with the majority of subjects indicating that despite their hearing loss, they still enjoy using the telephone as a means of maintaining contact with familiars. Hearing aid users who gave low scores on this question expressed how they do not enjoy using the telephone for this purpose due to their difficulty communicating on the telephone as it causes frustration and irritation. They also feel that because it takes them longer to converse over the telephone, they waste the time and money of their friends and family.

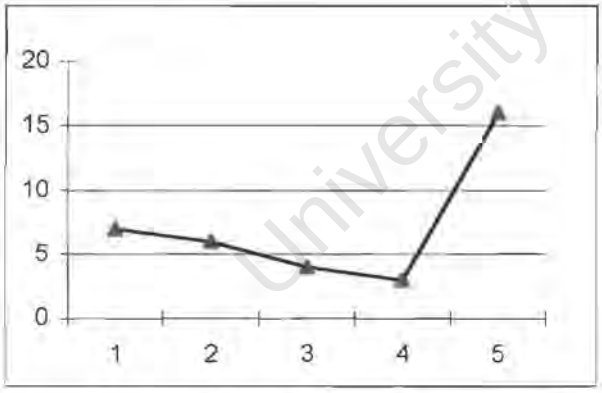

Figure 9. Use of the telephone for contact with friends and family.

1 = disagree strongly	2 = disagree	3= neutral	4= agree	5 = strongly agree

Subjects were asked to indicate whether they agreed with the statement that the telephone is a necessary device in their life. Results indicated that the majority of subjects in both groups strongly agreed with this statement. The implantees who gave low scores for this question also gave low scores for the question above (I enjoy using the telephone to keep in contact with friends and family). This was due to their difficulty communicating on the telephone, but also

friends and family). This was due to their difficulty communicating on the telephone, but also their reluctance to use the telephone even before the onset of hearing loss. Subjects who strongly agreed with this statement related the necessity of a telephone to their employment situation. Many subjects described how they would be unable to do their work without a telephone. Having children was also a factor that determined the necessity to use the telephone. The high number of subjects who strongly agreed with this question indicates the necessity of these subjects not only to have, but also to use the telephone. This is because they live in the hearing world. According to Compton (2001), although not everybody wants to use the telephone, they still need a good telephone solution for safety reasons. Although many of these subjects were using alternative forms of telecommunication, their desire to use the telephone emerged strongly. A person with normal hearing can rely on various telecommunication options. A hearing-impaired person does not have the luxury of relying on the telephone for remote communication.

Only 23 subjects reported seeking assistance for their telephone communication difficulties. Of these, only seven reported seeking help from their HHCPs, whereas the other subjects approached Telkom, wholesalers, cellular telephone suppliers and mail-order catalogues. Those who did not seek help gave two reasons in order of frequency: they were unaware of available assistance and dissatisfaction with the current service delivery. Many had not thought of any reasons. The majority of subjects (n=29) told their HHCPs about their telephone communication difficulties and the underlying expectations amongst the subjects was that since they were seeing a HHCP, it was assumed that the professional would know about their telephone communication difficulties. One subject said: "*I have seen an audiologist who, I mean I have a hearing problem, she knows that. I think it was an assumption that if you have a general hearing problem, then it is on everything; not necessarily on one item.*"

Subjects differed in their beliefs as to whether HHCPs should be providing assistance for telephone communication difficulties. Some believed that one of the main reasons for visiting an HHCP would be to receive assistance for their difficulties on the telephone, whereas others felt that with the caseload and responsibilities that HHCPs are already shouldering, providing assistance for the telephone should not be part of their job descriptions. This was despite the fact that the subjects were attending private practitioners. This concurs with the literature that HHCPs focus on hearing loss and not on hearing handicap that includes communicating over the telephone. Two subjects felt that: "*I don't expect audiologists to be sales ladies*" and " *they* [*audiologists*] *have so much to deal with that it is almost unfair to expect them to do and cope with supplying all the things* [*TADs*] *that are available.*" However, according to the Health

Professions Council of South Africa (2000), the scope of practice for audiologists consists of the provision of therapeutic services, which include the assessment for and dispensing of assistive devices. Many subjects felt that HHCPs do not know what is available with regards to TADs. Subjects indicated that they would only receive assistance if they told the HHCP about their difficulties or if the HHCP probed them to indicate where they were having communication difficulties. This was done mostly after the hearing aid fitting. This limits the type of circuitry (t-switch) that could be included in the hearing aid. Subsequently, the type of TADs available for use is then limited.

Rehabilitation services offered to all subjects were divided into three main categories: hearing aids, equipment and strategies or techniques. Subjects who were having difficulty on the telephone were advised to consider using more sophisticated hearing aids. Equipment recommended included:

- using a special telephone for hearing aid users,
- telephone amplifiers,
- devices that come with the cochlear implant,
- cellular telephones on vibration mode,
- the 'Teldem' text telephone,
- telephones with flashing lights,
- 'Nokia inductive loopset',
- speakerphones and
- foam pads placed around the receiver.

Techniques or strategies recommended included:

- the "yes/no" strategy,
- holding the telephone receiver away from the ear,
- calming down and waiting for the speaker to complete the sentence,
- increased motivation and
- telephone training with Audiology students.

All those who tried the above-mentioned services found them successful. One subject who was using the foam pads on the telephone receiver reported how the pads had successfully reduced feedback from the hearing aid. However, a limitation of these pads is that the telephone does not fit back onto the interrupter switch and an additional switch must be designed on top of the

interrupter switch so that the receiver can be placed back onto the telephone base set. Those subjects who did not purchase any of the devices offered provided several reasons:

- the devices did not provide sufficient amplification for their hearing loss,
- they did not receive demonstrations of the installation and use of the devices which resulted in the devices sitting on the desk and the subject losing interest in their use,
- they believed that their family members with normal hearing would find the device a nuisance (e.g. Telkom ringer with flasher),
- the device offered was too expensive and
- the device offered was already owned by the subject.

One subject reported how she sent off for a mail-order catalogue of devices for hearing-impaired people, but decided not to purchase anything: "*I thought I was paying money for something I knew nothing about. I didn't trust it - what I was looking at was a white piece that fitted over the receiver with an elastic. How did I know it would work?*"

Subjects who were not offered any of the above reported that either their HHCP did not have any devices to show them, or that the companies they approached could not provide any assistance in terms of literature on the availability of products for the hearing-impaired population. This highlights the importance of using demonstration models in HHCP practices. It also indicates the need for manufacturers and suppliers to make available pamphlets that inform and advertise the potential providers and users.

Half of the total subject group reported seeking assistance on their own. The two most frequently found items were the 'Phone Amp' and various types of speakerphones. All those who used the speakerphones reported their benefits, whereas four of the six subjects who used the 'Phone Amp' did not find it beneficial, either because the device did not provide sufficient amplification, or due to faults in the device itself rather than the amplification provided. Other devices found were the 'Nokia loopset', the 'CLARITY telephone' and a specially adapted telephone for cochlear implants. The predominant reason given by subjects who did not seek help on their own was a lack of knowledge of the availability of TADs.

3.4. USE OF TADs

The subjects' reported use of TADs revealed interesting findings. All the subjects who are currently using TADs (n=9) are hearing aid users; only one implantee had previously used a

TAD; only the 'Phone Amp' was used in the past and is currently being used; and only two subjects were using two-system combinations (the 'Phone Amp' and 'Telephone ringer with flasher', and the 'Phone Amp' and 'Teldem'). These particular TADs are locally manufactured and thus easily available. Of subjects who used TADs in the past, two purchased them one to two years ago whereas seven of the subjects purchased them more than five years ago. This indicates that at least some TADs have been available in South Africa for more than five years. Hence, the limited uptake of TADs cannot be related to the lack of availability, but rather to the lack of information on availability. Eight of the subjects used the TADs for a period of one to two years, whereas one subject used a TAD for more than five years. Reasons given for not currently using the TADs were that the devices did not provide sufficient amplification (n=8); the TAD was faulty (n=1) and that the TAD ('Teldem') was too expensive and many people did not have one to communicate with (n=1).

Subjects who were using TADs at home and work still reported telephone communication difficulties. These TADs were not portable and therefore were not used during travel or at other people's houses. Only one subject reported that he did not experience communication difficulties at work with his TAD ('CLARITY Telephone').

The nine hearing aid users who were already using TADs were asked to rate their communication ability with and without the use of their TAD (Figure 10). The 'Telkom ringer with flasher' was not included as it does not indicate communication ability, but rather an ability to be alerted to an incoming call. Results indicated a definite improvement in the subjects' communication ability with the TAD(s), although several subjects still reported some communication difficulties.

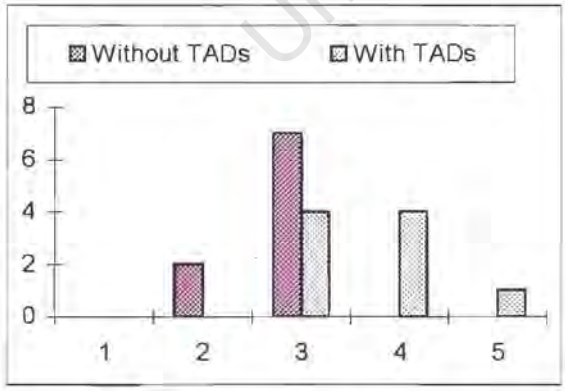

Figure 10. Communication ability with and without TADs.

1 = impossible	2 = extremely difficult	3= difficult	4= adequate	5 = with great ease

Only one subject reported a vast improvement with his TAD, that provided him with excellent communication. One subject who is using the 'CLARITY Telephone' indicated that he still has difficulties discriminating between numbers and letters. Another subject reported that despite the improvement in his communication ability since using the 'Phone Amp', clarity is still not optimal.

The same TAD users were asked to rate their satisfaction in telephone use with and without their TAD (Figure 11). Once again, there was a shift in the subjects' satisfaction with their telephone communication ability with the use of their TAD(s), although some subjects still feel that their telephonic communication could be improved. This could be achieved with telephone training and counselling as well as the uptake of new or alternative TADs. Although few were only satisfied with their use of TADs, they believed that any help was beneficial. Only one subject was very satisfied with this TAD. Hence, expectations of the subjects' TAD use should be addressed in the counselling process by the HHCP in order for hearing-impaired persons to obtain the maximum benefit from their TADs.

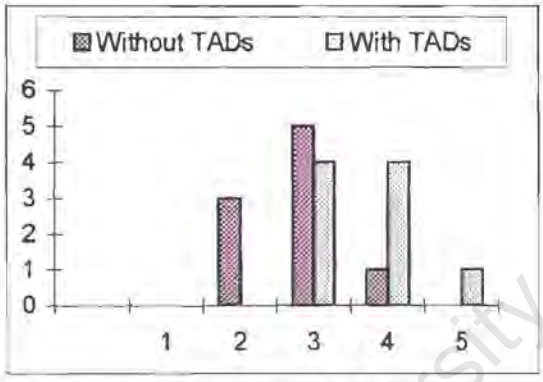

Figure 11. Satisfaction with telephone communication with and without TADs.

1 = not at all	2 = mildly satisfied	3= adequately satisfied	4= satisfied	5 = very satisfied

Subjects were asked to indicate what they liked about the TADs they had used up to then. Several factors were identified and these are listed in order of frequency.

- ease of use,
- cost,
- convenience,
- cosmetic appeal,
- compatibility with hearing aids and
- that hearing others could use the telephone with the device.

Subjects who were not using a TAD currently were asked why they were not using one and subjects who were using one or more TAD(s) were asked to indicate why they were not using any other type of TAD. Responses indicated an overwhelming lack of information regarding the range of TADs available in South Africa. Two predominant factors were identified that would influence them to purchase a device: cost and the benefit. For some, the cost of the device would be the deciding factor. One subject (with digital programmable hearing aids) reported that since he had paid a high price for his hearing aids and although he continues to have telephone communication problems, he does not want to invest in any additional devices. This indicates that even those using advanced digital hearing aids may continue to experience communication difficulties. This reinforces the need to assess all clients, irrespective of the type of hearing aids selected, for potential use of TADs. Alternatively, a hearing aid user who is currently using the 'Nokia inductive loopset' said "*yes, price is a concern, but when you are looking at something that you need, price goes out the window. It's like asking me what do you think of the price of hearing aids. I think the price of hearing aids is ridiculously expensive, but you've got to find the money because you have to have them.*" Another subject said that "*price is not always an issue, but to be quite honest, if I had something that worked and I got the clarity I needed, I would be willing to give up something else to be able to buy whatever it is. Cost really isn't an issue, but clarity and quality are.*" By increasing market sales and producing TADs in South Africa as well as securing government funding, it is assumed that the cost of the TADs could be reduced. This would result in consumers basing their choice predominantly on the benefit rather than the cost of the device.

Over half the subjects indicated that their hearing loss and the severe difficulties they experience caused them to use the phone less often than they would like "*I would certainly use the telephone a whole lot more if I didn't battle so much*". They described their telephone use as frustrating and a source of fear, panic and concern. Where subjects did not use the telephone less often, despite their hearing loss and the difficulties experienced, it was those that were obliged to use the telephone at work: "*I wouldn't say that my difficulties cause me to use the phone less often. I would say that I'm more concerned when I get a call than I used to be. I can't honestly say I take a call at ease*", and "*I don't have a choice. I have to use the phone, so I have to use and make do with what it is. If I had a choice, I probably would use the phone less because it would cause less problems.*" What is clear from these statements is that although the frequency of use remains the same, it is not out of choice nor without stress.

The majority of subjects were unaware of their constitutional rights, especially in the workplace. Subjects, irrespective of their employment status, discussed how their difficulties using the telephone affected their work. Some employed subjects did not disclose their hearing loss and the difficulties they were experiencing on the telephone to their employers for fear of discrimination and or retrenchment. A cochlear implantee described how she disclosed her hearing loss and her severe difficulties communicating on the telephone in an interview, but was told that this deemed her unfit to fill the position. Three subjects, who were recently unemployed and one who was retired, discussed how their difficulties on the telephone forced them to resign or to take early retirement. According to them, they were not offered any assistance in the form of TADs to help them fulfil their employment potential. Although, it is unlikely that employers have knowledge of available TADs, they could approach a HHCP for further information. In addition, the HHCP could visit the workplace in order to assess the type and location of telephones used in the office. This would allow the HHCP to recommend a particular TAD depending on the compatibility of the office telephones as well as the work environment (e.g., using a TAD to reduce background noise in busy work areas). One subject, however, reported that her employer allowed her to circumvent the use of the telephone and rely solely on text based communication via fax and e-mail.

Although there is no coherent or comprehensive legislation specifically pertaining to people with disabilities and their rights at present (White Paper on Integrated National Disability Strategy, 1997), people with disabilities are constitutionally protected in terms of clause 8(1) of the Bill of Rights. According to the Bill of Rights (9 (1,2,3)), no person, including the state may unfairly discriminate directly or indirectly against anyone on one or more grounds, including disability. The new Labour Relations Act (no. 66 of 1995) provides some protection for both employees and job seekers against unfair discrimination on the basis of their disability, especially in the areas of unfair dismissal and hiring practices. However, the provision in the Labour Relations Act (no. 66 of 1995) is not enforceable, but rather provides guidelines for good practice to employers and the courts. The Employment Equity Act (No. 55 of 1998) protects people with disabilities against unfair discrimination. The Draft Code is only a guide for employers and employees on important aspects of promoting equal opportunities and fair treatment for disabled people. It helps the above to understand their rights and obligations and ensure that disabled persons can enjoy and exercise their rights at work.

The hearing-impaired subjects in this study who reported discrimination in the workplace based on their disability have, according to the Constitution (38), "the right to approach a competent

court, alleging that a right in the Bill of Rights has been infringed or threatened, and the court may grant appropriate relief, including a declaration of rights" (Constitution of South Africa, 1996). This includes anyone acting in their own interest; anyone acting on behalf of another person who cannot act in their own name; anyone acting as a member of, or in the interest of, a group or class of persons; anyone acting in the public interest; and an association acting in the interest of its members. Hence, professionals such as HHCPs and organisations such as Deaf Federation of South Africa can approach the courts to assist those who are being discriminated in the workplace.

Only two subjects believed that their rights were being met. One, a hearing aid user, felt that organizations such as DEAFSA are providing hearing-impaired people with affordable services, whereas the other subject, a cochlear implantee, indicated that he did not expect any special treatment because of his disability. A cochlear implantee felt that although he doesn't believe his rights are being met: "*you come to the point where you have to say there appears to be absolutely nothing to be done and you try and make life as comfortable as possible. If we have to add to the strain and stresses of deafness looking at litigation, attacking the constitution and even trying to get the medical profession to change, I don't believe there is really anything to be done.*" The trend amongst the subjects was that they had low expectations of and resigned themselves to the fact that nothing could be done to improve this situation.

The subjects were asked to provide reasons why they felt their rights are not being met. The predominant reason given was that they were unaware of their rights and the legislation of the country. Other reasons were that hearing-impaired persons in South Africa are marginalized and that there are too few hearing-impaired persons for the government to provide assistance. Significantly, the majority of subjects shifted this responsibility onto Telkom, the manufacturers and suppliers of TADs and the government. Very few subjects identified their HHCP as the party responsible for providing information on assistive technology.

Subjects provided suggestions on how to improve their telephonic communication. Interestingly, all suggestions, whether relating to equipment or strategies are currently available. Hence, this highlights the lack of information available to hearing-impaired persons. Subjects were asked how improved ability on the telephone would enhance other aspects of their lives. Employed subjects indicated that improved telephone communication would not only enhance their employment opportunities, but also guarantee their employment, as well as reduce the stress induced by difficult telephonic communication. Since the majority of the subjects had already

completed their education, they did not feel that improved use of the telephone would help in this area. The general tendency amongst subjects with more severe telephonic communication difficulty was to rely on their family members to arrange social activities for them. This ranged from making reservations at restaurants to making social calls to friends on their behalf. According to them, improved telephonic communication would allow for greater independence and an improved sense-of-self. Family relationships could also be enhanced, especially for subjects with children living abroad or in a different city. Subjects indicated a need to use public telephones, but reported that they were not able to since many of these telephones were in busy areas with high levels of background noise. Public telephones are however available with inductive couplers, but are only beneficial for those with built in t-switches in their personal amplification. This indicates an additional reason for incorporating telecoil circuitry into hearing aids and cochlear implants.

3.5. EVALUATIONS OF TADs

Subjects evaluated one or more TADs chosen by the researcher, according to their degree of hearing loss and compatibility with their hearing aids. Of the TADs evaluated, one was a cellular inductive loop; three were portable telephone amplifiers; two were in-line telephone amplifiers; two were built-in amplifiers; one was a replacement handset and one was a telephone ringer to alert the user of an incoming call. Seven of the devices were hearing aid compatible. Calls were made using the TAD attached to either their home or work telephone. Each subject was asked to indicate the TAD(s) which improved telephonic communication. The results were then analysed based on the presence and type of amplification, the availability of the t-switch as well as the degree and configuration of the subject's hearing loss.

Some subjects indicated that several TADs were equally beneficial and therefore provided a selection of TADs as their choice. Subjects provided the advantages and disadvantages of the TADs evaluated, allowing the researcher to understand their preference for a particular device. According to Compton (2001), there are several factors that determine which telephone system will provide the most benefit and success to a hearing-impaired person. These include the degree and configuration of the hearing loss, their speech recognition ability, their lifestyle and personal preference for a particular system. All these factors were considered when TADs were chosen.

The TAD and combinations of TADs evaluated by the subjects (separated in terms of the presence and type of amplification as well as the presence of the t-switch) which were most beneficial is illustrated in Table 1. The figures in brackets after the TADs represent the number of subjects who selected the TADs as their preferred device(s). Of the subjects in Group 2, three did not like any TAD in particular or were satisfied with their own system (adapted telephone for cochlear implantees). One implantee described that "*using these devices became a balancing act because of positioning. I have to concentrate on putting the phone in the right position then on your speech, therefore, my full attention is not on you. With my telephone, I don't have to*

Table 1

Preferred TADs and combinations evaluated by the subjects.

Hearing aid users with t-Switches (n=13)	Hearing aid users without t-switches (n=13)	Group 2 (n=8)	Subjects awaiting amplification (n=2)
▫ Auriald, TE 2002 (1) ▫ Hear-a-Phone (1) ▫ Nokia inductive loopset & Phone Amp (2) ▫ Nokia inductive loopset (3) ▫ Phone Amp & AT&T portable amplifier (1) ▫ Hear-a-Phone & Auriald, TE 2002 (1) ▫ Phone Amp (2) ▫ Teknimed portable amplifier (2)	▫ Phone Amp (2) ▫ CLARITY portable high-frequency amplifier (1) ▫ Phone Amp & Telephone ringer with flasher (2) ▫ Phone Amp and AT&T portable amplifier (1) ▫ CLARITY Telephone (3) ▫ Teknimed portable amplifier & Telephone ringer with flasher (1) ▫ Nokia inductive loopset (1) * own speakerphone (1) *did not like any TAD (1)	▫ CLARITY Telephone (1) ▫ Phone Amp (3) ▫ Teknimed portable amplifier (1) ▫ Adapted telephone for cochlear implant (1) * did not like any TAD (2)	▫ CLARITY Telephone (1) ▫ Phone Amp & AT&T portable amplifier (1)

concentrate on anything else, but listening". Of the subjects in Group 1, one did not like any TAD in particular and six subjects liked their own systems. These systems were either their speakerphones or one of the TADs used for the evaluation ('Nokia neck loopset', 'Telephone ringer with flasher' and the 'Phone Amp').

