

*‘Immanuel Kant said that blindness separates you from things but deafness separates you from people. What can be done for the hearing impaired?’*

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**TITLE**

*Immanuel Kant said that blindness separates you from things but deafness separates you from people. What can be done for the hearing impaired?*

**ABSTRACT**

The famous German philosopher Immanuel Kant once said, “Blindness separates you from things but deafness separates you from people.” This implies that hearing forms a major part of our communication system, thus individuals with disorders affecting their hearing may suffer social stigmatisation and isolation. Hearing impairment can also potentially cause practical burdens (and ill-effects) on the affected individual and their family. This essay not only aims to outline the aetiology of hearing impairment and the different types of management that are available, but also to comprehensively address the social aspects of its effect in the community.

**INTRODUCTION**

Immanuel Kant (1724 – 1804) was a German philosopher from the Prussian city of Königsberg. His fame and contributions in traditional philosophical endeavours have had a profound impact on his philosophical followers and until today is regarded as one of the most influential thinkers in the history of Western philosophy. His famous works include Critique of Pure Reason, Critique of Practical Reason and Critique of Judgement.

Hearing acts as the primary means of communication which lies in the heart of all human interactions, thus individuals with profound hearing impairment may suffer from social stigmatisation and isolation.<sup>1</sup> Hearing impairment is defined as a complete (deafness) or partial loss of the ability to hear in one or both ears, due to congenital or acquired causes, and is recognised as a common disorder in both children and adults. WHO<sup>2</sup> estimated in 2005 that “278 million people worldwide have moderate to profound hearing loss in both ears and 80% of deaf and hearing-impaired people live in low- and middle-income countries.” Over 7 million people in the UK are suffering from hearing impairment (at all degrees

of severity) and out of this, 70 000 people have lived with deafness either since they were born or diagnosed in early childhood.<sup>3</sup>

A mother is often able to identify her baby as having hearing impairment by the baby's lack of response to sound. Doctors are expected to form an early diagnosis and intervention, especially in children, in order to prevent any irreversible developmental delay in speech and language acquisition which may cause poor academic performance and emotional stresses for the affected individual in the future. A multi-disciplinary team approach plays an essential role in preserving auditory skills but most importantly it is able to counter problems faced by the individual holistically.

## **DISABILITY**

Acquired hearing impairment in later life is thought to be a more traumatic experience for individuals because they have become reliant on hearing and therefore would face adjustment issues because of their devastating loss. Nonetheless, the social impact in both acquired hearing loss and those who were born deaf are similarly mentally challenging for them and their family.

Disability is defined as an observable mental or physical loss which causes a restriction in a person's ability to perform any activity within a normal range. A person is referred to as being "handicapped" when he/she is unable to fulfil his/her role, e.g. social or occupational, in society because of their disability thus reflecting their interaction with and adaptation to other individuals e.g. a deafened person would have to change occupation which does not require much aural communication or require support which can result in them missing out on promotions.<sup>4</sup>

Stigmatisation is often seen in people with a disability and is common in those with hearing impairment. Stigma is a label used to describe negative evaluations of a particular individual. There are 2 types of stigma described by Goffman<sup>5</sup>: *discreditable* (not obvious to others e.g. a deaf person without using any hearing devices may appear normal to others) and *discrediting* (obvious and visible

therefore cannot be hidden from others e.g. hearing aid used behind the ear by a deaf person). The fear of stigmatisation is a powerful force which can affect people's behaviour to prevent such discrimination, prejudice and disadvantage e.g. a deafened person is reluctant to speak in public as he is anxious of how he sounds. Professional counselling for them can have a significant beneficial effect in addressing their concerns and helping them alleviate the devastating effects of hearing impairment which is further compounded by society's attitude and stigma. There is a long-standing stigma associating deafness with low intelligence therefore, a strong focus to increase public awareness about deafness is important.

#### ***“Blindness - Separation from things”***

The Royal Blind Society has estimated that up to 2 million in the UK have a serious visual impairment and that 1 in 6 people over the age of 75 are blind or partially sighted. Deafness has always been compared to blindness, the latter being considered far worse. An example of this is seen when someone jokingly says to a hearing impaired person, “Well, at least you're not blind.” It may be really frustrating for a blind person to live life in a sighted world but the same goes for a deaf person living in a hearing world. The two cannot be easily compared as they will have different social consequences.

