ON HEARING IMPAIRMENT : BY THE AUDIOLOGIST - TO ALL THOSE CONCERNED

Reg,No.M8914

AN INDEPENDENT PROJECT WORK SUBMITTED IN PART FULFILMENT FOR FIRST YEAR M.Sc. (SPEECH AND HEARING) TO THE UNIVERSITY OF MYSORE

ALL INDIA INSTITUTE OF SPEECH AND HEARING: MYSORE - 570 006

MAY 1990

MY MUMMYJI DADDYJI AND NANIJI

for

all they have done

CERTIFICATE

This is to certify that the Independent project entitled: **ON HEARING IMPAIRMENT : BY THE AUDIOLOGIST - TO ALL THOSE CONCERNED** is the bonafide work in part fulfilment for *the* degree of Master of Science (speech and Hearing) of the student with Register No.M8914.

Mysore
May 1990

Director
All India Institute of
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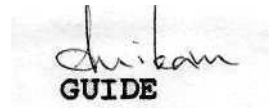
CERTIFICATE

This is to certify that this Independent Project entitled: **ON HEARING IMPAIRMENT: BY THE AUDIOLOGIST - TO ALL THOSE CONCERNED** has been prepared under my supervision and guidance.

Mysore

May 1990



GUIDE

DECLARATION

I hereby declare thai: this Independent Project entitled: **ON HEARING IMPAIRMENT : BY THE AUDIOLOGIST - TO ALL THOSE CONCERNED** is the result of ray *own* study under the guidance of Dr.(Miss) s, Nikam, Professor and Head of the Department, Department of Audiology, All India Institute of Speech aid Hearing, Mysore, and has not been submitted earlier at any University for any other Diploma or Degree.

Mysore

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INTRODUCTION

"Experience makes a man wiser" but folks, in the context that we are going to discuss, it takes a back seat. Well it is about the awareness and profilectic care in disease conditions afflicting the ear. The person so afflicted may turn wiser but is it wiser in eventually following the treatment, pre-cautionary and preventive measures? But the same could have been achieved at a much lesser cost that is, in being well informed about the hearing mechanism and its Vulnerability,

As audiologists we assume a position to understand the development of hearing, nature and cause of different hearing disorders before attempting to work with the hearing-impaired at the professional level. At the same time you, either as a parent, a social worker or a professional must also under-stand the developmental aspects, the nature and cause of the different hearing disorders before working with them.

An old saying goes "Prevention is better than cure". Any preventive method would require a well equipped precautionary measures which in turn can be designed or coined only/when there is access to the normal developmental pattern.

Research has enabled the professionals in our field to list out the factors which If prevalent would increase the chances of the disorders. To neglect the available treatment

aspects would be a major folly while on our quest for knowledge. Efforts are constantly on to resolve disorders either medically, surgically or by way of compensatory mechanisms with the main objective of resolving handicap. Implant is one such method that has been used in recent times. Though new and certainly is a major step in rehabilitation, it has its own merits and demerits.

One of the strongest interwoven relationships in our system is between speech and hearing. Hence while considering the management of hearing disorders and conservation of hearing, the inclusion of speech conservation in rehabilitation becomes obvious.

But disorders do not completely occur in isolation. So it is with hearing impairment as it is seen to occur with other sensory or motor deficits such as in case of deaf-blind.

Start now, enlighten yourselves and acquire the knowledge in these various facets of hearing, its impairment and its conservation.

So here we "Go.....

ANECDOTE OF VARIOUS EXPERIENCES

Have you met the man Who went all over the world seeking fortune when there was a gold mine in his backyard? We have not met him either, but we have met many, who seeking help for their speech and hearing problems went to many places before finding out that they could be helped at the speech and hearing centre. Meet a few of them -

" A 30 year old male came to us with the complaint of a sudden loss of hearing in his right ear with a feeling of blocking in that ear. He was an agriculturist and his occupation exposed him to high intensity noise levels. At times movement of jaw resulted in a popping sensation and temporarily improved hearing. Ear examination by ENT specialists revealed an impacted condition due to wax in the right ear canal. Hearing tests revealed a severe loss. But removal of wax restored normalcy. It is clear that impacted wax had influenced the malady.