Hearing aid users with built-in telecoils rated TADs using telecoils as the most beneficial, indicating that these hearing aid compatible TADs are a valuable form of communication

transmission for hearing aid users. Subjects who did not have built in t-switches were thus at a disadvantage. This highlights the importance of considering a t-switch in hearing aid selections. Each group analysed found the 'Phone Amp' beneficial and this was the most frequently chosen TAD, especially in the hearing aid without t-switches group and in Group 2. These results indicated that for the group overall, all subjects selected similar devices, irrespective of the presence and type of amplification used and the degree of their hearing loss.

Comparison of results by degree of hearing loss revealed that subjects from the moderately-severe and profound groups were more closely matched. This, however, was found to be an artefact of this study rather than an indication of the relationship between the different groups based on degree of loss and/or the type of TADs selected. Subjects in these two groups selected the 'Phone Amp' as their first preference for landline TADs and the 'Nokia inductive loopset' for cellular telephones. Since subjects with profound hearing losses were fitted with BTEs, often with a telecoil, they were able to evaluate this TAD and found it accessible and beneficial. The moderately-severe group, rather than the severe or even profound group, that found the 'Telephone ringer with flasher' beneficial. Two subjects who chose this device, also selected other forms of amplification ('portable telephone amplifier, Teknimed' or the 'Phone Amp'). One subject with a severe hearing loss, who is currently using a speakerphone, explained that: "*I'd use this device ['Phone Amp'] for the times when I'm just waking up or out the shower so I don't have to run to my speakerphone and fiddle to get my hearing aids in.*"

Results above show that amplification is still necessary and beneficial for those subjects with profound hearing losses. Thus, TADs are not a replacement device, but need to be seen as an addition to personal amplification. In addition, these results indicate that HHCPs should be evaluating TADs for all of their clients reporting telephonic difficulties, irrespective of the degree of their hearing loss. This finding does not concur with Tye-Murray (1998), who stated that the more severe the hearing loss, the bigger the attraction and requirement for devices.

There were no differences in the choice of TADs based on the configuration of the hearing loss. Significantly, two of the TADs selected by all were those TADs designed to provide gain in the high frequencies.

Nine of the ten TADs evaluated were found to be beneficial by at least one subject. The 'T80 telephone amplifier' was not selected by the subjects as speech was reported to be too soft. During the TAD evaluations, many subjects reported the same findings for the TADs; hence, a

brief summary of the evaluations of the telecoil devices, portable amplifiers and in-line amplifiers evaluated and selected by the subjects follows.

Telecoil Products

All these TADs, except for the 'Nokia inductive loopset', were reported to be too soft in volume and did not provide sufficient amplification. The 'AT&T portable amplifier' and the 'CLARITY telephone', although hearing aid compatible, were found to be more beneficial when used with the hearing aid on M. It was difficult to assess whether this was due to the decreased sensitivity of the hearing aid telecoil or the TAD itself. Those subjects without a volume control on their hearing aids and who found the telecoil devices too soft did not select the telecoil devices, as they could not adjust the volume. Subjects also reported that it was inconvenient to manoeuvre their hearing aid switches from the M to T before and after a telephone conversation. Using the 'Touchless Telecoil' telephone would eliminate this problem and reduce the time taken for the subjects to answer the call and manipulate the switches. However, subjects commented that it was uncomfortable to have both hearing aids on the t-switch as they felt *"cut off"* from the outside world and could not hear anything besides the telephone conversation. Although the Telecoil products were successful in attenuating background noise, they did not allow the user to be aware of background activities.

Portable amplifiers

The subjects tended to find portable devices impractical and inconvenient, as they had to place the device onto the receiver every time they made or received a call, since if the TAD was left on the receiver, it did not fit back into the telephone base. When receiving a call, time was lost in positioning the device, which resulted in a loss of critical information at the beginning of the conversation, when both the caller identification occurs and the topic of conversation initiated. Another general disadvantage of these TADs was difficulty in positioning the device and receiver on the ear, especially when a hearing aid was worn. The feedback experienced with these TADs was mostly due to the poor fit of the device on the telephone receiver. Certain telephones produced a better and tighter fit, which reduced the amount of feedback experienced. The positioning of the volume control on the TAD was also reported to be problematic. Subjects found it impractical to adjust the volume with one hand over their ear and found it difficult to see the direction of the on/off switch. Once they had found the switch and direction, manoeuvring the volume switch resulted in the dislodgement of the TAD from the receiver, which resulted in feedback.

In-line amplifiers

The subjects rated these devices very beneficial for amplification, however, they could not be used with the portable/cordless telephones that were currently being used by several subjects. Although portable amplifiers are a possible solution here, many found that they did not provide the same amplification and clarity achieved by in-line amplifiers.

The subjects' evaluations of the various TADs (see Appendix 9) were used for the purposes of training the HHCPs and in the design of the information brochure. The results from the TAD evaluations revealed that the subjects were looking for the following in their TADs.

TADs that provide extra amplification: although the majority of subjects reported that it was the clarity of speech that affected their communication, they still required additional amplification above their hearing aids or cochlear implants. Subjects in Group 2 reported that the volume provided by their speech processor was sufficient and they did not require additional amplification. However, during the evaluation process, more than half of the implantees found that TADs that provided amplification were beneficial to their telephone communication ability. This finding should alert the HHCP to probe their clients further, by using self assessment scales during the monitoring process for example. More importantly, it should highlight the importance of including TAD evaluations for each client (hearing aid user or implantee) reporting telephone communication difficulties at any stage of the management process. Hearing-impaired persons with mild hearing losses who are not hearing aid candidates, but who report difficulties on the telephone, should be provided with information and hands-on practice with TADs.

TADs to improve the clarity of the speech: most subjects could hear the speaker, but could not understand the speech. Although these subjects were counselled regarding the nature of their hearing loss and the deterioration of their speech discrimination abilities, they still requested devices that could assist in improving clarity on the telephone. This issue relates to the acceptance of their hearing loss and can be dealt with by the HHCP in the counselling process and in pre hearing aid fitting. Other solutions include recommending and fitting TADs and/or more sophisticated digital hearing aids available on the market.

TADs that match the frequency of the speech to the configuration of the hearing loss: this was particularly important for those subjects with high-frequency hearing losses. Although two devices, the portable high frequency amplifier and the 'CLARITY telephone' are available which provide increased gain in the high frequencies, subjects did not report an improvement in

communication ability. Instead, speech sounded, *"cut off"* at the beginning of words with high-frequency sounds. This compounded their communication difficulties. Similar comments were made by a HHCP who reported that her clients who were fitted with hearing aids designed to enhance high-frequencies reported that speech sounded cut off.

TADs that are portable: many subjects currently using TADs found that their use was limited to a particular telephone, either at home or work. These devices, although able to be moved, were often left attached to the phone, which limited the subjects' use of the telephone during travelling, social activities and at other people's homes. Subjects reported that they were interested in small, lightweight and easy-to-carry devices.

TADs that are affordable: subjects were mixed in their reports on the cost of TADs available in South Africa. Some would purchase a device irrespective of the price as long as it provided sufficient benefit to warrant the cost. Others felt that with the high cost of hearing aids, they did not want to spend their money on additional devices for the telephone. The general tendency amongst the subjects was that although Telkom is a profit-listed company, they should be providing TADs to their clients at an affordable rate. Although this is not Telkom's responsibility, this licensee is responsible for making all of their handsets compatible with hearing aids. An increase in sales of TADs would hopefully reduce the costs, however, Telkom's market for these devices will always be smaller than the market for their other products available to the general public.

TADs that are compact: subjects reported that TADs should not be manufactured as separate devices, but installed into the regular Telkom telephones. Although those subjects were not concerned with the cosmetic appeal of their TADs, they would rather have one regular telephone that could amplify speech as well as amplify the telephone ring. In addition, subjects with hearing aids and t-switches reported that standard Telkom telephones should have built-in telecoils as well as public telephones. In South Africa, public telephones are available with built-in telecoils and can be identified by a small blue rubber band just below the handset and around the silver cord.

TADs that attenuate background noise: this was particularly necessary for subjects who use cellular telephones, employed subjects who work in noisy environments or had small children. The use of TADs with built-in telecoils would be beneficial to these subjects, although some of the subjects did not have a t-switch included in their hearing aids.

TADs that show the identity of the caller: subjects reported that they would find it beneficial to have a screen that indicates the name/number of the caller. This would allow them to choose whether to answer the call based on the familiarity of the caller, since many subjects were more confident to communicate on the telephone with a familiar speaker who was aware of their telephone communication problems. Caller-line identity is currently available as a separate unit or as part of a telephone ('Screenstar' by Telkom) and on all cellular telephones.

TADs that provide visual access to the caller's face: cochlear implantees, as well as those subjects with profound hearing losses, reported that they would find it beneficial to be able to see the speaker's face during the call. This would allow them to lip read, watch their facial expressions and perhaps be able to see written information such as letters and numbers. Videophones are available from manufacturers (Alcatel) for example business conferencing and interpreting for the Deaf (TISSA, 2002). The limitations of videophones are the high cost of the calls and the unit itself, the specific bandwidth required and that they can only be used if both parties own one. The use of ISDN lines and the mass production of both these lines and videophones themselves, would allow greater accessibility to the general population for use in the home and in many small businesses.

In addition, subjects were requesting the following:
Increased marketing of TADs: subjects reported that Telkom and the manufacturers of TADs should provide more information to the HHCP and more marketing to the hearing-impaired population. Subjects believed that since their HHCP was not the best source of information for these devices, they require more advertising on what is available from the manufacturers or suppliers. These manufacturers and suppliers could use the HHCPs as a channel to access the hearing-impaired population and provide information directly to the professionals, thereby bypassing expensive large scale advertising.

Public education: evaluations of hearing-impaired subjects and TADs revealed that the majority of (hearing) speakers are not informed about how to talk to hearing-impaired people. Many believe that one has to shout in order for them to hear. However, all subjects indicated that the speaker should not shout, but speak at a normal speech volume, and slower. They also suggested that unfamiliar people first identify who they are and the reason for calling. Public education could take place through public awareness campaigns and public health inserts. This could be achieved through various mediums, either via print or the broadcast media (television and radio) and provided by the Department of Health Professional Associations such as the South African

Speech, Language and Hearing Association (SASHLA), by the TAD manufacturers and/or suppliers.

HHCPs should have the following information in mind when selecting TADs during the evaluation process. This information relates to the compatibility of the subjects' personal amplification, the subjects' telephone and factors relating to the subjects themselves.

Use of personal amplification with built-in t-switches: i.e. the presence of a telecoil would determine the type of TAD used and would provide the hearing-impaired user with a wider variety of choices.
Use of the telephone in noisy environments for hearing aid users with built-in t-switches: i.e. the need to use the telephone in noisy environments either at home, work and social activities or on public telephones would determine the type of TAD selected.
Residential status: i.e. those living alone may require TADs that alert the user to an incoming call as they cannot rely on others. In addition, they cannot rely on others to make and receive telephone calls for them, as can those living with family.
Current telephone capability and compatibility with TADs: i.e. the type of TAD selected would depend on the type of telephone used (for e.g. certain switchboard telephone systems cannot be replaced with other telephone set. The compatibility between the telephone and the TAD is also important (e.g. in-line amplifiers can not be attached to portable telephones).
Financial considerations: although there are affordable TADs available, the type of TAD selected would depend on the financial status of the user.
Manual dexterity: the type of TAD selected would also depend on the degree of manual dexterity of the user (e.g., the aged would benefit more from an in-line amplifier fixed to a telephone line rather than a portable amplifier that would have to placed on and removed before and after each call).

TAD candidacy issues were identified from the questionnaire and the TAD evaluations. Three factors were identified. Subjects in the study were candidates for a TAD if they needed or wanted to use the telephone, but had a hearing loss that resulted in them struggling to communicate over the telephone. Degree of hearing loss was only found to be a candidacy issue for auditory versus non-auditory TADs. In order for Hearing-impaired persons to use an auditory TAD, they have to have adequate residual hearing and speech recognition abilities. For subjects who do not meet the above criteria, they are able to make use of a non-auditory TAD such as the text telephone.

3.6. SUMMARY AND CONCLUSIONS OF HI GROUP

The results of this study indicate that hearing-impaired people with acquired-hearing loss, either moderately-severe, severe or profound in degree struggle to use both landline and cellular telephones at home, work, during travelling and experience similar difficulties on public telephones. Difficulties included hearing the telephone ring or hearing speech on the telephone. This was irrespective of the type of amplification used, i.e. either hearing aid(s) or cochlear implants. The frequency of telephone use amongst the subjects was determined by several factors: the need and desire to use the telephone, their individual personality and gender roles, the type of employment, whether there was someone else to call for them and the degree of difficulty they experienced on the telephone. The final factor was the predominant factor identified by cellular telephone users. No clear patterns emerged between the age and gender of the subjects with regard to their telephone use. Half the subjects tended to remove their hearing aid when communicating over the telephone, thus losing the amplification benefits obtained from their hearing aid.

Factors that influenced their success were divided into those relating to the speaker, to the telephone itself, to the hearing-impaired person and to the background noise. Factors relating to the speaker included the rate and volume of speech, the perceived clarity, familiarity, accent and pitch of the speaker's voice. Factors relating to the telephone included the type of telephone used, the position of the telephone and the telephone line. The positioning of the telephone receiver, their knowledge of the topic and the use of their hearing aid(s) were factors relating to the hearing-impaired subject. Areas of particular difficulty for the hearing-impaired, irrespective of the presence and type of amplification used (Group 1 or 2), included: discrimination between numbers and letters, and most especially high frequency sounds. The majority of subjects could hear the telephone ring when in the same room with their personal amplification, but could not do so without their hearing aid(s) or cochlear implants. Other factors that influenced their ability to hear the telephone ring included the location of the telephone in relation to the subject, the type of phone, the pitch of the ring, the ring volume, the presence of background noise and the number of telephones in the house.

The subjects' use of the telephone was analysed according to communication ability and level of satisfaction. Statistical tests revealed that Groups 1 and 2 rated their degree of difficulty communicating as well as their satisfaction with their telephone use, similarly. There was also no statistically significant difference in perception amongst the subjects in Group 1, between

their communication ability and satisfaction with their telephone use. However, there appeared to be a difference in the use versus the satisfaction with telephone use amongst subjects in Group 2, with the majority of the subjects reporting their telephone use as difficult, but who were less satisfied with their use of the telephone. This could be due to the high expectations of implantees after undergoing expensive and evasive surgery to improve their total communication ability.

Analysis of the subjects' communication ability on the cellular telephone revealed no statistically significant differences between the two groups, however the cochlear implantee group (Group 2) tended to use the cellular telephone for test messages or emergencies only, as opposed to all but four subjects in Group 1, who used it for work and social activities. The trend amongst all subjects, irrespective of age and gender, was that they enjoy using the telephone to keep in touch with friends and family and that the telephone was definitely an important device in their lives. This was particularly true for those subjects who were currently employed and relied on the use of the telephone to guarantee the continuation of their employment. This was due to the fact that the subjects all had acquired hearing losses and live in the hearing world. Although there has been widespread use of e-mail, the telephone continues to be a necessary means of communication. A reason for this lies in the synchronous nature of normal voice telephony (as opposed to e-mail, which is asynchronous), since, for the user using synchronous communication is the only way he/she can reliably ensure that an exchange of communication is successfully taking place.

Despite these difficulties, only half of the subjects sought help for their telephonic communication difficulties and only a third obtained help from their HHCP. Half the subjects who sought help received audiological rehabilitative assistance, of which, only five subjects were provided with information on or provision of any type of ALD or TAD. Results revealed that there was a very limited use of TADs amongst the hearing-impaired subjects. Only nine subjects, all belonging to Group 1, were currently using any type of TAD. The predominant factor identified for the low use in this subject group was lack of information. Only a few subjects were using TADs whilst the majority of subjects did not know of any available devices that could assist them on the telephone and more importantly, they were not counselled by their HHCP on ways to improve their use. The same results were found by Hoch (2000).

The subjects who were currently using a TAD(s) were asked to rate both their communication ability and satisfaction with and without the use of their TAD. Results indicated a significant

improvement in their communication ability and satisfaction with the TAD(s). However, several subjects still reported some communication difficulties and felt that their telephonic communication could be still further improved.

Over half of the subjects reported that their hearing loss resulted in them using the telephone less. Subjects described their use of the telephone as frustrating, embarrassing, stressful, time-consuming, obligatory and fear inducing. The subjects also believed that better telephone communication could improve their work opportunities, social activities, ability to use public telephones, familial relationships, sense of security and sense of self.

The tendency amongst all the subjects was that they did not believe that their rights regarding telecommunication, were being met according to the constitution of the country. Many did not know what their rights were or how they could use them or lobby for more and improved services as hearing-impaired people. The majority of subjects indicated that it was the responsibility of Telkom, the manufacturers and suppliers of TADs, and the government, to change and improve the current situation of hearing-impaired persons.

All subjects, irrespective of the presence and type of amplification used, the availability of a t-switch as well as the degree and configuration of the hearing loss, selected similar TADs. Hearing aid users with a built-in telecoil rated TADs with a telecoil as the most beneficial, indicating that these hearing aid compatible TADs are a valuable form of communication transmission for those wearing hearing aids. Subjects who did not have t-switches chose a variety of TADs, with the cochlear implantees selecting the 'Phone Amp' as the most beneficial. Similar results were obtained when analysed according to the degree and configuration of subjects' hearing loss. The moderately-severe group and the profound grouping this study had similar results. Although this was found to be an artefact of this study, it highlights the importance of TAD evaluations for every client who struggles to use the telephone, irrespective of the degree of hearing loss.

The TAD evaluations revealed that telecoil products were too soft. They were also inconvenient as one had to change the hearing aid continuously from the M to T positions. Portable amplifiers were reported to provide sufficient amplification, but most subjects described these as inconvenient and impractical (subjects had to place and remove the TAD before and after each call). In-line amplifiers were the most popular TAD evaluated; but these devices were not always compatible with all telephone models.

The subjects' expectation of TADs include: amplification, TADs to improve the clarity of the speaker's speech, TADs that could change the frequency of the speaker's speech to suit the configuration of their hearing loss, portability, affordability, TADs that are convenient, TADs that are compact, TADs that attenuate background noise, Caller Identity, visual access to the caller's face, increased marketing of TADs and education of the general public on how to communicate with the hearing-impaired on the telephone.

The information obtained from the hearing-impaired subject group was used to develop the training package for the HHCPs.

4. RESULTS AND DISCUSSION: HEARING HEALTH CARE PROFESSIONALS (HHCPs)

The HHCP subject group consisted of 27 audiologists and one hearing aid acoustician working in the Western Cape (n=19), Gauteng (n=4) and surrounding areas (n=5) in private practices, schools, primary and secondary hospitals, universities and non-governmental organisations.

4.1. BIOGRAPHICAL INFORMATION

All HHCPs had undergraduate degrees in Speech and Language Therapy and Audiology, except for two. Of these, one HHCP underwent a conversion course to upgrade from a hearing aid acoustician to an audiologist and obtained a certificate of competence from the Professional Board. Four of the HHCPs had further education after their undergraduate degrees. Two HHCPs had postgraduate Master of Science (MSc) degrees. One subject had obtained a teaching diploma and another a Society of Hearing Aid Acousticians (SHAA) diploma.

Subjects received undergraduate degrees from the following universities in South Africa: University of Cape Town (UCT); University of Stellenbosch (US); University of the Witwatersrand (Wits) and the University of Pretoria (UP). One subject obtained her postgraduate degree from the University of Washington (USA). The subject who converted from an acoustician to an audiologist obtained her qualifications from Groote Schuur Hospital and the certificate of competence from the Professional Board. The remedial teaching diploma was obtained from Rand Afrikaans University (RAU) and the SHAA from the Witwatersrand Technikon. One subject, a hearing aid acoustician, obtained her diploma from Pretoria Technikon.

The qualification dates varied widely spanning four decades, with the majority of HHCPs qualifying in the last decade (see Figure 12). Hence, these HHCPs would have had access to a curriculum containing information on the available technology, through textbooks and academic journals. Although, this would allow them to be better equipped to provide more and recent information to their clients as opposed to those HHCPs qualifying more than ten years ago who received limited information in their academic training, this was not found amongst these subjects.