#### ***“Deafness - Separation from people”***

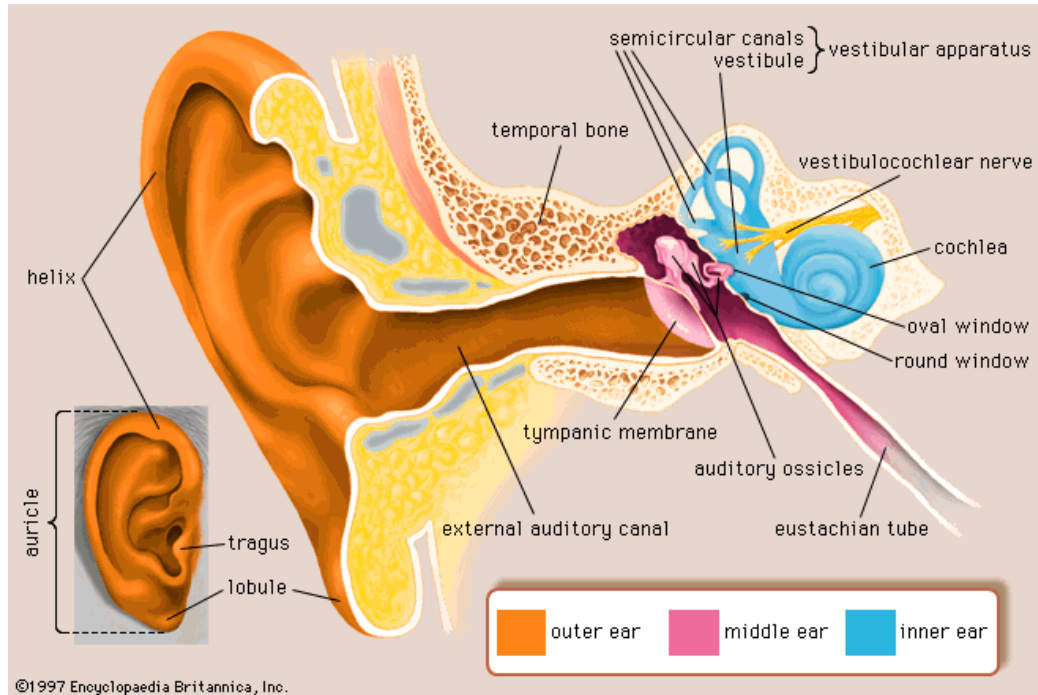
A collaborative research project have studied the psychological and social impact of becoming deafened in adult life.<sup>4</sup> It mentions that the deafened participants have reduced self-confidence and self-esteem and more prone to being impatient and angry particularly when faced with the public attitudes or even when trying to learn the bewildering communication strategies i.e. concentration on lip-movements and facial expressions. Some participants have lost their jobs due to the restricted tasks they are able to undertake. Mental health problems, e.g. depression and anxiety, have been commonly reported leading to a breakdown in relationships with family and friends. Some have gone to certain incredulous lengths to avoid contact with people so to prevent perceived consequences of being excluded, rejected and shunned by others.

Members of the recognisable 'Deaf Community' may not consider their deafness to be an impairment nor do they believe it causes a major impact on their quality of life. They communicate in their own language by signing and also have their own culture. British Sign Language (BSL) is the most common and preferred form of sign language used in the UK. It is quite different from spoken English as it has its own grammatical structure and syntax. I had the opportunity to visit the Merseyside Society for Deaf People where I gained a vast amount of knowledge about the Deaf Community. It was learnt that not all deaf people can read, this is especially true in those who were born deaf where BSL is their mother tongue. When a deaf person goes into hospital to see a doctor, an interpreter should ideally be present (Appendix 1).

## **ANATOMY AND FUNCTION**

The auditory system is made up of the ears and their connections to and within the central nervous system. The anatomy of the ear can be divided into three parts – outer, middle and inner structure (Diagram 1). Below is a summary of the functions of each structure.<sup>1,6,7,8</sup>

- 1) Outer ear: The auricle primarily acts as a directional sound funnel focusing acoustic energy into the external auditory canal until it reaches the tympanic membrane where its frequency range then gets amplified.
- 2) Middle ear: It has an impedance-matching device mechanism designed to increase the pressure signals arriving at the cochlea. The three auditory ossicles (malleus, incus and stapes) transmit sound vibrations from tympanic membrane to the cochlea, efficiently transferring sound energy from air to a fluid medium.
- 3) Inner ear: It comprises of the cochlea which contains the organ for hearing and is connected to the brainstem by the vestibulocochlear nerve, whereas the vestibule and semicircular canals play an important role as the coordinating control organ for balance.



**Diagram 1** Structure of the ear<sup>9</sup>

## AETIOLOGY

There are two forms of deafness and they may occur either unilaterally or bilaterally, namely:-

- 1) Conductive: results from mechanical attenuation of the sound waves in the outer or middle ear, preventing sound energy from reaching the cochlear fluids.
- 2) Sensorineural: results from defective function of the cochlea or the auditory nerve, and prevents neural impulses from being transmitted to the auditory cortex of the brain.

A mixed conductive and sensorineural deafness may also occur. The distinction between the two can be made clinically by performing the Rinne and Weber's tuning fork tests.<sup>10</sup>

Preventative measures to reduce risk factors for hearing impairment should be considered. Risk factors that may cause some babies to develop deafness include

prematurity and low birth weight, perinatal hypoxia, Rhesus diseases and intrauterine exposure to viruses. A family history of hereditary deafness may also be a contributory factor.

Specific conditions that may cause hearing impairment and deafness are listed below (Table 2).