NOTE: Certainly the problem of impacted wax within the external ear canal must be taken seriously and should not be allowed to go unnoticed. The best way of avoiding wax accumulation is by getting one's ears cleaned regularly. Otherwise, wax may later get hardened and may even damage the eardrum.

Other injuries of the crater ear and canal are Frostbite which is due to prolonged exposure to cold weather wherein the outer ear becomes red and swollen with excessive pain, itching and burning sensation. In the early stages the client may not have problem but at later stages due to blockage of the ear canal, he might develop mild to moderate loss. Some times foreign objects such as stones, beads or even insects may be inserted into our ear canal which is usually seen in children which may tear open the eardrum and damage the middle ear structures.

* In a fire accident, 8 year old boy burnt his face. The burns even extended upto the ear canal causing narrowing of the canal wall. He underwent treatment for his burns and came to us for help as he had developed hearing loss of minute degree. As he was too young, doctors did not recommend any surgery. So he was recommended to wear a hearing aid of special type,

NOTE: This kind of narrowing of ear canal may occur at the time of birth which may be due to intake of harmful drugs by the mother during pregnancy.

Other factors that may bring about hearing problem are fungal infections due to taking bath in contaminated water, or even a simple repeated scratching may invite virus and lead to ear pain and hence lead to problems.

* A young house wife aged 28 years came to us seeking help. She reported that in a family argument with her husband, she was slapped on her left cheek and immediately she developed giddiness and after sometime developed difficulty in hearing. A thorough ear examination revealed that her ear drum had ruptured. She underwent surgery and got the ear-drum repaired.

NOTE : Any injury or blasts due to crackers; rupture the delicate ear drum other than infections. Also note that any repeated infection like repeated attacks of cold may lead to blocking of the tube connecting nose, ear and throat causing accumulation of fluid in the middle ear cavity which intura puts pressure on the ear drum resulting in a rupture again leading to hearing problem. Such cases should be immediately brought to us. If delayed, then this will complicate the condition and reach the brain Causing meningitis.

* A 32 year old mechanical engineer working in an industry suspected that all was not well with his hearing. The hearing tests by an audiologist showed that perhaps his ears were exposed to a constant and loud noise. This was confirmed by him.

NOTE; People do not realize that by subjecting their ears to loud noise far long hours every day, their hearing will get damaged. Unfortunately, it is already too late when the

difficulty in hearing becomes apparent; too late because hearing loss acquired in this manner is incurable.

Being an intelligent young man, he came to us at a very-early stage, so further damage could be prevented by asking him to shift the source of noise elsewhere or he himself should more away. If this could not be achieved, he was advised to protect his ears against the noise by plugging it.

* A 67 year old man was examined here, after experiencing a sudden episode of giddiness with vomiting sensations which continued for several days. These severe attacks left him in a state of unsteadiness. During these attacks he developed kind of humming sound in his ears. Ear examination revealed a normal ear drum. X-ray of skull and inner ear revealed no significant abnormality. Hearing tests revealed a severe hearing loss at higher frequencies and his ability to discriminate sound was also poor. He was diagnosed as having Meniere's Disease. He was advised to take bed rest and avoid stressful situations. Dietetic controls involved low fluid and salt consumption. Later surgery was performed to restore balance and hearing.

NOTE: Such problems are episodic but one need not be alarmed about its complications. An early detection and immediate medical line of treatment is required. The occurring here is different from the gidiiness resulting due to physical weakness.

The individual with a problem similar to that mentioned above will feel as though the room is rotating and the buzzing sound in his ear will act an indicator to that person that he is going to get an attack but will not loose his consciousness unlike a physically weak person.