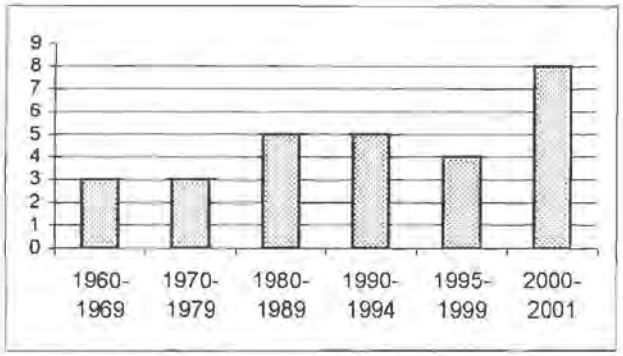

Figure 12. Year of qualification(s).

The majority of HHCPs were working in private practice (Figure 13). This may be a sampling issue as the names of these HHCPs were obtained from the Audiology In Action (AIA) group that consists primarily of audiologists working in private practice. In addition, it is these HHCPs who are most likely to dispense hearing aids and TADs. Those HHCPs working in a university setting do so either in a lecturing or a supervisory capacity. HHCPs working in a hospital setting were located at both primary and secondary hospitals in the Western Cape and

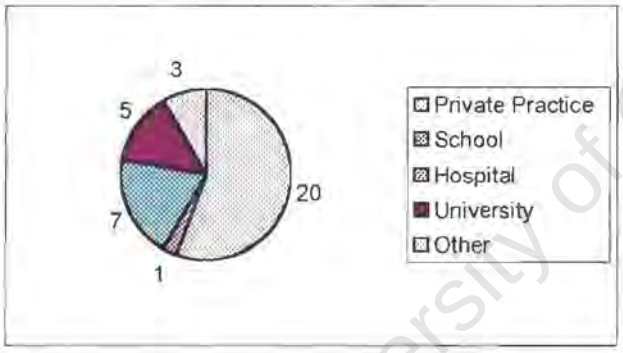

Figure 13. HHCPs' practise sites.

Gauteng. Other sites were a hearing aid company and a non-governmental organisation (NGO). Only one subject was working at a school. Six of the HHCPs were practising in more than one site.

HHCPs were divided into groups according to the number of years of practise (1-5 years, 6-10 years and 10+ years). These groupings allowed the researcher to compare the HHCPs in terms of: their tertiary education; educational institutions; site of practice; geographic location of practice; whether they included information about TADs; whether they included the telecoil component before and after the training; the number of TADs they owned; and whether they used Self Assessment Scales (SAS) in their practice. Results revealed only three differences.

Those HHCPs with more than ten years of clinical experience tended to use more SAS during the evaluation of their clients. They also indicated that they would more often include information about TADs during the rehabilitation process. Findings revealed that HHCPs graduating in the last five years had received information about TADs in their undergraduate education, irrespective of educational institution. This indicates that information about TADs has only recently been covered in the academic programme in South African universities (Reid, unpublished). This could be due either to the recent developments in this technology or to the increased awareness by the hearing health care profession that many hearing-impaired persons still struggle to use the telephone and need additional assistance. Although this would allow those HHCPs graduating in the last five years to have more recent information to include in their clients' rehabilitation programme, this information was reported to be very limited and included only one lecture or handout. In addition, it was found that this information was not disseminated to their clients. Only two HHCPs with 6-10 years and those with more than ten years of clinical experience reported to have received information about TADs in their undergraduate education. This lack of academic training has also been identified in academic institutions abroad (Compton, 1996). Only two of the HHCPs with MSc degrees did not receive information during their postgraduate education.

All of the HHCPs were performing diagnostic testing and hearing aid fitting, evaluation and orientation. Other types of audiological services performed included audiological rehabilitation for cochlear implanted adults, teenagers and children; industrial audiology and electrophysiological testing. Only three HHCPs were currently providing audiological rehabilitation, and these were directed to cochlear implantees only. A possible reason for the lack of audiological rehabilitation for hearing aid users stems from the belief by both HHCPs and hearing-impaired persons that hearing aids are able to solve all the communication difficulties occurring as a result of a hearing loss. Once a hearing aid has been fitted and apart from the hearing aid follow ups, the client is discharged with no further intervention. For cochlear implantees, audiological rehabilitation begins during the initial consultation with the HHCP and medical doctors. The client is monitored post fitting and provided with counselling and relevant audiological training (e.g. auditory training and telephone training). This highlights the limited audiological service provided to hearing-impaired persons. The scope of audiological practice should extend beyond diagnostic testing and hearing aid/cochlear implant fitting to include all areas such as individual and family counselling, telephone training and communication strategies. All HHCPs, irrespective of the nature of the treatment they provided, can were identify the needs of their clients, including the difficulties experienced on the telephone through

the case history and diagnostic evaluation of the hearing loss, including speech discrimination ability.

The majority of HHCPs reported that they received information (guidelines) about TADs from hearing aid dealers (HASS, Oticon, Beltone, Phonak, Widex and Danavox) (Figure 14). Enquiries for information were initiated by the HHCPs when particular clients required such information. The HHCPs reported that the information received during telephonic correspondence and hearing aid launches was often related to ALDs such as Frequency

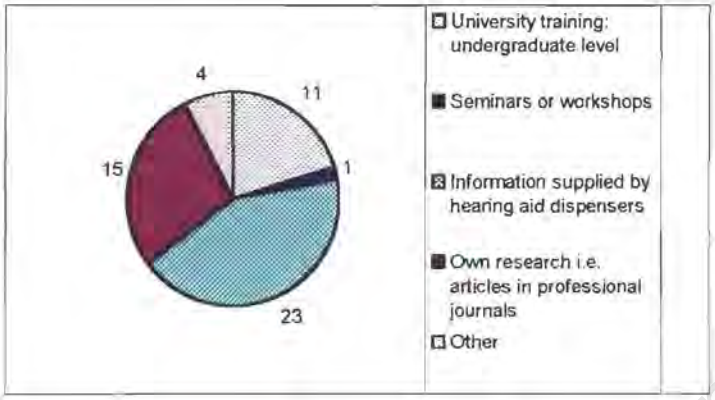

Figure 14. Source of information on TADs.

Modulation Systems (FM systems) and did not specifically relate to or include information about TADs. Information from hearing aid dealers was followed by articles in academic journals (e.g., The Hearing Journal). These results correlated those obtained from Reid (unpublished). Very few HHCPs received information during their undergraduate training and reported either receiving a handout or receiving only one lecture on the subject. Only one HHCP reported receiving a full module on ALDs.

Only one HHCP obtained information during seminars or workshops. HHCPs reported receiving limited information from other sources such as from ALD suppliers (Teknimed, GN Transistor and Amtronix), online websites (www.audiologyonline.com) and Deaf organisations such as DEAFSA. One HHCP who had worked in the USA reported obtaining information from her place of practice, since they were the biggest suppliers of ALDs in that state.

Only 13 HHCPs reported obtaining information from more than one source. The general trend amongst HHCPs was that information on TADs was not forthcoming from the hearing aid dealers and the suppliers of assistive technology, but rather that they were only provided with

information when it was specifically requested by the HHCPs. The lack of advertising and marketing amongst the hearing aid dealers and manufacturers could be one of the reasons why assistive technology in the form of TADs is not widespread among HHCPs.

4.2. KNOWLEDGE OF TADs

The HHCPs were required to rate on a scale, from extremely poor to excellent, their knowledge of certain areas relating to TADs. A comparison of this rating was made before and after the training in order to assess whether there had been a change or an improvement. Twelve aspects were questioned. Chi-Square analysis was used with a level of significance of 0.05.

Most HHCPs indicated that their knowledge of TADs before the training was poor (Figure 15). This correlates with the hearing-impaired subjects' perceptions that their HHCPs were unaware of available devices, as well as their experience of being supplied with the limited information. A Chi-Square analysis was used to analyse the HHCPs' rating of their knowledge of

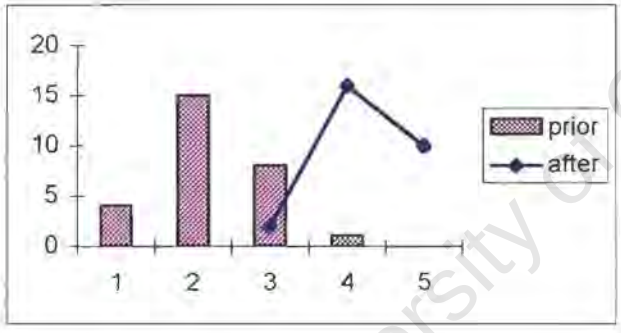

Figure 15. HHCPs' knowledge of available TADs.

1=extremely poor	2=poor	3=average	4=good	5=excellent

TADs pre- and post-training. Results revealed a significant difference in the ratings between the pre- and post-training findings ($p = 0.00000262$).

Before the training, HHCPs indicated that their knowledge of the function of the component parts and adjustments of TADs was extremely poor, poor or average, whereas post-training, there was a shift in their knowledge (see Figure 16). Most of the HHCPs rated that their knowledge post-training was good or excellent. A Chi-Square analysis was used to analyse the HHCPs' rating of their knowledge of the function of the component parts and adjustments of

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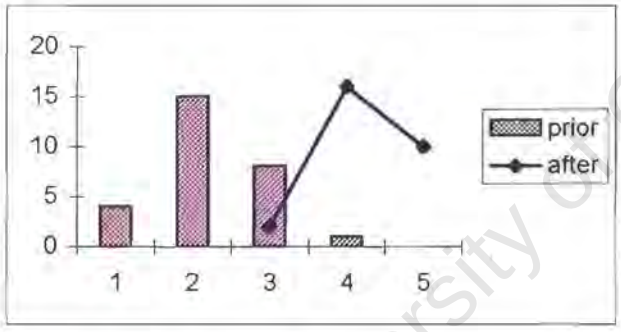

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pre- and post-training. Results revealed a significant difference in the ratings between the pre- and post-training findings (p = 0.00000353).

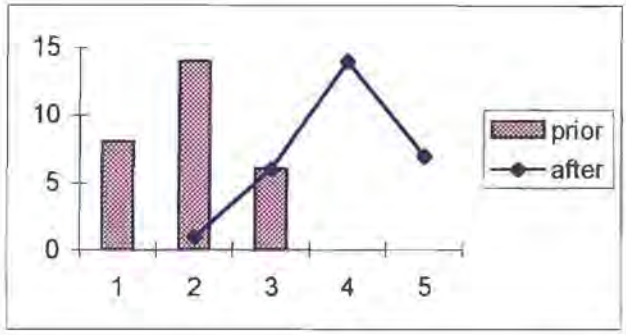

Figure 18. HHCPs' rating of their ability to fit, adjust and maintain TADs.

1=extremely poor	2=poor	3=average	4=good	5=excellent

Similarly, before the training, the results indicated that the HHCPs had little or no knowledge of the advantages and disadvantages of TADs (Figure 19). Post-training results show that the majority of HHCPs rate their knowledge of the above as good or excellent. A Chi-Square analysis was used to analyse the HHCPs' rating of the advantages and disadvantages of TADs pre- and post-training. Results revealed a significant difference in the ratings between the pre- and post-training findings (p = 0.000105).

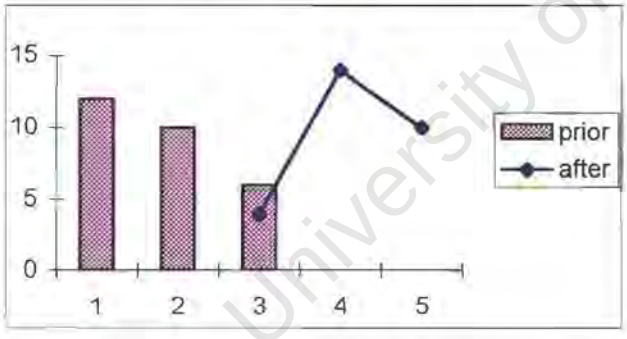

Figure 19. HHCPs' rating of their knowledge of the advantages and disadvantages of TADs.

1=extremely poor	2=poor	3=average	4=good	5=excellent

Results indicate that the training was beneficial in improving the knowledge of the HHCPs with respect to why particular TADs are selected, i.e. knowledge of selection criteria has improved with training (see Figure 20). A Chi-Square analysis was used to analyse the HHCPs' rating of their knowledge of why particular TADs are selected pre- and post-training. Results revealed a significant difference in the ratings between the pre- and post-training findings (p = 0.000446).

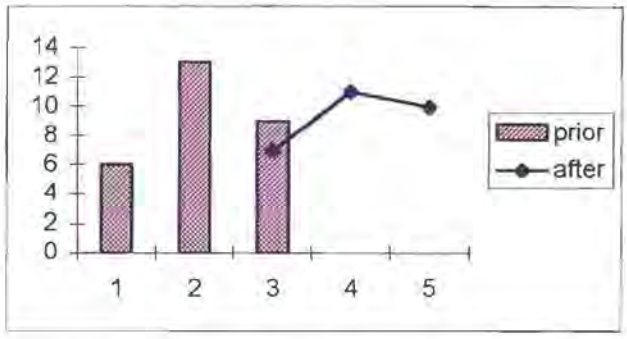

Figure 20. HHCPs' rating of their knowledge of why particular TADs are selected.

1=extremely poor	2=poor	3=average	4=good	5=excellent

The HHCPs indicated having extremely poor or poor knowledge on how to trouble-shoot TAD problems prior to training (Figure 21). Subsequent to the training, several HHCPs were still unsure. A possible reason for this is the time constraint during the training, hence a limited amount of information could be included. It was hoped that with continuous hands on experience with the devices and the availability of handouts, brochures and possibly video demonstrations and/or CD-ROMs, the HHCPs would be better equipped to trouble-shoot any arising problems. A Chi-Square analysis was used to analyse the HHCPs' rating of their ability to trouble shoot TAD problems pre- and post-training. Results revealed a significant difference in the ratings between the pre- and post-training findings ($p = 0.000103$).

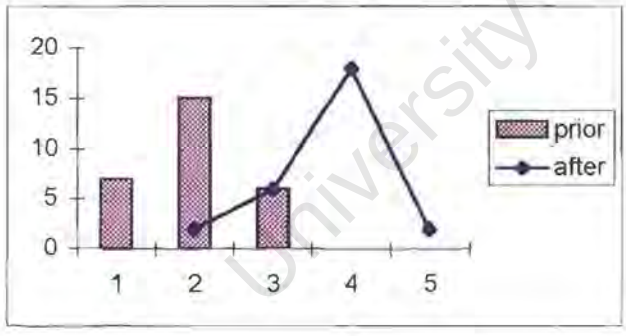

Figure 21. HHCPs' rating of their ability to trouble shoot.

1=extremely poor	2=poor	3=average	4=good	5=excellent

Post-training results showed a statistically significant improvement in knowledge in the demonstration of TADS to family members ($p = 0.00000228$) (see Figure 22). However, some HHCPs still report only poor or good ability to demonstrate TADs to family members. Those HHCPs who gave a low rating were those who had never had hands on experience with any TAD either in their workplace or during their training.

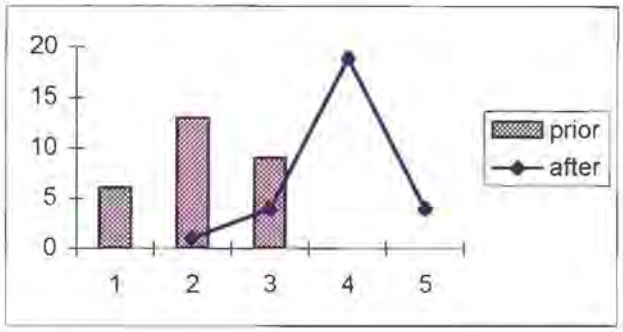

Figure 22. HHCPs' rating of their ability to demonstrate TADs to family members.

1=extremely poor	2=poor	3=average	4=good	5=excellent

Regarding answering questions about TADs (Figure 23), results reveal a statistical ($p = 0.000172$) and important shift in confidence before and after the training, where the majority of the HHCPs now rate their confidence as either very good or excellent. This increase in confidence will encourage the HHCPs to include TADs in their rehabilitation programmes more regularly. This would include detailed questioning of the clients' communication needs on the telephone both in the initial consultation and throughout the management process.

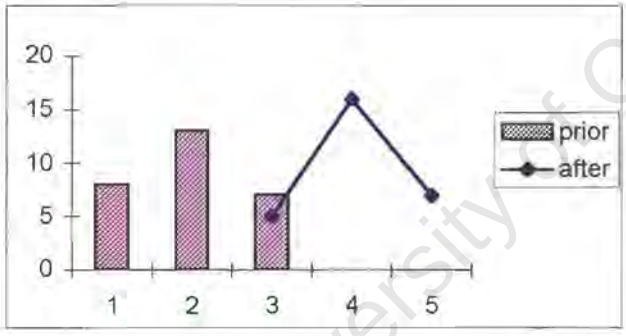

Figure 23. HHCPs' rating of their confidence in answering questions about TADs.

1=extremely poor	2=poor	3=average	4=good	5=excellent

Pre- and post-results indicate an increase in the knowledge of TAD prices ($p = 0.00000412$), although some HHCPs were still unsure (see Figure 24). Several HHCPs reported that once they knew of an available device, they would call the manufacturer or supplier to obtain a price quotation. However the problem, according to them, was the lack of knowledge of what devices were available.

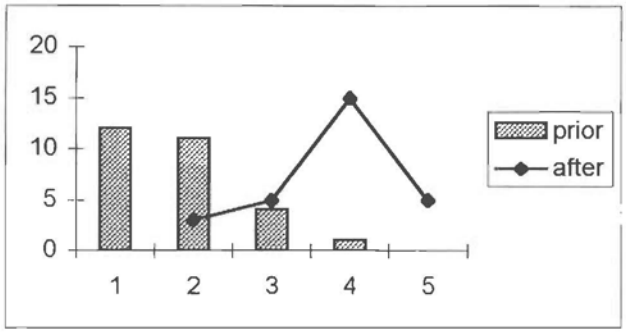

Figure 24. HHCPs' rating of their ability to provide price quotations for TADs.

1=extremely poor	2=poor	3=average	4=good	5=excellent

A Chi-Square analysis was used to analyse the HHCPs' rating of their ability to help their clients exercise their legal rights regarding telecommunication (according to the South African Telecommunication Act 103 of 1996) (Figure 25). Results revealed a significant difference in the ratings between the pre- and post-training findings ($p = 0.000154$). These findings correlate with the hearing-impaired subjects, where 94% do not know or do not think that their rights are being met. This strongly indicates that both clients and professionals need to be informed of the rights and legislations of the country and how to use them appropriately to ensure good service delivery and telephonic communication. One HHCP described why, before the training, her ability to help her clients exercise their legal rights was extremely poor: "*Not knowing what was locally available made this difficult. I would have referred them to DEAFSA. Perhaps without much luck?*" The White Paper on Integrated National Disability Strategy discusses the importance of rehabilitation services and includes assistive/rehabilitation

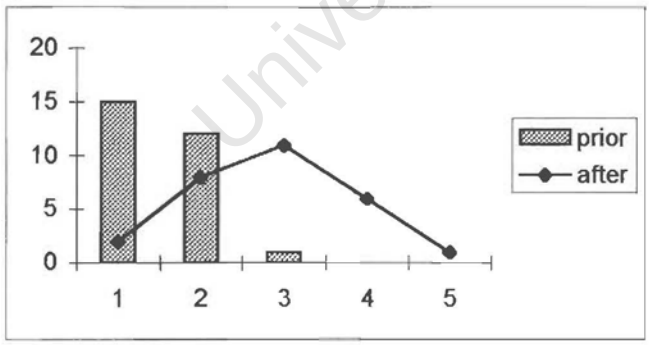

Figure 25. HHCPs' rating of their ability to help clients exercise their telecommunication legal rights.

1=extremely poor	2=poor	3=average	4=good	5=excellent

technology as one of its components. According to the policy guidelines, the production, supply and maintenance of these devices are currently uncoordinated. These devices are very expensive because they are imported and steeply taxed. HHCPs should themselves, assist their clients in lobbying for more accessible and affordable devices. Alternatively, they may become associated with DEAFSA and participate in their actions to change policies into legislation.

The HHCPs provided mixed responses when asked whether they thought it was profitable to supply TADS in addition to hearing aids (Figure 26). Two HHCPs who indicated their knowledge as good or excellent explained why, "Perhaps for me the question is not so much about profit, but more about client service and satisfaction. I think the telecoil facility is often overlooked when hearing aids are fitted in private practice (as with facility for FM system use too). However, perhaps because telecoil facilities have been so limited it has not really needed to be such a consideration". Although, before the training, HHCPs were evenly spread in their

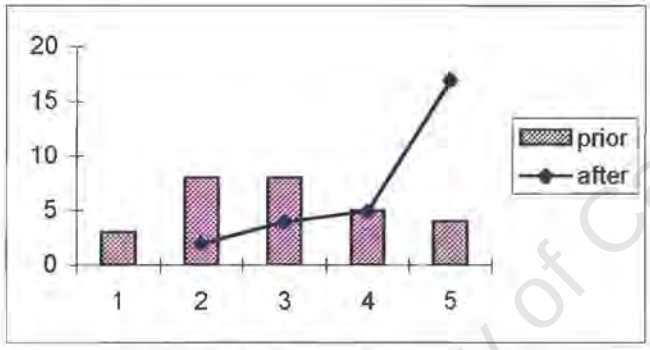

Figure 26. HHCPs' thoughts on the profitability of supplying TADs in addition to hearing aids.