**Table 2** Causes of hearing impairment and deafness<sup>10</sup>

<b>Conductive</b>	<b>Sensorineural</b>
<i>More common</i>	<i>More common</i>
Wax	Presbycusis
Acute otitis media with effusion	Noise-induced
Otosclerosis	Congenital (e.g. rubella, CMV)
Barotrauma	Drug-induced
Perforation or scarring of the tympanic membrane	Menière's disease
	Late otosclerosis
	Infections (e.g. meningitis, mumps)
<i>Less common</i>	<i>Less common</i>
Traumatic ossicular dislocation	Acoustic neuroma
Congenital atresia of external canal	Head injury
Agenesis of middle ear	CNS disease (e.g. multiple sclerosis)
Tumours of middle ear	Metabolic (e.g. hypothyroidism, Paget's)
	Psychogenic
	Unknown aetiology

## **DIAGNOSIS**

A detailed clinical history and examination must be obtained from patients and families. Simple hearing tests, e.g. Rinne and Weber's, can give an initial idea of the form of hearing loss. Imaging tools including otoscopy and scans would provide a more accurate diagnosis. Additionally, special investigations can be carried out such as pure-tone audiometry, with the presence of an air-bone gap, confirming any suggestions of a conductive hearing impairment.

### ***Newborn hearing screening***

An emphasis on early detection of hearing loss is vital to produce better outcomes and improvement in communication. Newborns would be screened before 6 months of age as cohort studies have shown that appropriate diagnosis and intervention within this age gap have been associated with good improvement of speech and language acquisition in hearing-impaired infants.<sup>11</sup> The screening tests used are namely the automated auditory brainstem response and transient evoked oto-acoustic emissions.

## **MANAGEMENT**

The management to treat causes of hearing impairment can be divided into conservative, medical or surgical options. Some of these will be mentioned in much detailed below.

### ***Non-implantable hearing aids***

A hearing aid is a small device consisting of a microphone, amplifier and speaker which transfers sound energy into electrical energy therefore make sounds appear louder, although not everyone agree they are clearer to understand.<sup>12</sup> Therefore it is important to offer pre-fitting counselling to patients and to address any unrealistically high expectations as it has been shown to be effective in improving its outcome and prevent disappointment.<sup>13</sup> Hearing aids are offered depending on the grade of the hearing impairment (Table 3). They have shown improvement in hearing and speech comprehension in individuals with sensorineural hearing impairment however, use of hearing aids in severe inner ear damage have shown to be ineffective.<sup>14</sup>



**Diagram 2** Styles of Hearing Aids.<sup>12</sup>

The different type of hearing aids is demonstrated in Diagram 2. Gudex et al<sup>15</sup> have also concluded that hearing aids can be beneficial in those suffering from tinnitus. Hearing aids are prescribed by ENT specialists and monitoring the progression of these patients is essential.

**Table 3** Grades of hearing impairment (WHO)<sup>16</sup>

<b>Grade of impairment</b>	<b>Corresponding audiometric ISO* value</b>	<b>Performance</b>	<b>Recommendations</b>
0 – No impairment	25dB or better (better ear)	No or very slight hearing problems. Able to hear whispers.	
1 – Slight impairment	26-40dB (better ear)	Able to hear and repeat words spoken in normal voice at 1 metre.	Counselling. Hearing aids may be needed.
2 – Moderate impairment	41-60dB (better ear)	Able to hear and repeat words spoken in raised voice at 1 metre.	Hearing aids usually recommended.
3 – Severe impairment	61-80dB (better ear)	Able to hear some words when shouted into better ear.	Hearing aids needed. If no hearing aids available, lip-reading and signing should be taught.
4 – Profound impairment including deafness	81dB or greater (better ear)	Unable to hear and understand even a shouted voice.	Hearing aids, cochlear and brain stem implants may help to understand words. Additional

			rehabilitation needed. Lip-reading and sometimes signing is essential.
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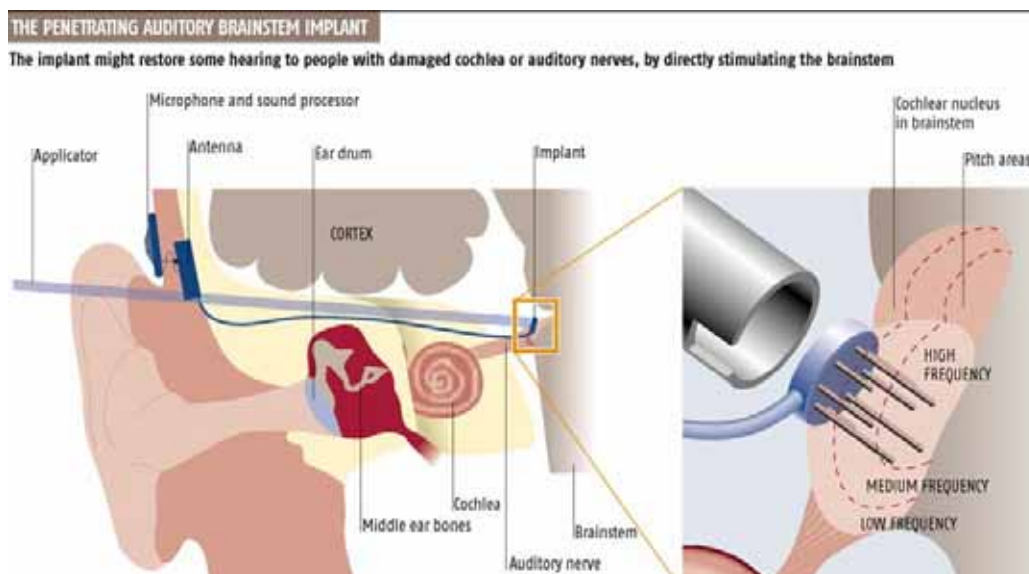
\*The audiometric ISO (International Standards Organisation) values are averages of values at 500, 1000, 2000, 4000 Hz.