* A 29 year old female came to us with the complaint of buzzing sound in her left ear with vomiting and repeated headaches and problems with hearing, and a sense of imbalance.

  Thorough examination revealed that the cause was not very clear, A check on the spinal fluid protein level was done to detect the presence of any tumour and it was found that the level had gone up. Hearing tests revealed a high frequency loss with poor speech discrimination ability.

NOTE: in such cases , it is difficult to detect the cause but once confirmed, treatment is basically surgery to remove the tumour.

* A 54 year old woman was seen in a speech and hearing center for an ear examination and hearing tests. Her chief complaint was a sudden loss of hearing in her right ear which had occurred without warning seventeen days earlier. She had experienced an upper respiratory tract infection with a low grade fever about 24 hours prior to the sudden loss of hearing. The sudden hearing loss was preceded by a buzzing sound

in the right ear. This was not accompanied by pain on discharge. She did not have giddiness on any previous history of ear infection. Hearing tests indicated a severe hearing loss in the right ear with poor speech discrimination.

About 2 weeks later the patient returned to the speech and hearing center for follow up examination and hearing tests. Reported a steady progressive recovery of hearing almost to normal and only a mild hissing sound.

NOTE: In the above case the problem was temporary. But in certain cases it goes unnoticed and leads to severe problem where restoration becomes difficult. In order to avoid these complications one must keep a control over systemic infections, go in for immediate medical aid during minor attacks of cold and viral infections.

* A 75 year old farmer was brought by his son with the complaint of difficulty in understanding other's speech with no other problems. This problem was reported to be gradual and progressive in both ears. A detailed examination revealed that he had severe hearing loss in both ears. The major complaint of the old man was that he was no more considered a part of the family and was always kept in isolation away from family affairs.

NOTE: People are not aware that every one has to pass their old age and it is the most difficult periods. The human body

cannot work in the same way through out life. At the later stage in life it gradually looses its ability to work efficiently So is it with our hearing mechanism. The nerves that help us in hearing become weak gradually. In such cases we cannot help them in regaining the capacity. We can provide them with hearing aids which will help in increasing the loudness of the sounds.

Basically with such groups one must be patient and tolerant while communicating with them and must not show any kind of indifference.

FOETAL DEVELOPMENTAL CHAST

Foetal week	Inner ear	Middle ear	External ear
3rd week	Plate like thickening of outer most layer or surface layer behind the brain and a pit formation develops.	Middle ear cavity or a depression begins to develop.	
4th week	The pit then enlarges and forms a closed sac; Division of organ of balance and hearing occurs.		Thickening of surface layer begins to form
5th week		-	Ear canal begins to develop.
6th week	Organ of balance grows further and gives rise to 2 sac like structures - utricle and saccule; Three semicircular canals begins to develop.		Six hillocks or elevations which form the elevations or depression of the outer ear and the convening begins to develop.
7th week	The snail like cochlea takes one turn i.e. one coil present. Minute structures i.e. cells develop with in the 2 sacs (utricle and saccule)		The outer ear moves outside and towards the sides of the head.
8th week	Channels to connect the 2 sacs with the semicircular canals now fully develop; minute structures called cells develop with in the 3 semicircular canals.	Two bones - incus and malleus present in the firm surface called cartilage; lower half of middle ear cavity formed.	Outer l/3rd position of ear canal turns into firm surface - the cartilage.