1=extremely poor	2=poor	3=average	4=good	5=excellent

beliefs that supplying TADs in addition to hearing aids was profitable, there was a statistically ($p = 0.00059$) marked shift in their belief after the training, with the majority of HHCPs now strongly agreeing that they are profitable. The before-training results correlated with findings from Reid (unpublished) where just under half of the subjects in her study believed that it was unprofitable to supply ALDs in addition to hearing aids.

HHCPs reported that in some areas, although showing an improvement after the training, they still had difficulties or needed additional training. These included helping their clients exercise their legal rights (Universal Access), their ability in the fitting, adjusting and maintenance of telecommunication devices, trouble-shooting telecommunication problems, demonstrating the devices to their clients' family and their ability to provide price quotations for the devices. There

was limited coverage of certain areas during the training, due to time constraints. Hence, future training sessions should include written handouts, personal hands-on practise with the devices and/or video demonstrations. HHCPs who tended to give high values, both pre- and post training, for the questions above were those HHCPs who owned more than one TAD (as demonstration models), and who had been working with these devices in their practice. Similarly, those who gave low values for these questions pre- training were those who did not own or use any TADs in their work and had little experience of them before the training. It was these HHCPs who showed a significant improvement in knowledge and ability after the training.

HHCPs were asked whether they included TADs as part of their rehabilitative services. The majority of HHCPs reported that they did not currently (n= 4) or only sometimes (n=18) included information about TADs as part of their rehabilitation. The predominant reason provided was a lack of knowledge of the available TADs, but also limited knowledge of the selection criteria, the fitting and use of the TADs. This correlates with two significant findings obtained by the hearing-impaired subject group. Although the majority of subjects told their HHCP about their telephone difficulties, only eight of the 36 subjects were provided with information on TADs and 71% of the hearing-impaired subjects sought help for their telephone communication difficulties from people other than their HHCPs. Although similar findings were obtained in previous research (Reid, unpublished), HHCPs in her study included information when working with hearing aid clients, but only sometimes with cochlear implantees. However, it was the implantees that reported more severe telephone communication difficulties and required additional training and TADs.

One HHCP reported that "*before telecoil and recent telephone adaptor which can be used with all processors, there was not much available*". She reports that due to the limited availability of TADs for cochlear implantees, audiological rehabilitation has focused on telephone training and strategies to facilitate conversations. These results indicate a lack of service provision, beyond hearing aids, to their clients, which has also been found by various researchers (Killingsworth, 1989; Reid, unpublished; Ross, 1997; Spitzer, 2000). Those HHCPs who indicated that they always include this information reported doing it after the hearing aid or cochlear implant fitting, during the hearing aid orientation and only when it was indicated during the case history. The HHCPs reported that post training, they would always or sometimes explain to their clients about devices that were available and compatible with their hearing aids. This, unfortunately, would occur during the hearing aid follow up, when the hearing aid had already been selected, therefore limiting certain clients who have not been fitted with hearing aids equipped with a telecoil.

Those who reported including it sometimes indicated that it took place when it was requested by clients who were experiencing communication difficulties on the telephone. The HHCPs that included this information would do so in their places of practice as opposed to in their clients' home or workplace. The latter would be considered ideal since it would provide the HHCP with information regarding the environment and the type of telephone used by the hearing-impaired client.

Two HHCPs who reported including TADs as part of their services accounted how their clients, although impressed with the information supplied to them by their HHCP on the availability of various TADs, found them too expensive to purchase as demonstration models. This demonstrates how increasing the market for TADs would hopefully increase their production and decrease their cost, making them affordable to the general public. One possible way to achieve this would be to approach the manufacturers themselves. HHCPs could relay to the manufacturers the fact that inclusion of TADs in their practices would increase sales and hence, profit for the manufacturers. This would hopefully urge them to provide free demonstration models to HHCPs and thus make TADs more accessible to both HHCPs and their hearing-impaired clients. However, the market for these devices will always be smaller than the market for other products. Possible solutions to this would be to get the government to subsidise these devices as well as to manufacture them locally and avoid import costs.

The majority of HHCPs indicated that they sometimes included the telecoil component into their clients' hearing aid(s) (Figure 27). One of the reasons provided for not including the telecoil more often, was that they were *"not as comfortable as they should be with it."* Two HHCPs

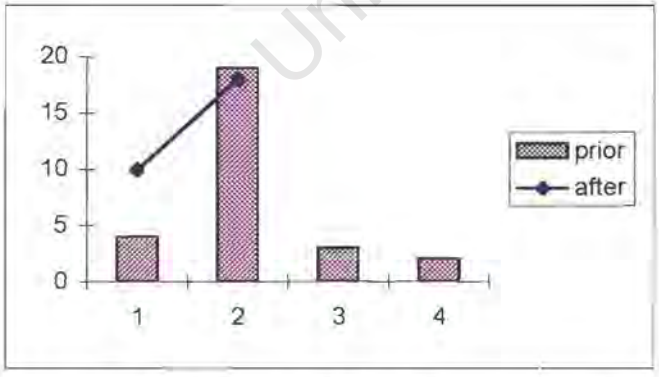

Figure 27. The inclusion of the telecoil component into hearing aids before and after the training.

1=always	2=sometimes	3=never	4=not applicable

who gave a not applicable response, reported that they use donated second hand hearing aids and often do not have a choice of whether to include the telecoil or not. Those who indicated that they do not include the telecoil component gave the following reasons: they were not sure about the possibilities of and availability of the telecoil option. When the telecoil component was included, either always or sometimes, it tended to occur, according to the HHCPs, when and if there was a possibility that the clients might use it. This was dependant on the client's needs and lifestyle, if the client was going to make use of either ALDs, and if the client was a frequent traveller or a theatre goer. The general tendency amongst the HHCPs was that although some hearing aids are equipped with a telecoil, they counsel their clients to ignore the t-switch or explain to their clients about the t-switch, but say that it is not often used or that there are only a few facilities in South Africa in which one can use the induction loop. Some of the HHCPs reported that having a t-switch has often "*been more of a hindrance than a help*" and although hearing aid users need to know of this facility on their hearing aid, it is debatable whether they remember or fully understand it. Those HHCPs who did provide information to their clients about the telecoil component did so in relation to the inductive loops available for television viewing and the theatre, and not in relation to the hearing-impaired clients' telephone use. This illustrates why the hearing-impaired subjects in this study were either uninformed about the telecoil component of their hearing aids, or were unaware of the possibility of using the telephone with hearing aid compatible TADs.

After the training, more HHCPs were including the telecoil component in their clients' hearing aids. HHCPs reported that after the training, they would fit the telecoil into a hearing aid depending on several factors both identified and explained in the training, as well as from their own clinical experience before and since the training:

- the degree of the hearing loss,
- how the clients have been managing on the telephone without a hearing aid,
- how their clients have been coping on the telephone with a hearing aid,
- the clients' financial status,
- their manual ability to use the switch or different programme and
- when it is relevant, indicated and appropriate.

Several HHCPs reported that after the training, they felt more competent, confident and informed about telecoil options, although they still required additional information and training. A Chi-Square analysis was used to analyse whether there was any difference in the inclusion of the telecoil before and after the training. Results revealed no significant difference before and after

the training (p = 0.27). Although some HHCPs felt more confident about fitting the telecoil component into the hearing aid after the training, others still felt uncomfortable or required more knowledge and experience. Other possible reasons include those given in the question as to whether HHCPs included the telecoil component of the hearing aid in their hearing aid fittings before the training. In addition, there was very little time lapse between the training and the post-training questionnaire. Hence, there was a limited time for the HHCPs to adjust their practice.

The number of TADs owned by the HHCPs is illustrated in Table 2. A comparison of the TADs owned by the HHCPs and those selected as the most beneficial by the hearing-impaired group revealed interesting findings. The HHCP group had the following TADs in order from most to least: 'T80 Telephone amplifier', the 'Phone Amp', 'Hear-a-Phone', 'CLARITY telephone' and 'Teldem'. A possible reason for these choices may be because these TADs are available from hearing aid suppliers (Logia from Oticon and HASS) or from the most likely supplier – the telephone company. The hearing-impaired group, on the other hand, selected the following in order from most to least: the 'Phone Amp', the 'Nokia inductive loopset', 'CLARITY telephone' and the 'Portable telephone amplifier, Teknimed'. Thus, only two of the five TADs owned by the HHCPs were those selected by the hearing-impaired group. The most frequently owned TAD by the HHCPs, the 'T80 Telephone amplifier', was, however, not selected at all by the

Table 2

TADs used in the HHCPs' practice pre-training.

TAD	*NUMBER OF HHCPs*
T80 Telephone amplifier (Logia)	11
Phone-Amp (Telkom)	9
Hear-a-Phone (HASS)	7
CLARITY telephone (HASS)	4
Teldem text telephone (Telkom)	2
AT&T portable telephone amplifier (HASS)	1
Auriald, TE 2002 (Teknimed)	1
Telephone ringer with lamp flasher (Telkom)	1
Nokia inductive loopset	1
Ericsson T-Hook	1

hearing-impaired subject group. This indicates a mismatch in information by the HHCPs regarding what TADs are beneficial to their clients. It highlights the importance of providing information to the HHCPs about TADs found by the hearing-impaired subjects to be the most beneficial. This will allow the HHCPs to stock these TADs and to be better informed as to what their clients are looking for to improve their telephonic communication.

Less than half of the HHCPs do not have any TADs in their practice (Figure 28). This result concurs with the hearing-impaired subject group who reported that their HHCPs did not have any devices to show them. Those HHCPs with no TADs were working in hospitals and in university settings as well as in private practice. Hence, cost might not be the sole reason for the

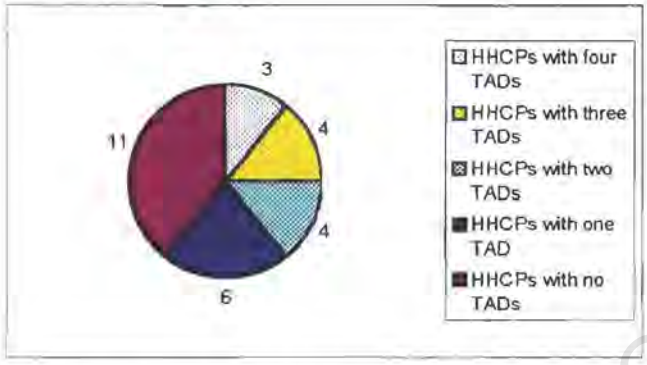

Figure 28. Number of TAD combinations.

lack of TADs, but also limited theoretical knowledge, limited hands-on experience with the devices and limited confidence in the recommendation and fitting of the devices. Only one HHCP acquired any TAD after the training, a 'Nokia inductive loopset', and another reported obtaining pamphlets on two of the devices after the training. A possible reason for this is the short time span from the training until the completion of the questionnaires.

The majority of HHCPs (n=25) indicated that they do not have a display of TADs. According to Killingsworth (1989), one way that consumers can learn about assistive devices is through experimenting with them. This can be achieved by creating a display area that houses various products. In addition, Reid (unpublished) reports that when a display area is used, the client gets the opportunity to see the working of the products by demonstration as well as by being exposed to the advantages and disadvantages of the devices. One HHCP reported that it would be useful if the manufacturers or suppliers could provide a sample of their devices that could be housed in her office.

HHCPs were asked to indicate the limitations of the TADs from the training provided. Only 22 answered this question. HHCPs reported that they answered this question according to the TADs they own, whereas some responded according to the limitations of the TADs they learnt about during the training. One HHCP reported that the limitation of the 'T80 Telephone amplifier' was that it did not indicate when it was on. This differed to the reports of the same device by the hearing-impaired subject group who reported that it was too soft. This indicates a mismatch in information between the professionals and their clients and reinforces the need for further training and education on the part of the HHCPs. Others reported that using the 'Nokia inductive loopset' was limited as it was only compatible with Nokia telephones. Some HHCPs reported that they have not been in a position to use these devices since the training and thus cannot remember what was covered in the training.

Some of the findings above concur with the reports given by the hearing-impaired subject group who are currently using TADs, as well as their evaluations of the devices. Both groups found the 'Nokia Inductive Loop', the 'T80 Telephone Amplifier' and the 'AT&T portable amplifier' expensive; the 'CLARITY telephone' was found to be cosmetically unappealing; and the 'AT&T portable amplifier' and the 'Teknimed portable amplifier TE 2001' were inconvenient. Some HHCPs indicated that they could not remember the advantages and disadvantages of the TADs (due to the time that had lapsed between the training and the provision of the questionnaires). This can be overcome by supplying written material in the form of a brochure that will be provided to each respondent at the completion of the research, as the final cycle of this research project.

The majority of HHCPs (n=23) were not using any form of Self-Assessment Scales (SASs). SASs that were being used by the HHCPs included both assessment scales devised by the HHCPs as well as formal SASs. Formal SASs included the Self-Assessment of Communication (SAC) (Schow & Nerbonne, 1982); Significant Other Assessment of Communication (SOAC) (Schow & Nerbonne, 1982); the Performance Inventory For Profound and Severe Losses (PIPSL) (Owens & Fujikawa, 1980); the Communication Profile for the Hearing-Impaired (CPHI) (Demorest & Erdman, 1986); the Hearing Handicap Inventory for Adults (HHIA) (Newman, Weinstein, Jacobson & Hug, 1991), the Hearing Handicap Inventory for the Elderly (HHIE) (Ventry & Weinstein, 1982) and the Denver Scale of Communication Function (Alpiner et al., 1974).

HHCPs who devised their own scales reported drawing them from a number of other scales, but that they had been significantly shortened and simplified. These revised scales focused only on the clients' hearing aid use and hence, may have missed the telephone difficulties experienced by their clients. These revised scales may not include information about their clients' telephonic experiences. This includes whether they have difficulty on all or particular telephones or whether their difficulties occur in specific settings (e.g. in background noise). In addition, these scales are used during the initial consultation and before the hearing aid fitting and orientation. Therefore, they do not provide the HHCP with information on how their client copes on the telephone with their hearing aid or even if they are using them on the telephone. This concurs with the hearing-impaired subjects' reports that their HHCP did not enquire about their telephone difficulties during the consultations. Two HHCPs working with cochlear implantees devised their own scale, including two scales for teenagers and children on the use of the telephone.

None of the HHCPs indicated an increase in their caseload after dispensing TADs. One possible reason for this is the short time span between the training and the responses by the HHCPs. Only four HHCPs provided reasons for their choice. One subject working at a hospital indicated that after the training, she would refer those clients who have telephone communication difficulties to their nearest Telkom branch for further information and to obtain a TAD. Another reported that this question was not relevant to the cochlear implant programme, although the results showed that many implantees could benefit from a TAD (both auditory or non auditory). It is hoped that with new cochlear implants available with telecoil circuitry, it will allow the HHCP to demonstrate TADs with built in telecoils to their clients. One HHCP indicated that most clients seem to cope very well with only hearing aids on the phone and only in the case of severe to profound losses does it become necessary for ALDs to be bought/demonstrated, although it was found previously that hearing aid users still have telephone communication problems and those people with moderately-severe hearing losses found TADs beneficial. Another HHCP reported that after fitting digital hearing aids, her clients are experiencing fewer problems on the telephone. This was not, however, found amongst the hearing-impaired subjects interviewed in this study, who continue to struggle on landline telephones and cellular telephones even with digital hearing aids and irrespective of the degree of their hearing loss.

All HHCPs indicated that they required more information and training on one or more of the following areas, ranked in frequency:

- price quotations for the devices,
- exercising their clients' telecommunication device legal rights,

- demonstrations of TADs to clients and family members,
- the availability of TADs in South Africa,
- trouble-shooting TAD problems,
- practicing in the fitting, adjustment and maintenance of TADs
- TAD selection criteria to be provided to the client and his/her family (i.e. auditory vs. non-auditory devices, amplifying the ring versus amplifying speech over the telephone),
- the advantages and disadvantages of TADs,
- the function of the component parts and adjustments of TADs.

All areas need to be updated regularly and hence, one training package cannot be considered sufficient. Information in the training packages should be updated and made available to the HHCPs.

4.3. GENERAL COMMENTS

The general tendency amongst HHCPs was that there is a demand for written material which can be used as a reference for the HHCP, as this information is not readily accessible. Areas that should be included are what devices are available in South Africa, where they can be purchased, as well as their advantages and disadvantages. TAD prices were also an area that needed to be included. However, due to the fluctuations in prices, the manufacturers or supplies should make this information available on their websites. This would allow easy access of information for HHCPs. All areas would be beneficial, according to the HHCPs, to give to their clients. HHCPs who do not have any TADs in their practice or who do not work with these devices daily, reported that although a vast amount of information was covered, they needed written information to refresh their memories. Other HHCPs believed that an agency should offer demonstrations of all the available products, with referral to retailers if necessary. Information about the available TADs should be left in doctors' rooms, clinics and retirement homes. The same HHCP reported, according to her experience working with TADs, that the only way hearing-impaired clients can derive full benefit from TADs is through the HHCP participating in home visits. There, the HHCP can identify and try to improve the factors that could be affecting the client's use of the phone. He/she can then demonstrate and try out various devices on the client's phone and in their environment, as opposed to a quiet office and an unfamiliar telephone.

HHCPs reported that the training was very beneficial and many areas were covered, although they would have liked hands-on experience with the devices on a telephone line and the ability to call out and hear the difference between the devices. One HHCP suggested that the training be

developed into a day workshop so that more time could be allocated to practical hands-on experimentation with the devices using a telephone line.

The predominant factor identified amongst the HHCPs was that, before the training, they were unfamiliar with all ALDs, but especially with TADs. The training provided the HHCPs with the motivation to learn more about these systems and devices in order to provide a more comprehensive service to their clients. One HHCP summed up her thoughts: "*I found the training to be very helpful. I feel much more confident in providing information on TADs. I didn't realise the importance of including the need for TADs in my assessment, and recently provide all my patients with the available options for TADs*".

In the following and final cycle of this research project, a brochure was designed for the purpose of increasing awareness and knowledge of TADs amongst HHCPs and hearing-impaired persons specifically, but also to the professional organisations and training institutions. Included in the brochure were pictures of the available TADs, TAD features, advantages and disadvantages of TADs, TAD-candidacy issues and TAD-selection criteria. The brochure was disseminated to the participating HHCPs, professional organisations and training institutions.

4.4. SUMMARY AND CONCLUSION OF HHCP GROUP

In summary, the HHCP group was made up of 27 audiologists and one hearing aid acoustician practicing in and around the two main geographical areas in South Africa. The HHCPs were grouped according to the number of years of practice (1-5 years, 6-10 years and 10+ years). This allowed the researcher to analyze these groupings according to their tertiary education; educational institutions; site of practice; geographic location of practice; whether they included information about TADs; whether they included the telecoil component before and after the training; the number of TADs they owned; and whether they used Self Assessment Scales (SAS) in their practice. Results revealed only three differences. HHCPs with more than ten years of clinical experience tended to include SAS with their clients in the evaluation stage and would include information about TADs during audiological rehabilitation more often than those with less than ten years of experience. Finally, findings revealed that HHCPs in the 1-5 year group indicated that they had received information about TADs in their undergraduate education. Although it was expected that HHCPs in this group would have more recent information to include in their clients' rehabilitation programme, it was found that this information was not disseminated to their clients.

Sources of information about TADs came primarily from hearing aid dealers (only when it was specifically requested by the client or HHCP) followed by articles in academic journals. HHCPs qualifying in the past 1-5 years indicated receiving limited information and included only one lecture or handout. Similarly to limited knowledge of TADs, results from this group highlighted the limited audiological service provided to hearing-impaired persons. Only three HHCPs were currently providing audiological rehabilitation, and these were directed to cochlear implantees only.

The knowledge base of HHCPs relating to several aspects of TADs was assessed pre- and post-training. Post-training results revealed a significant improvement in the HHCPs' knowledge of, ability in and confidence with: the available TADs; the function of the component parts and adjustments of TADs; the demonstration of the use of TADs; the fitting, adjusting and maintenance of TADs; the advantages and disadvantages of TADs; why particular TADs are selected; trouble-shooting TAD problems; demonstrating TADS to family members; answering questions about TADs; TAD prices; providing price quotations for TADs; helping their clients exercise their legal rights regarding telecommunication.

After the training, HHCPs also felt that supplying TADs in addition to hearing aids was profitable. However, lack of knowledge of the available TADs, limited knowledge of the selection criteria, as well as limited knowledge in the fitting and use of the TADs were predominant reasons given for not including TADs as part of their rehabilitative services, despite them being profitable. This correlates with two significant findings obtained by the hearing-impaired subject group and with similar findings from another South African researcher (Reid, unpublished). Similarly, limited knowledge of the telecoil component and the possibilities and availability of the telecoil option in the hearing aid, were reasons supplied by the HHCP for omitting this component before the training. Post-training results revealed an increase in confidence, competency and information, although they still required additional information and training.