### ***Cochlear implants***

Cochlear implants are recommended for those with severe to profound deafness who have failed to receive any benefit from acoustic hearing aids. It can be implanted in one ear or bilaterally especially in children or blind adults.<sup>17</sup> Coelho et al<sup>18</sup> concluded that children with cochlear implants have a direct correlation between voice and speech perception therefore resulting in a significant benefit in the development of oral language, speech and voice. They described cochlear implant as “one of the most effective and promising technologies to remediate hearing loss.”

### ***Auditory brain stem implants (ABSI)***

These implants are reserved for those with vestibular cochlear nerve damage e.g. due to neurofibromatosis type 2.<sup>14</sup> The implant electrode sits on the surface of the cochlear nuclei after the removal of the tumour.<sup>19</sup> This procedure is commonly done because it is a fairly new intervention with a narrow range of indications. More studies are being carried out to allow more new emerging indications for ABSI.



**Diagram 3:** Auditory brain stem implant.<sup>20</sup>

### ***Grommets***

A grommet is commonly used as a surgical intervention in children suffering from hearing impairment due to otitis media with effusion (OME), colloquially referred to as 'glue ear'. It is placed through a hole in the eardrum which then allows sufficient ventilation into middle ear. A systematic review carried out by Lous et al<sup>21</sup> concluded that insertion of grommets only produced a short-term hearing improvement in children with OME and no evidence have been reported on its effect on speech and language development. OME can either occur as a primary disorder or as a result of acute otitis media. Its medical management options consist of antibiotics, intranasal/oral corticosteroids and mucolytics. Adenoidectomy is also another surgical option.

### ***Middle ear surgery***

Specific causes e.g. trauma, malignancy, inflammatory conditions and cholesteatoma, may affect the normal middle ear anatomy and physiology.

Stapedectomy is an effective surgical intervention to the stapes for those suffering from otosclerosis (bone dystrophy of labyrinth capsule), which affects 2% of the UK population. Auditory results pre-operative and post-operative audiometry is then compared. In a retrospective study done on 82 patients who

underwent stapedectomy, 84.21% of them achieved good outcomes (airborne gap closure difference < 20dB) compared to the 10.52% who did not.<sup>22</sup> Common complications that arose from these patients included incus necrosis, displacement of prosthesis and oval window fistula. However, it has been shown that stapedotomy has fewer complications compared to stapedectomy, therefore is becoming more widely used.<sup>23</sup> The auditory level may worsen over years post-surgery but may not exceed the hearing loss prior to surgery, therefore some patients may still find it beneficial to use a hearing aid.

Tympanoplasty is indicated in cases with simple otitis media and tympanic membrane perforation but has also been effective in managing tinnitus.<sup>24</sup> Its method involves myringoplasty with or without incus and malleus reposition.

Incus transposition involves reconstructing any ossicular discontinuity by incus interposition or using a partial ossicular prosthesis.<sup>25</sup> One indication for this procedure is those suffering from chronic otitis media. Siddig et al<sup>26</sup> demonstrated promising results showing good long-term hearing outcomes (an air-borne gap of less than 20dB is seen in 70% of patients after 9.2 years).

An implantable middle ear device can be offered to patients with bilateral sensorineural hearing.<sup>27</sup> It has the same mechanism as a non-implantable hearing aid but with the transducer attached on the long process of incus allowing transmission of vibrations along the ossicular chain. It is still under experiment and has been fitted in a few centres in UK.

### ***Ear canal surgery***

Ear canal atresia due to congenital or acquired lesions may cause conductive hearing loss which may be relieved by surgery. Another indication for surgery is the presence of exostoses (benign growths of periosteal bone) formed in the ear canal which are found to be more common amongst water sports enthusiasts, especially surfers, due to the length of cold water exposure.<sup>28</sup>

### ***Drops and toilets***

Specialist aural toilet is one of the most effective treatments for otitis externa. Topical acetic acid drops and topical aluminium acetate drops are also commonly given, along with topical antibacterials, antifungals, anti-infective agents and corticosteroids. Exclusion of water penetration into the ear is encouraged in those with recurrent attacks.<sup>29</sup> In primary care, general practitioners often prescribed patients with otitis externa with Gentisone HC ear drops, a combination of gentamicin and hydrocortisone. A double-blind randomized controlled trial have concluded that the topical steroid-antibiotic combination is more effective in treating otitis externa compared to steroid treatment on its own.<sup>30</sup> Ear wax accumulation is a common complaint from patients. Its removal can be done using wax softeners with or without ear syringing and also by manual removal with specialised instruments namely suction, hook or ring probe.<sup>31</sup>

### ***Community services***

There are many services, locally and nationally, provided for the deaf society in UK e.g. Merseyside Society for Deaf People and LINK Centre for Deafened People. All centres provide similar services sharing a common aim which is to help the hearing impaired cope positively with their disability in everyday life.