9 th week:		Three layers at the ear drum fully formed.	
11th week	The coil in the inner ear takes *21/2* turns, and the nerve for hearing gets attached to a channel leading to inner ear.		
12th week	Minute structures responsible for picking up sensations sensory cells are found with in the coil. Maze like structures called labyrinth which includes inner ear structures such as coil. organ of balance develops fully and the envelop enclosing all the inner ear structures begins to harden.		
15th week	The tinniest bone of the middle-ear - strrruup in the form of a firm surface is formed.		
16th week		Hardening of the malleus and incus begins and form 2 strong bones	
18th week		stapes/strrrup begins to harden up and form bone.	
20th week	Inner ear structures fully mature and reach the adult size*		Outer ear is adult shape but continues to grow uptil age 9.
21st week		Eardrum is clearly seen	

30th week	-	Middle ear cavity is filled with air,	External ear canal continues to mature until 7 years of age.
32th week	-	Malleus and incus completely harden up and form 2 bones	-
34th week	-	Bone behind the outer ear called the mastoid gets filled with air filled cells.	-
35th week	-	Mastoid is completely filled with air cells.	-
37th week	-	Upper portion of the middle ear cavity gets filled with air; stapes continues to develop until Childhood,	-

Preventive measures to be followed by an expectant mother:

In order to give birth to a normal and healthy baby, an expectant mother should follow certain preventive measures. The first 3 months are very crucial for the development of the child as a majority of the inner ear structures develop and attain maturity. Any problem in this period will lead to severe damage to inner ear and cause severe hearing loss. The next 8 weeks is crucial for development of middle ear and outer ear structures.

Maternal infections:

Such as rubella, chicken pox, measles and others prove quite dangerous to the foetus. Immediate medical attention should be provided.

Nutrition's:

The mother should take proper nutritious food. She must consume more greens and less of fat containing food stuffs like potato and more of protein rich food like pulses.

Psychological and Physical stress:

An expectant mother should not undergo stressful situation. She should not exhaust herself. As both physical and psychological stress will have an impact on the developing foetus. Under stress the uterus might undergo compression affecting the baby in the utreus.

Drugs:

Care should be taken -to avoid as much as possible the intake of certain drugs like Thalidomide, Aminoqlycosides, Kanamysin, Streptomycin, Neomycin etc. These drugs are proved to be harmful resulting in deformed inner ear structures. Drugs consumed for minor problems like headaches such as Aspirin have temporary effect on hearing. So physicians consultation before consumption is essential.

Radiations:

Long duration of exposure to x-rays may have a negative effect on the developing baby. Hence repeated exposure should fee avoided.

Injury/ Accidents:

Any kind of injury or accidents can directly affect the baby. A mother should be careful in her steps and try to be on gaurd as much as possible.

Hereditory:

Last but not the least are the hereditory factors. A hereditory disease is genetically determined. Basic units of heredity is genes and the features of the infant are inherited

from the parents through these units. If there is any abnormality in the parental units it may get transmitted to the infant and thus may manifest as a disorder. The manifestations of that abnormal unit will depend on its strength,

HIGH RISK CHECKLIST

Read the following questions and circle " yes" or 'no'

1. Is any one in the child's family, on the father's side or mother's side, having a severe hearing problem since childhood? YES/NO
2. Is any one in the (child' s father's family or mother's) family having a speech problem? YES/NO
3. Is any one in the (child's father's family or mother's) family has a cleft lip and/or cleft palate? YES/NO
4. Is there any consanguinity present? (parents were blood relatives before marriage) YES/NO
5. Does the child have ears which look different i.e. abnormal (too small, rather big, slightly away from where ears are normally found) - YES/&O
6. Is the child's jaw or tongue different i.e. YES/NO
7. Did the (child's) mother take any drugs during pregnancy? YES/NO
8. Did the (child' s) mother have illness such as measles, mumps, chicken pox, etc. during pregnancy? YES/NO
9. Did the child's mother require treatment for conditions such as blood pressure during pregnancy? YES/NO

10. Did the child[1]s mother notice bleeding during pregnancy?- YES/NO

11 . Did. the mother consume any drugs like 'Gentamysin' or 'Amikasin' during pregnancy? YES/NO