Less than half of the HHCPs did not have any TADs in their practice. This was found to be irrespective of their site of practice. A comparison of the TADs owned by the HHCPs and those selected as the most beneficial by the hearing-impaired group revealed interesting findings. Only two of the five TADs owned by the HHCPs were those selected by the hearing-impaired group ('CLARITY telephone' and the 'Phone Amp'. This mismatch highlights the importance of providing HHCPs with information found by the hearing-impaired subjects to be the most

beneficial. Another mismatch occurred when HHCPs were asked to indicate the limitations of the TADs from the training provided. Although some reports concurred with the HI group, others revealed differing reports on the same device. Only one HHCP purchased a TAD post-training. This may be due to the short time from the training until the completion of the questionnaires.

In conclusion, all HHCPs reported that more and updated information and training (including hands-on experience with TADs) in one or more areas relating to TADs would be beneficial. In addition, information covered in the training should be made available in a written form to be used as a reference.

5. IMPLICATIONS

PRACTICAL AND CLINICAL IMPLICATIONS

Results from this study revealed that the hearing-impaired subjects struggle to use the landline and cellular telephone, but lack information on how to improve their use. This is either through the use of TADs and or by using various available strategies and techniques. Those professionals who are servicing this population are also uninformed regarding the availability of the devices as well as in the identification, assessment and fitting of these devices for their clients. In addition, the hearing aid(s) worn by the subjects appeared to be underused during telephone communication, with half of the subjects removing them.

Consumer Education And Public Awareness

The hearing-impaired subjects in this study made several suggestions on how their telephone communication could be improved. These include, not only educating HHCPs regarding the availability of TADs, but also giving them hands-on experience with these devices; educating the hearing world on how to communicate effectively on the telephone with a hearing-impaired person; educating emergency personnel to communicate with hearing-impaired persons during an emergency call; and educating employees on how hearing-impaired employees could be effective in the workplace, if they were provided with TADs. Although subjects in this study were using alternative forms of remote communication such as e-mail, facsimiles and a mediator, they still desired to use the landline and cellular telephone. This highlights the importance of educating the hearing-impaired regarding available TADs, in addition to addressing ways to maximise communication via alternative forms. This route will ensure both greater independence, rather than fostering dependence on others and other means for remote communication needs.

Results from this study show that hearing-impaired people feel that the hearing public do not understand the impact of a hearing loss on communication, especially the telephone. Therefore, the issue of educating the public about the difficulties experienced over the telephone, should be acknowledged and addressed. This could be accomplished by involving and incorporating the Deaf organisations and welfare departments; SASHLA; AIA; hearing aid companies; TAD companies as well as Telkom; using media campaigns with posters, radio broadcasts and

television programmes focusing on the difficulties experienced by hearing-impaired persons over the telephone; as well as strategies on how to improve telephone communication.

Employers should be aware that individuals with hearing-impairments have the same capabilities as everyone else, other than hearing. Allowances should be made for issues such as telephone use. As was evident in the present study, technological advances are available today in the form of fax machines, e-mail and TDDs. Therefore, telephone communication difficulty need not jeopardise a hearing-impaired person's chances of employment. Results showed that despite the difficulties experienced by currently employed individuals with telephone use, all of the subjects managed to circumvent these difficulties by using other forms of telecommunications, either fax, e-mail or a mediator. For those hearing impaired individuals entering the work place, all employers should, according to the legislation, provide access to telecommunication devices which include TADs; text telephones; pagers; visual aids; e.g., flashing lights in place of the telephone ring; and computer facilities in order to allow them to fulfil their vocational potential.

Various authors have discussed the rehabilitation of individuals with severe-profound hearing impairment, indicating that early intervention and support in the workplace, through information to both management and workmates, would be of greater importance, as well as early prescription of assistive devices suitable for the working environment (Hallberg et al., 2000; Thomas et al., 1982). This is borne out by the results of this study.

Assessment

The beginning of any rehabilitative process involves the assessment of the clients' communication disability, their needs and current functioning. The evaluation of communication needs or disability is a difficult task. Four possible causes underlying this difficulty have been identified by Tye-Murray (1998) and were also found in this study. These are that handicap varies as a function of the setting and communication partner (e.g. conversation with unfamiliar people is more difficult than with familiars; handicap can vary as a function of the topic (e.g. familiar and predictable topics are easier than unfamiliar ones); handicap is not always obvious during conversations with the client (e.g. discussions between the HHCP and the client may not represent that person's communication ability); and communication handicap cannot be assessed by one measure since it has many dimensions. Several measures are needed in order to obtain a comprehensive idea of that person's communication handicap in day to day living.

The HHCP has available to him/her several procedures in order to quantify the extent of communication handicap. Apart from the interview process, SASs have also been developed for this purpose. From the results in this study, the hearing-impaired subjects reported that their telephone communication ability was not assessed during the initial assessment or during the hearing aid follow-up session. This study found that the majority of HHCPs were not using any form of SASs to assess their clients' communication needs, particularly on the telephone. During the assessment, the HHCP should determine their clients' telephone experiences. This means that the client describes how the telephone sounds, and what their problems with the telephone are. It is necessary to find out whether the problem occurs only with certain telephones, with all telephones, or with telephones in certain settings. Knowing this may help the professional to decide for or against amplification, or for changing the type of telephone used (Slager, 1989). This should preferably take place in the clients' home and/or work, in order for the HHCP to look at factors such as the type of telephone used, and the location of the telephone to assess whether those factors need to be changed. Various TADs can then be assessed on the clients' own telephone. The most beneficial TAD can then be more easily identified and selected based on the compatibility between the TAD and the telephone.

Education of HHCPs

Results from the HHCPs indicated a lack of undergraduate training in TADs. Hence, Compton (2000) advocates that student audiologists, but including all working audiologists and academics, be instructed on how to recognise those who would benefit from assistive technology; how to evaluate; recommend; and train clients on the use of assistive technology. Audiologists have formal and informal assessment tools to use with both voice and text telephone use. Since hearing numbers (as in telephone numbers and addresses) and letters (as in names of people or streets) pose a problem on a regular telephone, the audiologist must evaluate the client's ability to hear numbers, letters, proper names, as well as closed-set and open-set sentences. In addition, the audiologist should evaluate the effectiveness of coupling other ALDs (hearing aid with a telecoil versus the microphone setting (Wilson and Scott, 2000), portable telephone amplifiers and amplified handsets either with or without a hearing aid). For telephone use in the written format, i.e. TDDs, the audiologist should assess the client's ability to compose and type a comprehensible message, his/her typing skills, as well as reading comprehension.

An important finding in this study was the mismatch of information from the hearing-impaired persons and the HHCPs with regard to which TADs were beneficial. Hence, HHCPs should be

monitoring their caseloads in order to identify which of their subjects using TADs are benefiting from them. This information could be disseminated to HHCPs belonging to groups and associations such as AIA and SASHLA, respectively. Assessment for TADs should occur for all clients complaining of telephone communication difficulties, irrespective of age and employment status.

Results of the study showed that HHCPs required additional information on all areas addressed in the training. In addition, technology, like any other, is constantly changing and HHCPs require regular updates in terms of advancements in TAD availability, features and use. Hence, TAD training should be ongoing and include information about the latest technological developments. This can be achieved through Continuing Professional Development (CPD), a policy that has been finalised by the Professional Board for Speech, Language and Hearing Professions in consultation with relevant participants and training institutions (Health Professions Council of South Africa, 2000).

Training For Hearing-Impaired by HHCPs

Training or workshops should address and include telephone training skills - teaching individuals the different cueing and communication strategies, how to use them and how to train their conversational partners in their use. Training should also include demonstrations of handset placement for both hearing aid and cochlear implantees. For those with more profound losses, they should be provided with instructions on how to make a telephone call in case of an emergency, as well as different effective coping strategies that could successfully be used by hearing impaired persons. One way of demonstrating the benefits of ALDs is to provide case studies of those persons who have themselves reported benefits from various devices. Wilson and Scott (2000) also recommend the use of role-play, where different types of telephone conversations, such as calling to make a doctor's appointment, or a reservation at a restaurant, can be played out and then analysed. It is also necessary for the audiologist to explain to the client that he/she will have reactions to newly used devices (or a newly acquired communication behaviour such as assertiveness), and this is important to discuss.

One method of ensuring that hearing-impaired people continuously use their hearing aid(s) is through pre-amplification counselling by their HHCPs. Pre-amplification counselling includes focusing on the many reasons why hearing aids, however sophisticated, may not resolve all of the their communication difficulties (for e.g., during adverse listening situations and with cellular telephones). If patients acknowledge this, not only is the likelihood of them returning the

hearing aid minimised, he/she will be more open to use assistive technology (Meadows Beyer & Northern, 2000). In addition, pre-hearing aid fitting will allow the HHCP to inform their clients that assistive technology circuitry cannot be incorporated into some hearing aids, due to space requirements (Palmer, 2001). However, research has found that some clients are willing to sacrifice cosmetics for better hearing, after the advantages and disadvantages of the various technologies have been discussed (Compton 1995 in Tyler & Schum, 1995). Incorporating telecoil circuitry into a hearing aid before fitting will minimise the costs and time spent without amplification. Hence, pre-amplification counselling should be carried out in order for the HHCP to discuss with their clients the various types of hearing aids available that will be compatible with the telephone. In addition, HHCPs should discuss the benefits of including telecoil circuitry in to hearing aids. Besides for the benefits of TADs with built-in telecoil, one benefit that should be highlighted is the use of public telephones that have built in inductive couplers. This will not only allow their client to use public telephones in noisy areas, but obtain the amplification provided by their hearing aid.

Counselling

Counselling the clients and their family members is also vital. Counselling should include the reasons for their communication difficulties on the telephone. This is by informing their clients how damage to the cochlear adversely affects their speech discrimination ability and hence, what is to be expected in terms of speech discrimination (especially on the telephone) by those with sensori-neural hearing losses. This will allow for realistic expectations from their use of the telephone and TADs. This is relevant for both hearing aid users and cochlear implantees. Including counselling on the acceptance of a hearing loss and its subsequent handicaps, a hearing-impaired person will be more inclined to use a hearing aid and/or TAD. In addition, the user will also be less likely to select a TAD based on its size, but rather on the benefits derived from the device. Counselling should also focus on assertiveness training. This will help the client to be more assertive about their hearing loss on the telephone and request the speaker to use various communication strategies. These could include decreasing their rate of speech, normalising speech volume, introducing themselves, identifying the purpose for the call and the topic of conversation.

Technical Training

There are various solutions available for the HHCP to include and maximise their clients'

telephone communication ability through telecoil circuitry. Due to the miniaturization of hearing aids, many are not being fitted with telecoils. However, where possible, all hearing aids should be fitted. A pre-amplifier can be provided for the telecoil that will increase its power. Some programmable hearing aids are able to increase the low frequency emphasis that will enhance the frequencies that are passed by the telephone. This emphasis may also be able to reduce feedback caused by the close proximity between the hearing aid and telephone receiver (Palmer, 2001). Although HHCPs are aware of this technology, the programmes available on the hearing aids are often not used for telecoil. Because of the great variability in telecoil power and frequency responses of hearing aids, it is recommend that HHCPs conduct real-ear measures with telecoils to ensure they function properly. When telecoil technology is implemented in a hearing aid, the patient must be instructed concerning its proper use. Hearing aid manufacturers should be providing this information during the launch of their hearing aids, and continue to provide assistance to the HHCPs on new developments and solutions on how to best include telecoil circuitry in their clients' hearing aids.

The general trend amongst the hearing-impaired subjects in this study was that they were unaware of the available TADs, and if they would not indicate their telephonic difficulties to their HHCP, they would not be informed or shown any device. Similarly, the majority of HHCPs in this study did not have demonstration models to show their clients or display areas of the devices they did have in their practices. It is assumed that a visible display of the available devices, or the creation of a "home-like environment" in the HHCPs office or practice would allow the hearing-impaired clients to try out a variety of appropriate devices together with their HHCPs. This would require the TAD manufacturers or suppliers to get involved. This would include providing demonstration models free of charge to the HHCPs who would be recommending these to their clients.

The limited knowledge of the HHCPs in the fitting, adjusting and maintaining of TADs; the function of the component parts and adjustments of TADs; their ability to demonstrate the use of TADs; their knowledge of how to trouble-shoot TAD problems; their ability to demonstrate TADs to family members; their confidence in answering questions about TADs; and their ability to provide price quotations for TADs could be improved by getting the manufacturers or suppliers of these devices, where appropriate, to educate their customers (the HHCPs) in the above. This could be done in a workshop or demonstrations, similar to hearing aid launches or workshops by the various manufacturers. Written material should be provided, as well as videotapes of the use of these devices. These then can be shown to the hearing-impaired client

and written information can be taken home for future reference. Manufacturers or suppliers of these devices can also provide updated information on their websites, which can be accessed by the HHCPs, hearing-impaired persons and the general public.

Advocacy

Although the rights of people with disabilities are enshrined in the Constitution, there is, as yet, no disability specific legislation. According to the White Paper on Integrated National Disability Strategy (1997), legislation has contributed to the social exclusion of persons with disabilities, for two reasons. It fails to protect the rights of people with disabilities and, through legislation, barriers have been created that prevent people with disabilities from accessing equal opportunities. Disabled persons have a need to be acknowledged as equal citizens and should thus enjoy equal rights and responsibilities. Resources must be utilized so to ensure that every individual has equal opportunities for participation in society. This refers to employment and access to telecommunication. The Employment Equity Act (no 55 of 1998) and the South African Telecommunication Act (103 of 1996) have been designed for this purpose. Individuals with disabilities who have been discriminated against, for example, in the workplace, are able to approach the courts. According to the Constitution, HHCPs can approach the courts on behalf of their clients, or as part of an organization (e.g. DEAFSA) acting in the interest of its members. However, many hearing-impaired subjects in this study as well as their HHCPs were not aware of their basic rights of equal opportunity, especially in the workplace. This indicates the need for hearing-impaired persons to become better advocates, not only for themselves, but also for all hearing-impaired persons in this country. Similarly, HHCPs should be familiar with the Bill of Rights and the various Acts. This knowledge may help their clients to prevent unfair discrimination in the workplace and high unemployment levels.

The White Paper on Integrated Disability Strategy (1997) describes rehabilitation as a process to help people with disabilities so that they may become fully participating members of society. This includes access to all the benefits and opportunities of that society. One component of rehabilitation is that of assistive technology, which includes TDDs. According to this White Paper, the initiatives to develop assistive technology that is both appropriate and affordable, has occurred in isolation from general technology development (i.e. they are aimed at a 'special market') and there has been little participation by consumers or collaboration between the various sectors and agencies. According to Sutherland (1995), to achieve universal accessibility, one requires strong advocacy on the part of consumers and HHCPs. This is in order to provide public education and allowing for barrier-free access to public facilities. Consumers here, refer

to the hearing-impaired persons themselves or members of the general population. Consumers should advocate for improved access to equipment via the Department of Social Services and Welfare. HHCPs should become involved in lobbying for more affordable and appropriate assistive technology. This can be achieved by imparting their knowledge of the benefits of this technology for hearing-impaired individuals. This can take place through DEAFSA or through Disabled People South Africa (DPSA).

Results from this study have shown that the importance of and need for TADs cannot be underestimated. More so, the benefit of using TADs for the four million hearing-impaired persons in South Africa who may be unaided, aided with analogue hearing aids and/or who live in adverse listening conditions cannot be underrated. Although this subject group is not representative in many ways of all of the four million South Africans with hearing loss, it does, however, highlight the telephone communication needs of all hearing impaired persons.

IMPLICATIONS FOR FURTHER RESEARCH

Further studies on the same topic should be performed with a more representative sample of hearing-impaired subjects. This relates to age range, socio-economic status, levels of hearing loss and language (including Xhosa speaking subjects in further studies). The questionnaire for the hearing-impaired should be translated into other South African languages in order to obtain a more representative sample of subjects across South Africa. Similarly, a more representative sample of HHCPs should be obtained from areas other than Gauteng and the Western Cape, as well as from other disciplines, such as hearing aid acousticians. Future research should investigate the long-term effects of the training on both the HHCPs and their hearing-impaired clients. It is assumed that with a longer period of time as well as the provision of the brochure, more HHCPs who took part in the training, and other professionals who received the brochure, will purchase TADs. They would also design SASs to suit the needs of their clients; create display areas to show their clients; and most importantly, include TADs into their rehabilitative service. Hence, a follow-up study looking at these factors would be beneficial for the HHCPs, their clients, and the manufacturers and suppliers of these devices. Future research could include the design of a videotape to be used as an educational tool for HHCPs and for demonstration to hearing-impaired persons. An increase in the up-take of these devices by both the HHCPs, as well as the hearing-impaired population would hopefully increase the market size, and thus lead to greater volume production, and lower estimated costs of the devices.

LIMITATIONS OF THE STUDY

Limitations of this study include the small sample size, which made generalisation difficult. Within the sample itself, there was an unequal distribution ratio of gender, employment and language. Xhosa subjects were not included due to the limited knowledge of the language by the researcher. More employed subjects would have provided further information regarding the use of TADs in the workplace. A longer period of time elapsing between the training and the post-training questionnaire would have allowed the HHCPs to purchase more TADs and experiment with them in their practises with their clients. These factors are a result of the scope of the present study.

In summary, an action research methodology was chosen for this study as it encompassed the aims of both action and research simultaneously. In this type of research, cycles, which consist of at least four primary elements: planning or intention, action, observation and reflection or critique are used. In this study, three main components formed three action-research cycles. In Cycle 1, the TADs were collected, the QHI was designed and information from the hearing-impaired subjects' responses and their hands-on experiences with the TADs was collected and analysed. Information from Cycle 1 was then carried over to Cycle 2 in which training for the HHCPs was developed, executed and the responses observed and analysed. In the final cycle, (Cycle 3), information from both cycles was used to design the information brochure, which was disseminated to the participating HHCPs, to the professional organisations and to training institutions.

6. CONCLUSION

In conclusion, hearing-impaired persons with varying degrees of hearing loss have telephone communication difficulty, both with landline and cellular telephone use. Although assistive technology is available in South Africa in the form of TADs, very few hearing-impaired persons in this study used them. Limited knowledge of the available devices was the predominant reason for the lack of use. Similarly, many HHCPs are uninformed of the availability and use of TADs. TAD training for the HHCPs resulted in improved knowledge of TADs, and confidence in recommending and incorporating these devices into their practices. For optimal telephone communication by hearing-impaired persons to be effective, awareness of the availability of TADs must occur, by both the hearing-impaired population, and especially the professionals servicing them. One way this could be achieved is through the provision of regular training for

the HHCPs to educate and update them about the latest available technology and through the availability of written information (brochure) to the HHCPs, the professional bodies and especially training institutions.

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APPENDIX 1(a)

INFORMED CONSENT FORM FOR THE HEARING-IMPAIRED SUBJECTS

(ENGLISH)

Name:_____ Date: _____

The purpose of this research is to educate both hearing impaired people and hearing health care professionals about telecommunication devices. All information will be collected through questionnaires and there are no risks to you.

I understand that I am participating in this research project and I give my permission for:

1. this interview to be tape recorded
2. the findings from this project to be published
3. the researcher to access my audiology records

All participation is voluntary and you have the right to withdraw from the study at any time. All audio taped interviews will be destroyed after use.

I understand that all information received and used will remain confidential and that anonymity will be guaranteed.

Signature of participant: .....

Signature of researcher:.....

Signature of witness: .....

APPENDIX 1(b)

INFORMED CONSENT FORM FOR THE HEARING-IMPAIRED SUBJECTS

(AFRIKAANS)

Naam:_____ Datum: _____

Die doel van hierdie navorsing is om beide gehoorgestremde mense en oodiologe/ gehoorapparaat akoestikuse oor telekommunikasie-toestelle op te voed. Alle inligting sal deur middle van vraelyste ingesamel word, en daar is geen risikos vir u nie.

Ek verstaan dat ek deelneem in hierdie navorsings projek en ek gee my toestemming dat:

1. hierdie onderhoud op oudioband opgeneem kan word.
2. die bevindinge van hierdie projek gepubliseer gaan word.
3. die navorser toegang sal hê tot my oudiologie rekords.

Ek verstaan dat my deelname vrywilliglik is, en dat ek die reg het om enige tyd van die studie te onttrek sonder enige vooroordeel teen my huidige behandeling/ondersteuning.

Ek verstaan dat al die inligting wat ontvang en gebruik is, sal vertroulik bly en dat anonimiteit gewaarborg sal word. Al die onderhoude wat op oudiobande is, sal na die navorsing, verniel word.

Handtekening van deelnemer:.....

Handtekening van navorser:.....

Handtekening van getuie:.....