#### ***The LINK Centre for Deafened People***

LINK is a national health facility used widely by health professionals in the UK which offers specialist rehabilitation for newly-diagnosed deafened people. The centre offers a programme which aims to help participants by maximising psychological well being, optimising effective communication, providing information on health conditions, ensuring access to appropriate services, facilities and hearing technologies and lastly, to improve their quality of life. LINK also provides continuing support by setting up social groups and self-management courses.

#### ***Merseyside Society for Deaf People (MSDP)***

This local centre in Liverpool aims to address any inequalities from the deaf community and help them achieve a full and active role in society. It provides a

variety of services not only to the deaf but also to their families including communication services, social work, providing them with appropriate environmental aids (e.g. room loop system and text telephone) and community development activities. The centre also promotes deaf awareness training and sign language training. A Powerpoint Presentation (Appendix 2) on MSDP, made by myself in 2008, will give an overview of its role and services

## **CONCLUSION**

Hearing impairment is a serious common condition affecting over 7 million people in the UK, both children and adults. Some are born deaf whereas a majority of people acquire hearing impairment or loss in later life due to old age or trauma. Society has little understanding of deafness, assuming that deafness tends to be associated with low intelligence. Therefore, people in society should be made aware of its effect and far-reaching implication (especially the psychological impacts). Deafness is considered to be a disability and there are a lot of issues surrounding this matter as it does not only affect the deaf person but can also cause a burden to partners and families. Community service centres are established especially for the deaf and hearing impaired, and their families, to ensure they fulfil their role in society and live a normal life, free from discrimination and prejudice.

The management provided for hearing impairment have escalated in recent years with newer technologies available and this essay would have portrayed a broad overview of some of the different types of interventions that are safely used in clinical practice today. The interventions mentioned here are sourced from published studies supporting the efficacy and effectiveness of management hearing impairment, but like all procedures they may have significant complications which need to be kept in mind in order for patients to make informed decisions when considering it and so they can be prevented whenever possible. Counselling and rehabilitation services have also shown to be beneficial on the psychosocial dimension.

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**APPENDICES**

***Appendix 1: Deaf Awareness Poster 2008***

The poster features a large red title 'Understand This?' at the top. Below it are two rows of photographs. The first row shows a man in a striped shirt pointing to his ear in two different ways. The second row shows a woman in a pink patterned top performing four different hand gestures. Below the photos are three large red words: 'No?', 'Yes?', and 'Maybe?'. The bottom half of the poster has a red background with white text. It reads: 'Every Deaf person you speak to will have a different fluency level of English', 'REMEMBER', 'Could this person benefit from an INTERPRETER?', and a list of names: 'Zainab Suleman, Nurul Ghazali, Periklis Nikomanis, Molly Makhoha, Kevin Kelly, Eloise Newbold and Shazana Nor. (Produced by 3<sup>rd</sup> Year medical students)'. At the bottom are logos for 'msdp' (Mansfield Society of Deaf People) and 'RNID' (Royal National Institute of Deaf People), along with their contact information: Tel: 0151 2280888, Fax: 0151 228 4872, http://www.msdp.org.uk; Tel: 020 7296 8000, Fax: 020 7296 8199, http://www.rnid.org.uk.

# Understand This?



**No?      Yes?      Maybe?**

Every Deaf person you speak to will have a different fluency level of English

**REMEMBER**

Could this person benefit from an **INTERPRETER?**

Zainab Suleman, Nurul Ghazali, Periklis Nikomanis, Molly Makhoha, Kevin Kelly, Eloise Newbold and Shazana Nor.  
(Produced by 3<sup>rd</sup> Year medical students)