APPENDIX 1(c)

INFORMED CONSENT FORM FOR THE HEARING HEALTH CARE PROFESSIONALS (ENGLISH)

Name: _____ Date: _____

The purpose of this research is to educate both hearing impaired people and hearing health care professionals about telecommunication devices. All information will be collected through questionnaires and there are no risks to you.

I understand that I am participating in this research project and I give my permission for the findings from this project to be published

I understand that all participation is voluntary and that I have the right to withdraw from the study at any time.

I understand that all information received and used will remain confidential and that anonymity will be guaranteed.

Signature of participant:.....

Signature of researcher:.....

APPENDIX 1(d)

INFORMED CONSENT FORM FOR THE HEARING HEALTH CARE PROFESSIONALS (AFRIKAANS)

Naam: _____ Datum: _____

Die doel van hierdie navorsing is om beide gehoorgestremde mense en oodiologe/ gehoorapparaat akoestikuse oor telekommunikasie-toestelle op te voed. Alle inligting sal deur middle van vraelyste ingesamel word, en daar is geen risikos vir u nie.

Ek verstaan dat ek deelneem in hierdie navorsings projek en ek gee my toestemming dat die bevindinge van hierdie projek gepubliseer gaan word.

Ek verstaan dat my deelname vrywilliglik is, en dat ek die reg het om enige tyd van die studie te onttrek.

Ek verstaan dat al die inligting wat ontvang en gebruik is, sal vertroulik bly en dat anonimiteit gewaarborg sal word.

Handtekening van deelnemer:.....

Handtekening van navorser:.....

APPENDIX 2

QUESTIONNAIRE FOR THE HEARING-IMPAIRED SUBJECTS

1) BIOGRAPHICAL INFORMATION

1. Name_____
2. Age _____
3. Male/Female _____
4. How would you describe yourself?

Deaf	Hard-of-hearing	Hearing-impaired	deafened	Hearing	Other

5. If you know the degree of your hearing loss, is it:

Mild	
Moderate	
Moderately-severe	
Severe	
Profound	

6. Residential area _____
7. Residential status

Living alone	
Living with family	
Living in a dormitory, residence	

- If you are living with family, how are they related to you? Please give details_____

8. Hearing status of those living with you

Deaf	Hard-of-hearing	Hearing-impaired	Deafened	Hearing	Other

9. Did you leave school with qualifications?

Std 8 (Junior Certificate)	Matric (Senior Certificate)	Other

10. Did you go on with further education?

University Degree	Training College	Other

11. Employment status

Currently Employed	
Unemployed	
Retired	

- If you are recently unemployed, what was your previous job and why did you stop working? _____

12. If employed, what is your profession?

Unskilled	
Skilled	
Professional	

13. Where do you work? _____

14. Your monthly take-home income is between

Under R1000	R1000-R5000	R5000-R8000	R8000-R10 000	R10 000 +

15. Do you use any form of amplification?

Hearing aids	
Cochlear implant	

16. If you wear hearing aids, what type do you use?

Type of hearing aid	✓	**Unilateral (1)**	**Bilateral (2)**
ITE			
ITC			
BTE			
Body aid			
Other			

17. How long have you used these? _____

18. What were you using before these hearing aids? _____

19. Why did you change to your current hearing aids? _____

20. Where did you obtain the above?

Audiologist	
Hearing aid acoustician	
Hearing aid dealer	
ENT	
Other	

21. Did you receive any rehabilitative services?

Yes	
No	

22. If yes, which?

Counselling	
Information regarding assistive listening devices (ALDs)	
Provision of ALDs	
Speech reading	
Other?	

If other, please specify_____

2) USE OF THE TELEPHONE

1. Do you own a landline telephone at home?

Yes	
No	

2. If yes, what type of telephone do you own?

Telkom	
Other, give details	

3. If no, why not?

_____

_____

4. Do you own a landline telephone at work?

Yes	
No	

5. If yes, what type of telephone do you own?

Telkom	
Other, give details	

6. If no, why not?

_____

_____

7. Where do you use the telephone?

At home	
At work	
Travelling and social activities	
Other	

8. If yes, how often do you use the telephone?

Always	Home	Work	Other
Often			
Seldom			
Never			

9. Please explain your answer above?

_____

10.

a) Can you carry on a telephone conversation without difficulty?

Yes	No

b) Can you hear the telephone ring when you are in the same room as the phone?

Yes	No

c) Can you hear the telephone ring when you are in the next room?

Yes	No

11. :

a) I know that I can use the telephone to obtain the help I need in an emergency

0	1	2	3	4	5
Not applicable	Disagree strongly				strongly agree

b) I have great confidence that the information I obtain over the telephone is accurate.

0	1	2	3	4	5
Not applicable	Disagree strongly				strongly agree

c) I enjoy using the telephone to keep in contact with friends and family

0	1	2	3	4	5
Not applicable	Disagree strongly				strongly agree

d) The telephone is a necessary device in my life

0	1	2	3	4	5
Not applicable	Disagree strongly				strongly agree

3) SATISFACTION OF TELEPHONE USE WITHOUT TELECOMMUNICATION DEVICES/SYSTEMS

1. How would you rate your ability to communicate on the telephone?

   A) Without any attachments

1	2	3	4	5
Impossible	extremely difficult	difficult	adequate	with great ease

2. How satisfied are you with your telephonic communication in general:

A) without attachments

1	2	3	4	5
Not at all				very satisfied

3. What problems on the telephone do you have difficulties in

Problem areas	**Yes**	**No**
Hearing the telephone ring		
Hearing speech over the telephone		

4. If you use hearing aid(s) or have a cochlear implant, please indicate whether you have difficulties with the above either with or without your hearing aid(s) or cochlear implant

Problem areas	**With hearing aid(s) or cochlear implant**	**Without hearing aid (s) or cochlear implants**
Hearing the telephone ring		
Hearing speech over the telephone		

5. Please indicate where you have difficulties hearing the telephone ring

Where	**With hearing aid(s) or cochlear implant**	**Without hearing aid (s) or cochlear implants**
At home		
At work		
Public telephones		
At other people's homes		

6. Please indicate where you have difficulties hearing speech over the telephone

Where	**With hearing aid(s) or cochlear implant**	**Without hearing aid (s) or cochlear implants**
At home		
At work		
Public telephones		
At other people's homes		

4) USE OF TELECOMMUNICATION DEVICES/SYSTEMS

1. Have you sought help for improving your telephonic communication?

Yes	No

2. If not, why not?_____

3. If yes, from whom?

Audiologist	
Hearing aid dealer	
Hearing aid acoustician	
Ear, Nose and Throat Specialist	
Other, give details	

4. Did the above recommend a device/system for you to use?

Yes	No

5. If yes, which device was recommended?_____

6. Did you purchase any devices/systems?

Yes	No

7. If yes, what did you purchase? _____
8. If no, why not? _____
9. Please indicate the following:

System	**Have Used**	**Presently use**	**Where? (home, work, public telephones and other social activities, other)**
T80 Telephone Amplifier (Logia)			
Auriald, TE 2002 (Special Telephone for hearing aid users) (Teknimed)			
Portable telephone amplifier, TE 2001 (Teknimed)			
Hear-a-Phone (HASS)			

AT&T portable telephone amplifier (HASS)			
CLARITY Telephone (HASS)			
CLARITY portable high frequency amplifier (HASS)			
Phone-Amp (Telkom)			
Teldem (Telkom)			
Telephone ringer with flasher (Telkom)			
Nokia inductive loopset LPS-1			
Ericsson T-Hook			

For the device(s)/system(s) you have used in the past:

10. When did you purchase it?_____

11. How long did you use the device/system?_____

12. If you are not using the system, please give details why you stopped?

_____

For the device(s)/system(s) that you are currently using:

13. When did you purchase it?_____

14. How long have you been using the device/system?_____

15. If you are not satisfied, what areas do you still have difficulty in?

A) Hearing the telephone ring:

Where	**With hearing aid(s) or cochlear implant and your device/system**	**Without hearing aid (s) or cochlear implants and your device/system**
At home		
At work		
During travelling		
At other people's homes		

- Other, give details _____

B) Hearing speech over the telephone:

Where	**With hearing aid(s) or cochlear implant and your device/system**	**Without hearing aid (s) or cochlear implants and your device/system**
At home		
At work		
During travelling		
At other people's homes		

16. What was it about the product that appealed to you?

For each product state:

Ease of use	
Compatibility with hearing aid(s)	
Cost factor	
Cosmetic appeal	
Manual dexterity	
Convenience	
Family members can use the phone with this device	

- Please give details?_____

17. If you have not ever used the above, please indicate why?

Difficult to use	
Not compatibility with hearing aid(s)	
To expensive	
Not cosmetically appealing	
Poor manual dexterity	
Too inconvenient	
Have never heard of the available systems	
Family members can not use the phone with this device	

18. When looking to purchase and use a device/system, what will attract you to purchase one product over the other? _____

5) SATISFACTION OF TELEPHONE USE WITH TELECOMMUNICATION DEVICES/SYSTEM

1. How satisfied are you with your telephonic communication in general:

B) with attachments

1	2	3	4	5
Not at all				very satisfied

2. How would you rate your ability to communicate on the telephone with attachments

1	2	3	4	5
Impossible	extremely difficult	difficult	adequate	with great ease

3. For each of the attachments/device/system you use:
   - How satisfied are you with your use of the above?

1	2	3	4	5
Not at all				Very satisfied

   - How would you rate your telephonic communication with the above?

1	2	3	4	5
Extremely poor				Excellent

6) SATISFACTION WITH CURRENT SERVICE DELIVERY FOR HEARING IMPAIRMENT

1. Does a hearing problem cause you to use the phone less than you would like?

Yes	Sometimes	No

2. Do you believe that your rights as a hearing impaired person are being met according to the rights and legislation of the country?
   - If yes, why? _____
   - If no, why not? _____

3. If no, what do you feel could be done to change the situation?

   _____

4. What do you feel/think could improve your use of the telephone?_____

Why?_____

5. Do you feel that improved telephonic communication will help or enhance your:

Employment opportunities	
Educational opportunities	
Social activities	
Ability to use public telephones	
Familial relationships	
Sense of security	
Sense of self	

Please give details

_____

_____

APPENDIX 3

QUESTIONNAIRE VIR DIE GEHOOR-GESTREMDE

1) BIOGRAPHICAL INFORMATION

1. Naam_____
2. Ouderdom _____
3. Manlik/vroulik _____
4. Hoe sal jy jouself beskryf?

Doof	Hardhorend	Gehoor-gestremd	Doof geword	Horend	Ander

5. As jy die graad van jou gehoorverlies ken, is dit:

Gering	
Matig	
Matig-erg	
Erge	
Uitermatig	

6. Woonadres _____
7. Residensiele status

Woon alleen	
Woon met familie	
Woon in a koshuis	

- As jy met jou familie woon, hoe is julle verwant?

Gee asseblief besonderhede_____

8. Gehoorstatus van die gene wat met jou bly

Doof	Hardhorend	Gehoor-gestremd	Doof geword	Horend	Ander

9. Het jy skool met kwalifikasies verlaat?

Std 8 (Junior Sertifikaat)	Matriek (Senior Sertifikaat)	Besonderhede

10. Het jy met verdere studies voortgegaan?

Universiteitsgraad	Kollege	Besonderhede

11. Werkstatus

Werk tans	
Werkloos	
Afgetree	

- As jy onlang werkloos is, wat was jou vorige werk en hoekom het jy ophou werk?

_____

12. As jy werk, wat is jou beroep?

Onbekwaam	
Bekwaam	
Professioneel	

13. Waar werk jy? _____

14. Jou maadelikse huis-toe-vat inkomste is tussen:

Minder as R1000	R1000-R5000	R5000-R8000	R8000-R10 000	R10 000 +

15. Gebruik jy enige vorm van gehoorversterking?

Gehoorapparate	
Koglêere implanting	

16. As jy n gehoorapparaat gebruik, watter tipe gebruik jy?

Tipe gehoorapparaat	✓	**Unilateraal (1)**	**Bilateraal (2)**
In die oor			
In die kanaal			
Agter die oor			
Liggaams apparaat			
Ander			

17. Hoe lank het jy hierdie gebruik?_____

18. Wat het jy voor die gehoopapparate of koglêere implanting gebruik? _____

19. Hoekom het jy jou huidige gehoorapparaat of koglêere implanting verander?_

20. Waar het jy die bogenoemde verkry?

Oudioloog	
Gehoorapparaat akoestikus	
Gehoorapparaat handelaar	
Ooor-neus-en keel spesialis	
Ander	

21. Het jy rehabilitasie dienste ontvang?

Ja	
Nee	

22. Indien ya, watter?

Raad oor gehoorverlies	
Inligting in verband met (ALDs)	
Voorsiening van ALDs	
Spraaklees	
Ander	

Indien ander, gee besonderhede asseblief_____

2) GEBRUIK VAN DIE TELEFOON

1. Besit jy a landlyn telefoon by die huis?

Ja	
Nee	

2. Indien ja, watter tipe telefoon besit jy?

Telkom	
Ander, gee besonderhede	

3. Indien nee, hoekom nie?

_____

4. Het `n landlyn telefoon by die werk?

Ja	
Nee	

5. Indien ja, watter tipe telefoon besit jy?

Telkom	
Ander, gee besonderhede	

6. Indien nee, hoekom nie?

_____

7. Waar gebruik jy die telefoon?

By die huis	
By die werk	
Reis en sosiale aktiwiteite	
Ander	

8. Indien ja, hoe gereeld gebruik jy die telefoon?

Altyd	Huis	Werk	Ander
Gereeld			
Wynig			
Nooit			

9. verduidelik asseblief jou bogenoemde antwoord?

_____

10.

a) Kan jy `n telefoongesprek voer sonder om te sukkel/ swaar te kry?

Ja	Nee

b) Kan jy die telefoon hoor lui as jy in dieselfde kamer as die telefoon is?

Ja	Nee

c) Kan jy die telefoon hoor lui wanneer jy in n ander kamer is?

Ja	Nee

11.

a) Ek weet dat ek die telefoon kan gebruik om die nodige hulp te verkry in a noodgeval

0	1	2	3	4	5
Nie van Toepassing	stem glad nie saam nie				stem sterk saam

b) Ek het groot selfvertroue dat die inligting wat ek oor die telefoon verkry, korrek is

0	1	2	3	4	5
Nie van Toepassing	stem glad nie saam nie				stem sterk saam

c) Ek geniet om die telefoon te gebruik om met vriende en familie in kontak te bly

0	1	2	3	4	5
Nie van Toepassing	stem glad nie saam nie				stem sterk saam

d) Die telefoon is `n nodige apparaat in my lewe

0	1	2	3	4	5
Nie van Toepassing	stem glad nie saam nie				stem sterk saam

3) TEVREDENHEID VAN TELEFOONGEBRUIK SONDER TELEKOMMUNIKASIE APPARATE/ STELSELS

1. Hoe sal jy jou vermoë om op die telefoon te kommunikeer?

   A) sonder apparate/ stelsel

1	2	3	4	5
Onmoontlik	vreeslik moeilik	moeilik	redelik	met groot gewak

1. Hoe tevrede is jy met jou telefoon kommunikasie in die algemeen?

A) Sonder apparate/ stelsel

1	2	3	4	5
Glad nie				baie tevrede

2. Watter probleme met die telefoon vind jy moeilik?

Probleem areas	**Ja**	**Nee**
Om die telefoon te hoor lui		
Om spraak oor die telefoon te hoor		

3. As jy ´n gehoorapparaat of koglêere implanting het, dui asseblief aan of jy probleme met of sonder jou gehoorapperaat of koglêere implanting ondervind

Probleem areas	**Met ´n gehoorapparaat of koglêere implanting**	**Sonder ´n gehoorapparaat of koglêere implanting**
Om die telefoon te hoor lui		
Om spraak oor die telefoon te hoor		

4. Dui asseblief aan waar dit moeilik is om die telefoon te hoor lui

Waar	**Met ´n gehoorapparaat of koglêere implanting**	**Sonder ´n gehoorapparaat of koglêere implanting**
By die huis		
By die werk		
Publieke telefone		
By ander mense se huise		

5. Dui asseblief aan waar dit vir jou moeilik is om spraak oor die telefoon te hoor

Waar	**Met n gehoorapparaat of koglêere implanting**	**Sonder n gehoorapparaat of koglêere implanting**
By die huis		
By die werk		
Publieke telefone		
By ander mense se huise		

4) GEBRUIK VAN TELEKOMMUNIKASIE APPARATE/ STELSEL

1. Het jy hulp gesoek om jou telefoon kommunikasie te verbeter?

Ja	Nee

2. Indien nee, hoekom nie?_____

3. Indien ja, van wie?

Oudioloog	
Gehoorapparaat akoestikus	
Gehoorapparaat handelaar	
Ooor-neus-en keel spesialis	
Ander	

4. Het die bogenoemde ´n apparaat of stelsel voorgestel vir jou om te gebruik?

Ja	Nee

5. Indien ja, watter apparaat was voorgestel?_____

6. Het jy enige apparaat gekoop?

Ja	Nee

7. Indien ja, wat het jy gekoop? _____
8. Indien nie, hoekom nie? _____
9. Het jy vir die oudioloog van jou probleme/moeilikhede met die telefoon vertel?
   _____
10. Indien ja, wat het hy/sy aangeraai/voorgestel?_____
11. Het jy dit probeer?_____
12. Indien ja, was dit suksesvol?_____
13. Indien ja, hoekom dink jy so?_____
14. As jy dit nie probeer het, hoekom nie ?_____
15. Het jy op jou eie navraag gedoen/gekyk na apparate wat jou kan help met die telefoon?_____

16. Indien ja, wat het jy gevind?_____

17. Het dit gehelp?_____

18. Indien nie, hoekom nie?_____

19. Toe jou oudioloog jou gehoorapparaat evaluasie gedoen het, wat het hy/sy oor die T knoppie gesê?_____

20. Het jou oudioloog jou aangeraai om n T knoppie in te sluit in jou gehoorapparaat.)_____

21. Besit jy 'n sellulêre telefoon?_____

22. Indien ja, is dit 'n analoog of digitale foon?_____

23. Indien ja, ervaar jy enige probleme om spraak oor die sellulêre telefoon te hoor? _____

24. Indien ja, watter probleme het jy? (probleme om spraak te hoor)_____

25. Indien daar steuringe is, kan jy dit beskryf?_____

26. Wat doen jy as die selfoon lui? (skakel die gehoorapparaat af, haal die apparaat uit, antwoord die oproep met die gehoorapparaat, gebruik n stelsel)_____

27. As jy enige van die bogenoemde doen, help dit?_____

28. Dui asseblief die volgende aan:

Stelsel	**Het gebruik**	**Huidige gebruik**	**Waar? (huis, werk, publieke telefoone en ander sosiale aktiwiteite**
T80 Telefoon versterker (Logia)			
Auriald, TE 2002 (Spesiale telefoon vir gehoorapparaat gebruikers) (Teknimed)			
Draagbare telefoon versterker TE 2001 (Teknimed)			
Hear-a-Phone (Phonak)			
AT&T Draagbare telefoon versterker (HASS)			
CLARITY Telefoon (HASS)			

CLARITY draagbare hoë frekwensie versterker (HASS)			
The Phone-Amp (Telkom)			
Teldem (Telkom)			
Telefoon ringer met flitser (Telkom)			
Nokia Induksie "loop" LPS-1			
Ericsson T-Hook			

Vir die apparaat/stelsel wat jy in die verlede gebruik:

29. Wanneer het jy dit gekoop?_____

30. Hoe lank het jy die apparaat/stelsel gebruik?_____

31. Indien jy nie die stelsel gebruik nie, gee besonderhede oor hoekom jy opgehou het?

_____

Vir die apparaat/ stelsel wat jy tans gebruik:

32. Wanneer het jy dit gekoop?_____

33. Hoe lank gebruik jy die apparaat/ stelsel?_____

34. Indien jy nie tevrede is nie, in watter areas het jy steeds probleme?

A) Om die telefoon te hoor lui:

Waar	**Met ´n gehoorapparaat of koglêere implanting en die apparaat of stelsel**	**Sonder ´n gehoorapparaat of koglêere implanting en die apparaat of stelsel**
By die huis		
By die werk		
Publieke telefone		
By ander mense se huise		

- Ander, besonderhede_____

B) Spraak oor die telefoon te hoor:

Waar	**Met ´n gehoorapperaat of koglêere implanting en die apparaat of stelsel**	**Sonder ´n gehoorapperaat of koglêere implanting en die apparaat of stelsel**
By die huis		
By die werk		
Publieke telefone		
By ander mense se huise		

35. Wat was dit van die produk waarvan jy gehou het?

Vir elke produk:

Gemak van gebruik	
Kan gebruik word met gehoorapparate	
Prysfaktor	
Kosmetiese voorkoms	
Maklik hanteerbaar	
Gerieflikheid	
Familielede kan nie die telefoon met hierdie apparaat gebruik nie	

- Gee asseblief besonderhede?_____

36. Indien jy nooit die bogenoemde gebruik het nie, dui asseblief aan hoekom?

Moeilik om te gebruik	
Kan nie met gehoorapparate gebruik word nie	
Te duur	
Nie kosmeties aantreklik nie	
Moeilik hanteerbaar	
Te ongerieflik	
Het nog nooit van die beskikbare stelsels gehoor nie	
Familielede kan nie die foon met hierdie stelsel gebruik nie	

37. Wanneer jy belang stel om ´n apparaat of stelsel te koop en gebruik, wat sal jou oorwin om een produk bo ´n ander te koop? _____

5) TEVREDENHEID VAN TELEFOONGEBRUIK MET TELEKOMMUNIKASIE APPARATE/ STELSEL

1. Hoe tevrede is jy met jou telefoonkommunikasie in die algemeen:

B) Met apparate/stelsels

1	2	3	4	5
Glad nie				baie tevrede

2. Hoe sal jy jou vermoë om oor die telefoon te kommunikeer met apparate/stelsels

1	2	3	4	5
Onmoontlike	vreeslik moeilik	moeilik	redelik	met groot gewak

3. Vir elk van die apparate/stelsels wat jy gebruik:
   - Hoe tevrede is jy met jou gebruik van die bogenoemde?

1	2	3	4	5
Glad nie				baie tevrede

   - Hoe sal jy sê jou telefoonkommunikasie met die bogenoemde is?

1	2	3	4	5
Vreeslik swak				Uitstekend

6) TEVREDENHEID

1. Veroorsak n gehoorprobleem dat jy die telefoon minder as wat jy gebruik?

Ja	Somtyds	Nee

2. Glo jy dat jou regte as ´n gehoorgestremde persoon gemeet word volgens die regte en wetgewing van die land?
   - Indien ja, hoekom? _____
   - Indien nie, hoekom nie? _____

3. Indien nee, wat voel jy kan gedoen word om die situasie te verander?

   _____

4. Wat voel/dink jy kan jou telefoongebruik verbeter? _____

Hoekom?_____

5. Voel jy dat verbeterde telefoonkommunikasie sal die volgende help/verbeter:

Werksgeleenthede	
Opvoedkundige geleenthede	
Sosiale aktiwiteite	
Vermoë om publieke telefone te gebruik	
Familie verhoudings	
Beter sekuriteit	
Beter gevoel van jouself	

Gee asseblief besonderhede

_____

APPENDIX 4

QUESTIONNAIRE FOR THE HEARING-HEALTH CARE PROFESSIONAL

1. BIOGRAPHICAL INFORMATION

1. Name

2. Please list your tertiary qualification (s) and the year of completion for each qualification.

Degree/diploma	Educational institution	Year of completion

3. Place(s) of practice

Private	
School	
Hospital	
State clinic	
Other	

4. Location of practice

Western Cape	
Gauteng	

5. How long have you been practicing as an audiologist/ hearing aid acoustician?

years

6. Field of specialisation?

7. Where did you obtain information regarding telecommunication devices prior to the training workshop?

Where?		Please Give Details
University training: undergraduate		
University training: postgraduate		
Seminars or workshops		
Information supplied by hearing aid dispensers		
Own research i.e. articles in professional journals		
Other		

2. KNOWLEDGE OF TELECOMMUNICATION DEVICES/SYSTEMS

1. How would you rate your knowledge of the available telephone assistive devices:

   - prior to the training workshop?

1	2	3	4	5
Extremely poor				Excellent

   - after the training workshop?

1	2	3	4	5
Extremely poor				Excellent

2. How would you rate your knowledge of the function of the component parts and adjustments of telephone assistive devices

   - prior to the training workshop?

1	2	3	4	5
Extremely poor				Excellent

   - after the training workshop?

1	2	3	4	5
Extremely poor				Excellent

3. How would you rate your ability to demonstrate the use of the device(s)

   - prior to the training workshop?

1	2	3	4	5
Extremely poor				Excellent

   - after the training workshop?

1	2	3	4	5
Extremely poor				Excellent

4. How would you rate your ability in the practice in fitting, adjusting, and maintaining telephone assistive devices

   - prior to the training workshop?

1	2	3	4	5
Extremely poor				Excellent

   - after the training workshop?

1	2	3	4	5
Extremely poor				Excellent

5. How would you rate your knowledge of the advantages and disadvantages of the devices and their capabilities and limitations

   - prior to the training workshop?

1	2	3	4	5
Extremely poor				Excellent

- after the training workshop?

1	2	3	4	5

Extremely poor Excellent

6. How would you rate your knowledge of why particular telephone assistive devices are selected

- prior to the training workshop?

1	2	3	4	5

Extremely poor Excellent

- after the training workshop?

1	2	3	4	5

Extremely poor Excellent

7. How would you rate your knowledge of how to trouble-shoot telephone problems

- prior to the training workshop?

1	2	3	4	5

Extremely poor Excellent

- after the training workshop?

1	2	3	4	5

Extremely poor Excellent

8. How would you rate your ability to demonstrate the device to family members

- prior to the training workshop?

1	2	3	4	5

Extremely poor Excellent

- after the training workshop?

1	2	3	4	5

Extremely poor Excellent

9. How would you rate your confidence in answering questions about telephone assistive devices

- prior to the training workshop?

1	2	3	4	5

Extremely poor Excellent

- after the training workshop?

1	2	3	4	5

Extremely poor Excellent

10. How would you rate your ability in providing price quotations for the devices when the clients enquired about them

- prior to the training workshop?

1	2	3	4	5

Extremely poor Excellent

➢ after the training workshop?

1	2	3	4	5
Extremely poor				Excellent

11. How would you rate your ability to help your clients exercise their legal rights to good telephonic communication

➢ prior to the training workshop?

1	2	3	4	5
Extremely poor				Excellent

➢ after the training workshop?

1	2	3	4	5
Extremely poor				Excellent

12. Did you think that it was profitable to supply telephone assistive devices to clients in addition to hearing aids?

➢ prior to the training workshop?

1	2	3	4	5
Strongly disagree				strongly agree

➢ after the training workshop?

1	2	3	4	5
Strongly disagree				strongly agree

3. PERFORMANCE OF PROFESSIONALS

13. Do you include information regarding telephone assistive devices in your rehabilitative services?

		When?	Where?
Always			
Sometimes			
Never			

14. Before the training, did you include the Telecoil component of the hearing aid in your hearing aid fittings

Always	
Sometimes	
Never	

Please give details of your answer?

15. After the training, do you include the Telecoil component of the hearing aid in your hearing aid fittings

Always	
Sometimes	
Never	

Please give details of your answer?

16. Please indicate which telephone assistive devices you have in your office at present:

System	
T80 Telephone Amplifier (Logia)	
Auriald, TE 2002 (Special Telephone for hearing aid users) (Teknimed)	
Portable telephone amplifier, TE 2001 (Teknimed)	
Hear-a-Phone (HASS)	
AT&T portable telephone amplifier (HASS)	
CLARITY Telephone (HASS)	
CLARITY portable high frequency amplifier (HASS)	
Phone-Amp (Telkom)	
Teldem (Telkom)	
Telephone ringer with flasher (Telkom)	
Nokia inductive loopset LPS-1	
Ericsson T-Hook	

17. Of those you have ticked off, which ones have you had prior to the workshop and which ones did you acquire post workshop?

System	**Prior to the workshop**	**Post-workshop**
T80 Telephone Amplifier (Logia)		
Auriald, TE 2002 (Special Telephone for hearing aid users) (Teknimed)		
Portable telephone amplifier, TE 2001 (Teknimed)		
Hear-a-Phone (HASS)		
AT&T portable telephone amplifier (HASS)		
CLARITY Telephone (HASS)		
CLARITY portable high frequency amplifier (HASS)		
Phone-Amp (Telkom)		
Teldem (Telkom)		
Telephone ringer with flasher (Telkom)		
Nokia inductive loopset LPS-1		
Ericsson T-Hook		

18. Do you have a display area of the available telecommunication devices in the office?

Yes	
No	

19. From your experience with the devices/systems during the training, are there any limitations of the products? Please indicate:

Device	Difficult to use	Not compatible with hearing aids	Too expensive	Cannot be used by those with poor manual dexterity	Too inconvenient	Not cosmetically appealing
T80 Telephone Amplifier (Logia)						
Auriald, TE 2002 (Special Telephone for hearing aid users) (Teknimed)						
Portable telephone amplifier, TE 2001 (Teknimed)						
Hear-a-Phone (HASS)						
AT&T portable telephone amplifier (HASS)						
CLARITY Telephone (HASS)						
CLARITY portable high frequency amplifier (HASS)						

Phone-Amp (Telkom)						
Teldem (Telkom)						
Telephone ringer with flasher (Telkom)						
Nokia inductive loopset LPS-1						
Ericsson T-Hook						

20. Do you use any existing self-assessment scales when evaluating your patients?

Yes	
No	

21. If yes, which ones do you use?

22. Have you developed your own scale to suit the needs of your clients?

Yes	
No	

23. If yes, is it available for the researcher to look at?

Yes	
No	

24. If you have been dispensing telephone assistive devices in your practise, have you noticed an increase in your caseload?

Yes	
No	

25. To what would you attribute this?

26. Which areas covered in the workshop do you feel require further training?

Available telephone assistive devices in South Africa	
The function of the component parts and adjustments of telephone assistive devices	
Demonstration in the use of the device(s)	
The practice in fitting, adjusting, and maintaining telephone assistive devices	
Information of the advantages and disadvantages of the devices	
Information to give the client and his/her family of why particular telephone assistive devices are selected i.e. auditory vs. non auditory devices, amplifying the ring vs. amplifying speech over the telephone	
Information of how to trouble-shoot telecommunication problems	
Information of how to demonstrate the device to family members	
More information of price quotations for the devices	
More information to help your clients exercise their legal rights regarding telecommunication	

27. Please include any comments and/or suggestions of the training and your experience participating in this research

APPENDIX 5.

RESPONSE SHEET FOR THE HEARING-IMPAIRED SUBJECTS

1. BIOGRAPHICAL INFORMATION

Age

18-25	
26-35	
36-45	
46-55	
56-65	
66-75	
75-78	

Gender

Male	
Female	

Personal Hearing Status

Deaf	
Hard-of-Hearing	
Hearing-impaired	
Deafened	
Hearing	
Other	

Degree of Hearing Loss

Mild	
Moderate	
Moderately-severe	
Severe	
Profound	
Unknown	

Residential area

Northern suburbs	
Southern suburbs	

Residential Status

Living alone	
Living with family	
Living in a dormitory/residence	

Who lives with you?

Wife and children	
Husband	
Wife	
Husband and children	
Partner	
Parents and siblings	

Hearing status of those living with you

Deaf	
Hard-of-Hearing	
Hearing-impaired	
Deafened	
Hearing	
Other	

School qualification

Std 8 (junior certificate)	
Matric (Senior certificate)	
Overseas schooling	

Further Education

University Degree	
Training college / national diploma	
Other/details	
None	

Employment Status

Currently employed	
Unemployed	
Retired	

Profession (working, unemployed or retired)

Unskilled	
Skilled	
Professional	

Monthly income

Under R1000	
R1000-R5000	
R5000-R8000	
R8000-R10 000	
R10 000 +	
Retired/pension	
Unemployed	
Would not say	

Amplification

Hearing aid(s)	
Cochlear implant	
None	

What type of hearing aids do you use?

ITE	
ITC	
BTE	
Body Aid	
Other	

Unilateral

Bilateral

Switches used

O + M + T	
O + M/T	
O + M	
Cochlear implant with out T	
Cochlear implant with T	

Length of time HI has had current hearing aid

<1 year	
1-2 yrs	
2-5 yrs	
> 5 yrs	

Length of time HI has had cochlear implant

<1 year	
1-2 yrs	
2-5 yrs	
> 5 yrs	

What was the HI using before current hearing aids/cochlear implant

Nothing	
Hearing aids	
Doesn't have amplification	

Where did you obtain h/aid/cochlear implant

Audiologist	
Hearing aid acoustician	
ENT	
Other/details	

Rehabilitative services offered

Yes	
No	

If yes, which?

Counselling	
Info re ALDs	
Provision of ALDs	
Speech reading	
Other/details Telephone training	

Did you make use of the offered services?

Yes	
No	

2. USE OF THE TELEPHONE

Landline telephone at HOME

Yes	
No	

What type?

Telkom	
Other/ details	
Adapted telephone for cochlear implant	

Landline telephone at WORK

Yes	
No	

What type?

Telkom	
Other/ details	

Where do you use the telephone

At home	
At work	
Travelling and social activities	

If yes, how often?

	Home	Work	Other
Always			
Often			
Seldom			
Never			

Do you use the hearing aids when you use the telephone

Yes	
No	

Can you carry on a telephone conversation without difficulty

Yes	
No	
Sometimes	

Can you hear the telephone ring (with h/aids or cochlear implant) when you are in the same room as the phone?

Yes	
No	
Depends on the phone	
Not always if I don't have my h/aids in or if I put the h/aid on soft	

Can you hear the telephone ring (without h/aids / cochlear implants) when you are in the same room as the phone?

Yes	
No	

Can you hear the telephone ring when you are in the next room?

13	
10	
5	

I know I can use the telephone to obtain the help I need in an emergency

0 (NA)	
1 (disagree strongly)	
2	
3	
4	
5 (strongly agree)	

I have great confidence that the information I obtain over the telephone is accurate

0 (NA)	
1 (disagree strongly)	
2	
3	
4	
5 (strongly agree)	

I enjoy using the telephone to keep in contact with friends and family

0 (NA)	
1 (disagree strongly)	
2	
3	

4	
5 (strongly agree)	

The telephone is a necessary device in my life

0 (NA)	
1 (disagree strongly)	
2	
3	
4	
5 (strongly agree)	

3. SATISFACTION OF TELEPHONE USE WITHOUT TELECOMMUNICATION DEVICES/SYSTEMS

Communication on the landline telephone without attachments

1 (impossible)	
2 (extremely difficult)	
3 (difficult)	
4 (adequate)	
5 (with great ease)	

Communication on the cellular telephone without attachments

1 (impossible)	
2 (extremely difficult)	
3 (difficult)	
4 (adequate)	
5 (with great ease)	
Does not have one	
Has cell phone but does not use	
Has cell phone for sms only	

Satisfaction with telephonic communication in general without attachments

1 (not at all)	
2	
3	
4	
5 (very satisfied)	

Problems on telephone

	Yes	No
Hearing telephone ring (on a normal phone-not their special phone)		
Hearing speech over the telephone (on a normal Telkom phone-not their special phone)		

Aided and difficulties on phone

	With h/a / CI		Without h/a / CI	
Hearing telephone ring (on a normal phone-not their special phone)	Yes	No	Yes	No
Hearing speech over the telephone (normal phone)	Yes	No	Yes	No

Where difficulties arise hearing the telephone ring? (on a normal phone)

	With h/a / CI			Without h/a / CI		
At home	Yes		No	Yes		No
At work	Yes		No	Yes		No
Public telephones	Yes		Na	Yes		Na
At other people's homes	Yes	No	NA	Yes	No	NA

Where difficulties arise hearing the speech over the telephone?

	With h/a / CI			Without h/a / CI		
At home	Yes		No	Yes		No
At work	Yes		No	Yes		No
Public telephones	Yes		Na	Yes		Na
At other people's homes	Yes	No	NA	Yes	No	NA

4. USE OF TELECOMMUNICATION DEVICES/SYSTEMS

Have you sought help for telephone comm.?

Yes	
No	

If not, why?

If yes, from whom?

Audiologist	
Other	

Did they recommend a device/system/technique?

Yes	
No	

Did you purchase any device/system?

Yes	
No	

Have you told yr audiologist about your problems hearing on the telephone?

Yes	
No	

If yes, what did s/he recommend?

Have you tried it?

Yes	
No	

If yes, was it successful?

Yes	
No	

Have you looked into devices to help you with the telephone on your own?

Yes	
No	

If yes, what did you find?

Did it help?

Yes	
No	
Haven't used it	

If you haven't looked for help, why not?

When your HHCP was performing the hearing aid evaluation, what did she/he say about the T switch?

Did your HHCP advise u on including the T switch into yr hearing aid

Yes	
No	
Has hearing aid or cochlear implant with the t switch already	

Do you own a cellular telephone?

Yes	
No	
Has cell phone but does not use	
Has cell phone for sms only	

If yes, is it an analogue or digital phone?

Analogue	
Digital	

Can you hear the cell phone ring?

Yes	
No	

If yes, do you experience any difficulties hearing speech over the cell phone?

Yes	
No	

If yes, what?

If there is interference, can u describe it?

What do you do when the cell rings?

If you do any of the above, does it help?

Yes	
No	

Indicate the following?

System	**Have Used**	**Presently use**	**Where? (at present**
T80 Telephone Amplifier (Logia)			
Auriald, TE 2002 (Special Telephone for hearing aid users) (Teknimed)			
Portable telephone amplifier, TE 2001 (Teknimed)			
Hear-a-Phone (HASS)			
AT&T portable telephone amplifier (HASS)			
CLARITY Telephone (HASS)			
CLARITY portable high frequency amplifier (HASS)			
Phone-Amp (Telkom)			
Teldem (Telkom)			
Telephone ringer with flasher (Telkom)			
Nokia inductive loopset LPS-1			

Used in the past:

When did you purchase it?

<1 year	
1-2 yrs	
2-5 yrs	
> 5 yrs	

How long did you use the device/system

<1 year	
1-2 yrs	
2-5 yrs	
> 5 yrs	

Why did you stop using it?

Currently using:

When did you purchase it?

<1 year	
1-2 yrs	
2-5 yrs	
> 5 yrs	

How long have you been using the device/system

<1 year	
1-2 yrs	
2-5 yrs	
> 5 yrs	

Areas of difficulty still, with TAD

Difficulty Hearing the telephone ring:

Where	**With HA(s) or CI & TAD**	**Without HA(s) or CI & TAD**
At home		
At work		
During travelling		
At other people's homes		

Difficulty Hearing speech over the telephone:

Where	**With HA(s) or CI & TAD**			**Without HA(s) or CI & TAD**		
At home						
At work						
During travelling						
At other people's homes						

What was it about the product that appealed to you? (1 = like) (have and are using)

Ease of use	
Compatibility with hearing aid(s)	
Cost factor	
Cosmetic appeal	
Manual dexterity	
Convenience	
Family members can not use the phone with this device	

If you have not ever used the above, or have used some but not others, please indicate why?

Difficult to use	
Not compatibility with hearing aid(s)	
To expensive	
Not cosmetically appealing	
Poor manual dexterity	
Too inconvenient	
Have never heard of the available systems (ever or in South Africa)	
Family members can not use the phone with this device	
Don't need it	
Ignorance	
Paying money for something I know nothing about, didn't trust it	

When looking to purchase and use a device/system, what will attract you to purchase one product over the other?

5) SATISFACTION OF TELEPHONE USE WITH TELECOMMUNICATION DEVICES/SYSTEM

How satisfied are you with your telephonic communication in general:
with attachments

1 (not at all)	
2	
3	
4	
5 (very satisfied)	

How would you rate your ability to communicate on the telephone with attachments

1 (impossible)	
2 (extremely difficult)	
3 (difficult)	
4 (adequate)	
5 (with great ease)	

How satisfied are you with your telephonic communication in general:
without attachments

1 (not at all)	
2	
3	
4	
5 (very satisfied)	

How would you rate your ability to communicate on the telephone without attachments

1 (impossible)	
2 (extremely difficult)	
3 (difficult)	
4 (adequate)	
5 (with great ease)	

For each of the devices you use

How satisfied are you with your use of the above?

Device	1 (not at all)	2	3	4	5 (very satisfied)

How would you rate your telephonic communication with the above?

Device	1 (extremely poor)	2	3	4	5 (excellent)

6) SATISFACTION WITH CURRENT SERVICE DELIVERY FOR HEARING IMPAIRMENT

Does a hearing problem cause you to use the phone less than you would like?

Yes	
Sometimes	
No	

Do you believe that your rights as a hearing impaired person are being met according to the rights and legislation of the country?

Yes	
No	
Haven't thought about it	

If no, why

If no, what do you feel could be done to change the situation?

What do you feel/think could improve your use of the telephone?