Tel: 0151 2280888  
Fax: 0151 228 4872  
<http://www.msdp.org.uk>



Tel: 020 7296 8000  
Fax: 020 7296 8199  
<http://www.rnid.org.uk>

**Appendix 2 : Merseyside Society for Deaf People Presentation 2008**

 <p>By: Shazana Nor Year 3 2008</p>
<ul style="list-style-type: none"> <li>• Located in West Derby, Liverpool.</li> <li>• Established in 1864.</li> <li>• Provides services to D/deaf and Hard of Hearing people.</li> <li>• Aim: to ensure that they achieve a full, active and influencing role in mainstream society.</li> <li>• Covers Liverpool, Sefton, Wirral.</li> <li>• 85 staff and 2500 using the services.</li> <li>• Charity; some programs funded by Liverpool &amp; Wirral local authorities.</li> <li>• Operate within CACDP guidelines.</li> </ul>
<h3 style="text-align: center;">Training &amp; Development</h3> <ul style="list-style-type: none"> <li>• Aims to promote equality and improve access             <ul style="list-style-type: none"> <li>- Deaf Awareness Training</li> <li>- Deaf Equality Action training</li> <li>- Sign Language Training</li> <li>- Building Survey Audits</li> <li>- Consultations</li> </ul> </li> </ul>
<h3 style="text-align: center;">Communication Services Department</h3> <ul style="list-style-type: none"> <li>• Aim: to provide information in an accessible form for D/deaf, Hard of Hearing and Hearing people.</li> <li>• Services offers include:             <ul style="list-style-type: none"> <li>- English – BSL Interpreters</li> <li>- Note Takers</li> <li>- Palantypist</li> <li>- Lip Speakers</li> <li>- Deaf Blind Interpreters</li> <li>- Deaf Relay Interpreters</li> </ul> </li> <li>• Provide communication support for a wide range of assignments.</li> </ul>

## Social Work

- Provide a professional and comprehensive service.
- Support and advice given to children and their families, elderly, people in home or residential care.

## Environmental Aids

- Room Loop System
- Portable Doorchime
- Personal TV Amplifier
- Timeflash Alarm Clock
- Text Telephone
- Ph



## Community Development

- Works closely with the Deaf community in creating new initiatives
- Works with local and national organisations
- Services include:
  - Volunteer service
  - Youth and community
  - Children & families
  - Summer play-scheme
  - Group consultation



## DeafAbility Productions Limited

- Provide access of information to cater for their communication needs.
  - MSDP website
  - BSL Translations
  - Library Resources

**'Immanuel Kant said that blindness separates you from things but deafness separates you from people. What can be done for the hearing impaired?'**

Written by Becky Wilson, University of East Anglia

Word count: 2950 excluding references

## **'Immanuel Kant said that blindness separates you from things but deafness separates you from people. What can be done for the hearing impaired?'**

Deafness is a topic I am intimately familiar with, having begun losing my own hearing in my second year: I'm now profoundly deaf and about to embark on fifth year. Medical school isn't easy for anyone, it certainly isn't easy if you can't hear, but it does mean I've found a huge number of strategies for coping with deafness, and I've tried most of them.

Leaving aside the medical causes of deafness, there are two types of people with hearing loss. A person can either be deaf, meaning that they can't hear properly but live in the hearing culture and use the spoken word as their first language, or Deaf, which means that they are a member of the Deaf community, and probably use sign language as their first language. (1) People who are Deaf consider their loss of hearing to be a culture, not just a medical phenomenon, and many oppose such technologies as cochlear implants as attempts to destroy their culture. (2)

The obvious barrier facing the deaf person is that they can't hear other people talking. This includes talking to people face to face, on the telephone, and also listening to the radio, watching TV, going to the theatre, and all sorts of other settings. We use speech all the time, and until I started losing my own hearing, took for granted completely how important it is to be able to understand other people talking. Speech is the main form of social sounds, but there are two other important types of sound, too. (3)

Warning sounds aren't just alarms and sirens, but also the sounds that signal that something needs our attention. We use sound as alerting or warning, for example, alarm clocks, and fire alarms. We use it to remind us of things going on around us, for example, the sound of a toaster popping, a tap running or a kettle boiling - as a deaf person, I often forget that these sounds even exist, and am frequently surprised when friends tell me the kettle's boiled without looking at it! Environmental sounds are the third type, and there are more important to people than they at first appear. A sense of sound reminds us that the external world is still out there, when we are otherwise concentrating so hard on something that we could be totally absorbed in it - many deaf people fidget, and one reason for this is that it's a sensory connection to the outside world, while other people would be able to hear the wind in the trees, other people talking, or pages of books being turned. (3) Personally, as I write this, I'm very aware of the sensation of my fingers on the keyboard, and my toes in the carpet.

Lack of sound ought, logically, to be the only barrier meeting deaf people - after all, it's plenty to be learning to cope with. Unfortunately, a major problem most of us experience at some time is the attitude of the people around us. If I'd been given a pound for every time I've been told I can't be a doctor, or at least that I can't do cardiology or respiratory medicine - well, I'd have so much money, I'd be able to afford not to work! Fortunately (for me, and I hope for my patients) I wouldn't want to give up, and being told I can't do something just makes me more determined. I've been told just as many times that I can hear if I want to, I'm just being awkward - usually because people don't understand the profound effect that lighting, background noise, and how tired I am have on how well I can lipread them, how well I can hear to guess at the sounds that aren't visible on the lips, and how well I can guess

at what word would make sense in context. Amanda Kvalsvig compared it to solving crossword puzzles at the speed of light, and I quite agree. (4)

Deafness separates people from sound – social, warning and environmental, and the loss brings with it a strong emotional reaction, and the attitudes of other people which can be barriers in getting on with life. Thankfully, there are some steps that can help with each one of these problems, so deafness, although a significant disability, isn't the end.

Hearing aids are indispensable to many deaf people, and I couldn't be without mine. They aren't a cure for deafness - far from it, hence the need for all the other things I intend to write about - but at best, they restore the ability to understand speech if the background conditions are right, and at worst, provide a sense of environmental sound to prevent the feeling of sensory isolation.

There are various ways of dividing up hearing aids into different types - the one most commonly used by people who wear hearing aids is based on appearances. Behind-the-ear (BTEs) aids are the ones prescribed on the NHS, and consist of a processor that sits behind the ear, and a tube and an earmould directing the sound from this processor into the user's ear. They're also the only option for profound deafness; the aids perched on my own ears are BTEs. Other options include In-The-Ear (ITE) aids for severe losses, In-The-Canal (ITC) aids for mild to moderate and some severe losses, and Completely-In-Canal (CIC) aids for mild to moderate losses. Level of hearing loss isn't the only factor affecting the choice of type of aid; canals need to be large enough for the technology to fit inside if the patient wants one of the more discreet aids, and BTE aids make it much easier to interface with other technologies. (3)

Many people prefer the more discreet hearing aids, because they find BTEs unattractive. I know many young people who think that hearing aids are "for old people" and wouldn't want to wear them. My processors are a silvery grey, which I find quite pretty and sometimes match my jewellery to; and I'm currently coveting the glittery earmoulds sported by a kid I met in my Paeds rotation. Connevans also supply Ear Gear, covers for the processor in a variety of different colours, for the truly fashion-conscious.

Bone anchored aids are another option, used particularly frequently for hearing losses caused by outer or middle ear problems. An implant is fitted into the mastoid bone, and a processor screwed onto it externally, bypassing the middle ear and transmitting sound direct to the cochlea. Another option for middle ear problems is spectacle aids, which combine a pair of glasses with hearing aids on the arms, vibrating directly against the mastoid bone; however, I can see difficulties arising when the deaf person has to remove their glasses to change the batteries in the aids, and then can't see to change them! They're also quite expensive, so they're not available on the NHS.

Cochlear implants are becoming increasingly popular, to return a degree of hearing to the profoundly deaf, and the technology they employ is improving all the time. They consist of two parts, an implant, and a processor. The implant consists of an electrode, inserted into the cochlea to directly stimulate the auditory nerve, and a magnetic coil receiver implanted into the skull, behind the ear. The speech processor is then placed behind the ear, with a coil transmitter to sit over the implanted one, held in place by magnetic forces, and transmit the messages from the processor. (5) A cochlear implant is not a perfect bionic ear, and many of the people who use them still rely on lipreading to be able to understand speech. However,

they can make a big difference. A recent implantee, whose progress I have been following avidly, says that "After all these years of being trapped by my hearing loss into being someone I am not, now the old me is bubbling under the surface." (6)

With all the will – and wonderful technology – in the world, nothing can restore hearing to perfection, particularly for those with more severe losses. For all people with hearing loss, whether deaf or Deaf, lipreading makes a real difference to interaction with the outside world, and to quality of life. Lipreading classes are available in various locations across the country, although they can be harder to find in rural areas than in cities. In some places, they're provided free of charge to deaf people. Not all sounds can be read on the lips, only around 30% of sounds, and lipreading is very tiring. But that 30% makes a real difference to someone who can't hear those sounds, and I would recommend learning to lipread to anyone experiencing hearing loss – at a class, if at all possible, because these are good places to socialise as well as to learn. In the words of Edward B Nitchie, "Lipreading, then, is not a cure for deafness, nor is it even a cure for all the ills of deafness; but from some of the worst ills it is a true alleviation." (3)

In big group meetings, lipreading around a room can be very difficult, and very tiring to attempt. For meetings, Language Service Professionals, LSPs, exist to make life easier – there are lipspeakers, signers (for those who know British Sign Language) and palantypists, also known as speech-to-text reporters, who type whole conversations word for word, as the meeting goes along, so the deaf person can follow and contribute.

Nitchie was right when it came to face-to-face conversation. However, he published Lipreading in 1912 – before the telephone became popular, and made conversation without lipreading such a daily occurrence. Many deaf people I speak to dread the telephone ringing, but there are alternatives out there. For people with mild to moderate hearing losses, telephones are available with induction loops installed, so they can "talk" directly into the hearing aid. For those of us who are more deaf, Minicom, a textphone service, is available, and Typetalk allows me to call my friends, type messages to them, which an operator then reads out to my friend, waits for their response, and types it back to me so it appears on my screen. It's a little slower than other friends can have telephone conversations, but much quicker than asking the friend to repeat everything 3 times, then asking them to just email me! Other good alternatives to using the phone are email, text messaging, and instant messaging on computers.

Hearing aids, lipreading, and the Minicom are all helpful in boosting or replacing social sounds. However, they don't always help with warning sounds – not least because we can't, don't and wouldn't want to wear our hearing aids 24 hours a day. At the end of a long day, I look forward to taking my aids out and having a rest from struggling to communicate. So, we need to replace these warning sounds somehow. For people with mild to moderate hearing losses, amplifying the signals already there can be adequate, and many technologies have louder alternatives now – phones and doorbells that ring more loudly, for example. Once people pass a certain level of hearing loss, however, amplifying sounds runs the risk of annoying the neighbours more than they help the deaf person! Two good alternatives to warning sounds are visual (usually flashing lights) and tactile (usually vibrate pads.) The RNID (7) and companies such as Connevans (8) provide deaf-friendly alternatives to every warning sounds I've ever thought of and worried about, and plenty that had never occurred to me. The lighting for a whole house can be wired up so that the lights flash on and off, in different patterns for different signals – the fire alarm, doorbell and Minicom, for example.