Do you feel that improved telephonic communication will help or enhance your:

	Yes	No	Na
Employment opportunities			
Educational opportunities			
Social activities			
Ability to use public telephones			
Familial relationships			
Sense of security			
Sense of self			

APPENDIX 6:

TRAINING PACKAGE FOR THE HEARING HEALTH CARE PROFESSIONAL (HHCP)

1. **Outline For Today's Training**
- Background information
- Explanation, demonstration and hands-on trials with Telephone Assistive Devices

2. **Background**
- ALDs
- TADs

3. **Why Am I Here?**
- There are over 4 million hearing impaired people in South Africa (SANCD Clinical Service Division:Africa: 24-27 Oct. 1995)
- Before 1999 no South African research on ALDs
- 1999 and 2001: SA research into knowledge of Audiologist re. ALDs

4. **Why Am I Here?**
- Hoch (2000): the use of telecommunication systems by adults with acquired hearing loss
- Major findings:

–They struggled on the phone, but
–wanted & needed to use the phone
–Wanted to be "just like everybody else"
–Unaware of devices available to improve telephonic communication
–Were not counseled by audiologist regarding help for the telephone

5. **Why Focus on the Telephone?**
- major reason for referral to a HHCP is difficulty on the telephone
- Even once fitted with a hearing aid,hearing-impaired persons struggle to use the telephone

6. **The Effects of a Hearing Loss on Telephone Use**

Difficulties in using the telephone can affect a person's:
- Employment opportunities
- Educational opportunities
- Social activities
- Familial relationships
- Ability to use public telephones
- Sense of security, and
- Sense of self

7. **I Would Have More ALDs If:**
- I could have home trials
- I needed them
- I had more information about them

- I could afford them
- Speech was clearer through the devices
- I was given personal demonstration and instruction on how to use them

8. Different Types of TADs

- Auditory or voice based
- Amplification
- Ring
- Speech
- Cellular telephone loop system

- Non-auditory or text based
- Ring (Flashing light and Vibration)
- Text telephones
- fax, internet & e-mail, Short Message Service (SMS), pagers

9. Auditory TADs Available in South Africa

- Ring

–Devices to amplify the ring

- Telephone ringer with lamp flasher (Telkom)
- Clarity Telephone with built in ring amplifier (HASS)

–Devices to change the pitch of the ring

- Clarity Telephone with built in pitch adjustment (HASS)

10. Auditory TADs Available in South Africa (cont.)

- Speech

–Devices to amplify speech

- In-line amplifiers

-The Phone Amplifier (Telkom)
-Clarity in-line high-frequency amplifier (HASS)

- Portable amplifiers

-AT&T portable telephone amplifier (HASS)
-Portable telephone amplifier (TE 2001) (Teknimed)

- Built in amplifiers

-Clarity Telephone (HASS)

11. Auditory TADs Available in South Africa (cont.)

- Speech

–Devices for direct speech input using Telecoil

- Portable amplifiers

-Snap on telephone amplifier (Oticon)

- Replacement handsets

-Hear a Phone (HASS)

- Special telephones with built in telecoil

-Special telephone for hearing aid users (Teknimed)

- Cellular telephone neck loop with built in telecoil

-Nokia inductive loop (Nokia)
-Ericsson neck loop (Ericsson)

12. Non-auditory TADs Available in South Africa

- Ring

–Flashing light

- Telephone ringer with lamp flasher (Telkom)

–Vibration for cellular telephone

- Text based medium

–Text telephone (Teldem) (Telkom)
–SMS for cellular telephones
–Fax
–E-mail
–Pagers

13. Advantages and Disadvantages of the Nokia Neck Loop

Advantages

- Easy to use
- Cosmetically appealing
- Speech is clear
- Speech loud enough
- Can make cell & h/aid louder
- Do not hear background noise
- Can be used as a hands-free device
- No interference
- Good for traveling
- Very helpful for cell phone users

Disadvantages

- Have to switch M to T to M
- Expensive
- Expensive if you have to also buy a Nokia phone

14. Advantages and Disadvantages of the Hear a Phone (HASS)

Advantages

- Easy to use
- Speech is clear
- Easy to carry
- Other people can use it
- Cosmetically appealing
- Cost: affordable

Disadvantages

- Speech is often too soft
- Problem with self adjusting hearing aids
- No marked difference in loudness between M and T

15. **Advantages and Disadvantages of the Special Telephone for Hearing Aid Users (Teknimed)**

Advantages

- Easy to use
- Speech is clear
- No feedback
- Likes flashing light
- Cosmetically appealing
- Cost: affordable

Disadvantages

- Speech muffled or not clear
- Speech is often too soft
- Ring too soft
- Have to switch M to T to M
- Phone to light and flimsy

16. **Advantages and Disadvantages of the Snap on Telephone Amplifier (Oticon)**

Advantages

- Easy to use
- Speech is clear
- Cosmetically appealing
- Good for traveling

Disadvantages

- Speech too soft
- Problem with self adjusting hearing aids
- Have to switch M to T to M
- Nuisance to put it on after receiving a call
- Is small and can be lost
- Expensive

17. Advantages and Disadvantages of the AT&T Portable Amplifier (HAAS)

Advantages

- Easy to use
- Speech is clear
- Speech loud enough
- Cosmetically appealing

Disadvantages

- Nuisance to put it on after receiving a call
- Not practical
- Feedback++
- Speech distorted (muffled, scratchy)
- Difficulty with positioning (with hearing aids)
- Have to fiddle with the volume above ear
- Doesn't fit onto all phones
- Expensive

18. **Advantages and Disadvantages of the Portable Telephone Amplifier (Teknimed)**

Advantages

- Easy to use
- Speech is clear
- Speech loud enough
- Cost: affordable
- Good for traveling

Disadvantages

- Leather strap more restrictive
- Speech too soft
- Speech unclear
- Nuisance to put it on after receiving a call
- Not practical
- Difficulty with positioning (with hearing aids)
- Have to fiddle with the volume above ear
- Doesn't fit onto all phones
- Not cosmetically appealing

19. Advantages and Disadvantages of the Phone Amp (Telkom)

Advantages

- Easy to put in
- Speech is clear
- Speech loud enough
- Likes the control over the volume in front of you
- Cosmetically appealing
- Cost: affordable
- Other people can use this

Disadvantages

- Attachment cord too short
- Speech distorted if too loud

20. Advantages and Disadvantages of the CLARITY Portable High-Frequency Amplifier (HASS)

Advantages

- Easy to use
- Likes the control over the volume in front of you
- Cosmetically appealing

Disadvantages

- Feedback ++
- Speech sounds cut off
- Speech not clear
- Loud but distorted
- Attachment cord too short

21. Advantages and Disadvantages of the CLARITY Telephone (HASS)

Advantages
- Easy to use
- Speech loud enough
- Speech is clear
- Ring volume good
- Ring pitch options good

Disadvantages
- Speech sounds cut off
- Speech unclear
- Not cosmetically appealing

22. Advantages and Disadvantages of the Telephone Ringer With Flasher (Telkom)

Advantages
- Easy to use
- Ring is very loud
- Cosmetically appealing

Disadvantages
- Too loud for hearing people
- Cumbersome if more than one TAD on phone
- Flasher useless unless in the same room

23. Hearing Impaired People's Report of TADs
- Most liked TADs by Hearing Aid Users with Telecoil
- Most liked TADs by Hearing Aid Users without Telecoil
- Most liked TADs by Cochlear Implant Users
- Most liked TADs by subjects without any amplification

24. General Comments
- People don't like changing from M to T to M
- Devices limited with non adjustable hearing aids
- Positioning on the phone with portable amplifier and hearing aids, difficult
- People want a volume control with TADs using Telecoil
- People don't like having to put a device on and off when answering a call
- Some phones not compatible with work telephone setup
- Sensitivity of hearing people in the house
- Factors to consider: cost and benefits

25. The Potential Benefits of Including TADs Into Your Practice
- Additional sales
- Increased profits
- Improved customer satisfaction
- Boosts reputation
- Increase in referrals
- A potential marketing advantage
- Expands scope of your practice

(Compton in Bloom 1996, Killingsworth, 1993)

26. The Role of the Hearing Health Care Professional re TADs

- *Be able to:*

–Identify when TADs are needed
–Assess the need for a particular TAD
–Recommend a TAD
–Train the client. This includes:

- Why this TAD was chosen
- Its capabilities and limitations
- Installation instructions
- Practical instruction of its use
- Practical demonstration of its use
- Trouble shooting techniques

27. The Role of the Hearing Health Care Professional re TADs (cont.)

- Consult with other professionals including:

–Fellow hearing health care professionals
–Sound engineers & technicians

- Continuing education regarding assistive technology

28. Where To Begin the Evaluation?

- Perform a comprehensive evaluation, including:

–A detailed evaluation of each clients' individual communication disabilities and needs
–At home, work, school/university, traveling and social activities

- Look at:

–Individual lifestyle
–Level of activity

29. Where To Begin the Evaluation?

- Most effective when performed before or during hearing aid evaluation

–Time spent on TAD selection minimized
–TAD and hearing aid circuitry
–"a hearing aid that can't interface with ALDs or telephones is only half a hearing aid" (Morris, 1998)

30. How To Evaluate the Need For a TAD

- Needs assessment questionnaire including:

–Client Oriented Scale of Improvement (COSI)
–Hearing Handicap Inventory for the Elderly/Adult (HHIE/HHIA)
–Abbreviated Profile of Hearing Aid Benefit (APHAB)
–Glasgow Scale of Communication function
–Communication Needs Questionnaire (Compton, Lewis, palmer & Thelen)

- Checklists
- Simply ask the client!!

31. Assessment Procedure For TADs

- Determine clients' telephone experiences
- Client should describe:

–How the telephone sounds

–Problems on the telephone
- Certain telephones
- All telephones
- Telephones in certain settings

32. Selection Of TADs
- Determined by:

–Individual's lifestyle

–Individual's communication needs in each setting
- Home
- Workplace
- Educational settings
- Traveling and social activities

–Suitability of TAD for those around the user

33. Factors Determining Acceptance and/or Popularity of TADs
- Lifestyle
- Level of activity
- Individuals' hearing difficulties
- Appearance of a product
- Its performance
- Its ease of use
- Durability
- Price

34. Ideas On How to Introduce TADs Into Your Practice
- Know what devices are available
- Have information handy (e.g brochures)
- Purchase a variety of devices
- Develop a display case
- Create a "home-like environment" to try out devices

Appendix 7

RESPONSE SHEET FOR THE HEARING-HEALTH CARE PROFESSIONALS

1. BIOGRAPHICAL INFORMATION

Degree/diploma(s)

Educational institution

Year of completion

1960-1969	
1970-1979	
1980-1989	
1990-1999	
2000-2001	

Place of practice

Private	
School	
Hospital	
State clinic	
University	
Other	

Location of practice

Western cape	
Gauteng	
Other	

Length of practice

1-3 yrs	
4-10 yrs	
>10 yrs	

Field of specialisation

Information regarding telecommunication devices obtained prior to the training workshop?

Where?	
University training: undergraduate	
University training: postgraduate	
Seminars or workshops	
Information supplied by hearing aid dispensers	
Own research i.e. articles in professional journals	
Other	

Details

2. KNOWLEDGE OF TELECOMMUNICATION DEVICES/SYSTEMS

How would you rate your knowledge of the available telecommunication devices/systems:

- prior to the training workshop?

1(extremely poor)	
2	
3	
4	
5 (excellent)	

- after the training workshop?

1(extremely poor)	
2	
3	
4	
5 (excellent)	

How would you rate your knowledge of the function of the component parts and adjustments of telecommunication devices

- prior to the training workshop?

1(extremely poor)	
2	
3	
4	
5 (excellent)	

- after the training workshop?

1(extremely poor)	
2	
3	
4	
5 (excellent)	

How would you rate your ability to demonstrate the use of the device(s)

- prior to the training workshop?

1(extremely poor)	
2	
3	
4	
5 (excellent)	

- after the training workshop?

1(extremely poor)	
2	
3	
4	
5 (excellent)	

How would you rate your ability in the practice in fitting, adjusting, and maintaining telecommunication systems/devices

- prior to the training workshop?

1(extremely poor)	
2	
3	
4	
5 (excellent)	

- after the training workshop?

1(extremely poor)	
2	
3	
4	
5 (excellent)	

How would you rate your knowledge of the advantages and disadvantages of the devices and their capabilities and limitations?

- prior to the training workshop?

1(extremely poor)	
2	
3	
4	
5 (excellent)	

- after the training workshop?

1(extremely poor)	
2	
3	
4	
5 (excellent)	

How would you rate your knowledge of why particular telecommunication devices are selected

- prior to the training workshop?

1(extremely poor)	
2	
3	
4	
5 (excellent)	

- after the training workshop?

1(extremely poor)	
2	
3	
4	
5 (excellent)	

How would you rate your knowledge of how to trouble-shoot telecommunication problems

- prior to the training workshop?

1(extremely poor)	
2	
3	
4	
5 (excellent)	

- after the training workshop?

1(extremely poor)	
2	
3	
4	
5 (excellent)	

How would you rate your ability to demonstrate the device to family members

- prior to the training workshop?

1(extremely poor)	
2	
3	
4	
5 (excellent)	

- after the training workshop?

1(extremely poor)	
2	
3	
4	
5 (excellent)	

How would you rate your confidence in answering questions about telecommunication devices

- prior to the training workshop?

1(extremely poor)	
2	
3	
4	
5 (excellent)	

- after the training workshop?

1(extremely poor)	
2	
3	
4	
5 (excellent)	

How would you rate your ability in providing price quotations for the devices when the clients enquired about them

- prior to the training workshop?

1(extremely poor)	
2	
3	
4	
5 (excellent)	

- after the training workshop?

1(extremely poor)	
2	
3	
4	
5 (excellent)	

How would you rate your ability to help your clients exercise their telecommunication device legal rights

- prior to the training workshop?

1(extremely poor)	
2	
3	
4	
5 (excellent)	

- after the training workshop?

1(extremely poor)	
2	
3	
4	
5 (excellent)	

Did you think that it was profitable to supply telecommunication devices to clients in addition to hearing aids?

- prior to the training workshop?

1(extremely poor)	
2	
3	
4	
5 (excellent)	

- after the training workshop?

1(extremely poor)	
2	
3	
4	
5 (excellent)	

3. PERFORMANCE OF PROFESSIONALS

Do you include information regarding telecommunication devices/systems in your rehabilitative services?

Always	
Sometimes	
Never	

When

Where?

Before the training, did you include the Telecoil component of the hearing aid in your hearing aid fittings

Always	
Sometimes	
Never	
NA	

Details

After the training, do you include the Telecoil component of the hearing aid in your hearing aid fittings

Always	
Sometimes	
Never	
NA	

Details

Please indicate which telecommunication devices you have in your office at present

System	
T80 Telephone Amplifier (Logia)	
Auriald, TE 2002 (Special Telephone for hearing aid users) (Teknimed)	
Portable telephone amplifier, TE 2001 (Teknimed)	
Hear-a-Phone (HASS)	
AT&T portable telephone amplifier (HASS)	
CLARITY Telephone (HASS)	
CLARITY portable high frequency amplifier (HASS)	
Phone-Amp (Telkom)	
Teldem (Telkom)	
Telephone ringer with flasher (Telkom)	
Nokia inductive loopset LPS-1	
Ericsson T-Hook	

Of those you have ticked off, which ones have you had prior to the workshop and which ones did you acquire post workshop?

System	**Prior to the workshop**	**Post-workshop**
T80 Telephone Amplifier (Logia)		
Auriald, TE 2002 (Special Telephone for hearing aid users) (Teknimed)		
Portable telephone amplifier, TE 2001 (Teknimed)		
Hear-a-Phone (HASS)		
AT&T portable telephone amplifier (HASS)		
CLARITY Telephone (HASS)		
CLARITY portable high frequency amplifier (HASS)		
Phone-Amp (Telkom)		
Teldem (Telkom)		
Telephone ringer with flasher (Telkom)		
Nokia inductive loopset LPS-1		
Ericsson T-Hook		

Do you have a display area of the available telecommunication devices in the office?

Yes	
No	

From your experience with the devices/systems during the training, are there any limitations of the products?

Device	Difficult to use	Not compatible with hearing aids	Too expensive	Cannot be used by those with poor manual dexterity	Too inconvenient	Not cosmetically appealing
T80 Telephone Amplifier (Logia)						
Auriald, TE 2002 (Special Telephone for hearing aid users) (Teknimed)						
Portable telephone amplifier, TE 2001 (Teknimed)						
Hear-a-Phone (HASS)						
AT&T portable telephone amplifier (HASS)						
CLARITY Telephone (HASS)						

CLARITY portable high frequency amplifier (HASS)						
Phone-Amp (Telkom)						
Teldem (Telkom)						
Telephone ringer with flasher (Telkom)						
Nokia inductive loopset LPS-1						
Ericsson T-Hook						

Do you use any existing self-assessment scales when evaluating your patients?

Yes	
No	

If yes, which ones do you use?

Have you developed your own scale to suit the needs of your clients?

Yes	
No	

If yes, is it available for the researcher to look at?

Yes	
No	

If you have been dispensing telecommunication devices in your practise, have you noticed an increase in your caseload?

Yes	
No	
Na	

To what would you attribute this?

Which areas covered in the workshop do you feel require further training?

Available telecommunication devices in South Africa	
The function of the component parts and adjustments of telecommunication devices	
Demonstration in the use of the device(s)	
The practice in fitting, adjusting, and maintaining telecommunication systems/devices	
Information of the advantages and disadvantages of the devices	
Information to give the client and his/her family of why particular telecommunication devices are selected i.e. auditory vs. non auditory devices, amplifying the ring vs. amplifying speech over the telephone	
Information of how to trouble-shoot telecommunication problems	
Information of how to demonstrate the device to family members	
More information of price quotations for the devices	
More information to help your clients exercise their telecommunication device legal rights	

Appendix 8.

Illustrations of old Telkom telephone models.

Protea – 1968

Lorea – 1981 The new electronic model is on the left – characterised by the "star" and "hash" symbols

APPENDIX 9

HEARING-IMPAIRED SUBJECTS' EVALUATION OF THE TADS

Table 3.

Advantages and Disadvantages of the Hear-a-Phone (HASS).

Advantages	*Disadvantages*
Easy to use	Speech was often too soft
Speech was clear	Problem with self adjusting hearing aids
Easy to carry	No marked difference in loudness between M and T
Cost: affordable	
Cosmetically appealing	
Other members of the family can use it	

Table 4.

Advantages and Disadvantages of the Nokia inductive loopset.

Advantages	*Disadvantages*
Easy to use	Have to switch M to T to M
Speech was clear	Expensive
Speech was loud enough	Have to also buy a Nokia phone
Cosmetically appealing	
Good for traveling	
Did not hear background noise	
Can be used as a hands-free device	
No interference experienced	
Can make cell & hearing aid louder	

Table 5.

Advantages and Disadvantages of the Auriald, TE 2002 (Teknimed).

Advantages	*Disadvantages*
Easy to use	Speech was muffled or not clear
Speech was clear	Speech was often too soft
Cost: affordable	Have to switch M to T to M
Cosmetically appealing	Ring was too soft
No feedback experienced	Phone to light and flimsy
Likes flashing light	

Table 6.

Advantages and Disadvantages of the T80 telephone amplifier (Logia).

Advantages	*Disadvantages*
Easy to use	Speech was too soft
Speech was clear	Problem with self adjusting hearing aids
Cosmetically appealing	Have to switch M to T to M
Good for traveling	Nuisance to put it on after receiving a call
	Expensive
	Device was small and can be lost

Table 7.

Advantages and Disadvantages of the CLARITY Telephone (HASS).

Advantages	*Disadvantages*
Easy to use	Speech was unclear
Speech was clear	Speech sounded cut off
Speech was loud enough	Not cosmetically appealing
Ring volume was good	
Ring pitch options were good	

Table 8.

Advantages and Disadvantages of the AT&T portable amplifier (HASS).

Advantages	*Disadvantages*
Easy to use	Speech was distorted (sounded muffled and scratchy)
Speech was clear	Nuisance to put it on after receiving a call
Speech was loud enough	Expensive
Cosmetically appealing	Not practical
	Difficulty with positioning (with hearing aids)
	Have to fiddle with the volume above ear
	Does not fit onto all phones
	Too much feedback experience

Table 9.

Advantages and Disadvantages of the Portable telephone amplifier, TE 2001 (Teknimed)

Advantages	*Disadvantages*
Easy to use	Speech was unclear
Speech was clear	Speech was too soft
Speech was loud enough	Nuisance to put it on after receiving a call
Cost: affordable	Not practical
Good for traveling	Not cosmetically appealing
	Difficulty with positioning (with hearing aids)
	Had to fiddle with volume control above ear
	Strap was restrictive
	Does not fit onto all phones

Table 10.

Advantages and Disadvantages of the Telephone ringer with flasher (Telkom).

Advantages	*Disadvantages*
Easy to use	Ring mode is too loud for hearing people
Cosmetically appealing	Cumbersome if more than one TAD attached to the phone

Ring was very loud	Flasher useless unless the person was in the same room

Table 11.

Advantages and Disadvantages of the Phone Amp (Telkom).

Advantages	*Disadvantages*
Easy to use	Speech became distorted if put on too loud
Speech was clear	Attachment cord was too short resulting in the TAD lifting up with the receiver
Speech was loud enough	
Cost: affordable	
Cosmetically appealing	
Other members of the family can use this	
Liked the control over the volume in front of you	

Table 12.

Advantages and Disadvantages of the CLARITY portable high-frequency amplifier (HASS).

Advantages	*Disadvantages*
Easy to use	Speech sounded cut off
Cosmetically appealing	Loud enough, but distorted
Liked the control over the volume in front of you	Too much feedback experienced
	Attachment cord was too short resulting in the TAD lifting up with the receiver