For people who prefer vibrating alerts to visual ones, most gadgets can be modified to use this. My alarm clock has a pad that slips under my pillow and vibrates to wake me, which is very effective – it's impossible to sleep through a lump of plastic shaking your brain out of your ears. Fire alarms, door bells, telephones or minicomms, and even baby listeners, can all be linked up to a vibrating pager, worn by the deaf person.

Environmental sounds are harder to replace, depending on the severity of hearing loss. Many deaf people suffer from tinnitus, a continuous noise in the ears or in the head, worse when stressed or tired (or, in my experience, when tipsy.) For people with milder hearing losses, natural sounds can help to drown out or distract from the tinnitus, and there are gadgets available from places like Connevans that produce a variety of soothing sounds, like rainfall or the sound of the sea, which helps with tinnitus. For those with more severe hearing losses, counselling, relaxation and distraction can help. (9) It can become a vicious circle, with stress aggravating the tinnitus and the tinnitus aggravating stress, so cognitive techniques can help with this. (9) The British Tinnitus Association, and the RNID Tinnitus Helpline, exist to provide information and support to people affected with tinnitus.

The defining characteristic of acquired hearing impairment is the devastating feeling of loss. (9) This leads to a reaction similar to bereavement, described best by Elisabeth Kubler-Ross. Deafened people will need time and support to get through this, but it is important to remember that although depression is a stage of adaptation to this loss, clinical depression is also more common among deafened people, and it is important to watch out for this, and to treat it as being just as significant as it would be in any other patient. Peer support plays a very important, but commonly underestimated, role in coping with acquired hearing loss. When I started losing my hearing, I was the only person I knew at uni to have experienced deafness; although my friends were very supportive, I knew they couldn't really understand. Joining UK Health Professionals with Hearing Loss (10) was a significant step, for me, in coming to terms with what had happened by talking it over with other people who had experienced similar things, and there are various similar groups out there, with slightly different focuses. Other ways of meeting deafened people are to attend lipreading classes, or courses on coping with hearing loss – people with acquired profound deafness can attend an intensive rehabilitation programme run by Hearing Concern LINK. These focus on all sorts of areas, such as lipreading, tinnitus, equipment, and relaxation, but there are usually 12-14 people there, and the emphasis is very much on “communication, confidence and feeling positive,” which helps with dealing with the emotional side of deafness as well.

The only major barrier left, then, that we haven't dealt with yet is the attitudes of other people. In my experience, problems in this area are more often caused by people not knowing, or temporarily forgetting, how best to help the deaf person to understand them. The best solution to this is to be assertive – for the deaf person to state what they need, without apologising for being deaf, and without being rude. There's a simple set of rules on how to help a deaf person to understand, often referred to as the Ten Commandments: I can't trace the original set, and they're stated differently everywhere, so I've modified the ones I found on the Cochlear Association website (11)

- I. Ask how best to attract our attention so you don't startle us, for example, flick a light switch, stamp on the floor, tap us on the shoulder. Don't flick a light switch in a room full of deaf people, though, if you only want one response: it's the equivalent of shouting “OI!” at the top of your voice to attract one person's attention.
- II. Try to keep background noise to a minimum, if possible – don't try to talk to us while the radio's on, the kettle's boiling and someone's vacuuming.

- III. Stand or sit where we can see you to lipread
- IV. Don't cover your mouth or look away from us while you're talking.
- V. If there's a bright light, sit or stand so that the light is behind the deaf person – it stops the silhouette effect which makes it hard to lipread.
- VI. Speak normally, clearly and don't mumble. But don't over-emphasise words; this makes lipreading harder
- VII. If we don't understand, rephrase things when you repeat them
- VIII. Write notes, memos or email to confirm specific instructions, and be patient if we do the same – we're just checking that we understood.
- IX. In a group setting, make sure we know the topic of conversation before we get going. Lipreading is largely guesswork, it helps when we have some context.
- X. Be patient and understanding. Don't show frustration if you have to repeat yourself, it's as frustrating for us as it is for you.

Unfortunately, not everyone can be convinced: some people's attitudes to deafness are that if we can't hear, we can't do things that hearing people can. The only method I've found so far for dealing with this is stubborn persistence, and showing those people that it's possible. In the world of work, the Disability Discrimination Act means that reasonable adaptations have to be made for deaf people within the workplace, and there are associations out there that can help deaf people to find jobs. (3)

Overall, technology has done wonderful things for the lives of deaf people – we can get a sense of sound back, find alternative alerting sounds, block out tinnitus if our deafness isn't too bad. There are also lots of things people can do for themselves, and lots of organisations that can help. And I can assure people that, while life with hearing loss isn't easy, there really is life after deaf.

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