12. Was the child's mother exposed to radiations. such as x-rays, during pregnancy? YES/NO

13. Was the (child's) mother hospitalized for long prior to delivery of the child? YES/NO

14. Did the child weigh less than normal at the time of birth? YES/NO

15. Was the child born prematurely? By how many weeks? If yes, say the number. YES/NO

16. Was the child's appearance blue at the time of birth? YES/NO

17. Did the child not cry immediately after birth but did so after some time? YES/NO

18. Was the child given blood transfusion soon after birth? YES/NO

19. Was the child's appearance yellow at the time of birth? YES/NO

MIDDLE EAR IMPLANT

Implantable hearing aids

For the hearing impaired, to improve their ability to hear by means of an implanted hearing aid has been a long cherished dream.

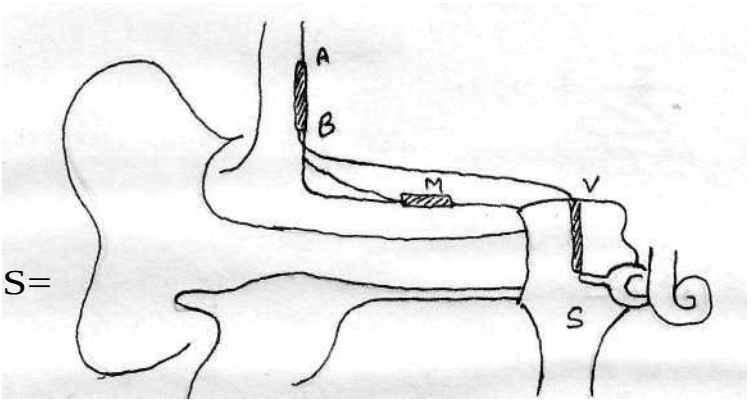
This chapter will highlight the principle behind the implant, the technical aspect and application.

Now what is middle ear Implant? By now you must be familiar with the behind-the-ear hearing aid and in-the-ear hearing aid. In the behind-the-ear, the device is placed behind your ear while in an in-the-ear, device is placed within the concha. A middle ear implant (MEI) is implanted in the middle ear to act as a hearing aid.

Before talking about the implant, I would like to enlighten you with the middle ear structures. Middle ear is a cavity. It starts from the ear drum which in turn is connected to 3 tiny bones - malleus that resembles a hammer and incus that resembles anvil and the last bone which is the tiniest of all is stapes which is a look alike of a horse's stirrup. Stapes is in turn fixed to oval window. Middle ear is bounded by 6 walls and a tube arising from the inferior part of the cavity that connects the middle ear to nose and throat.

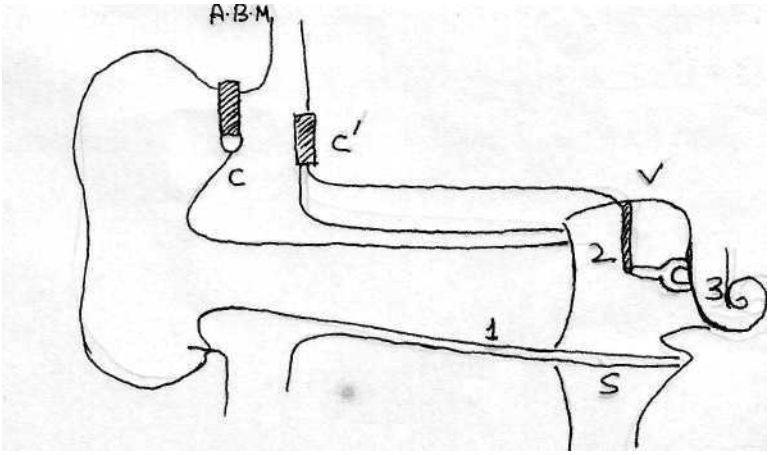
Technical aspects:

There are 2 types of MEI - the totally implant table MEI and partially implantable MEI. Both these implants, have the same parts in it consisting of microphone, amplifier - battery complex vibrator whereas in the total MEI, the microphone is implanted tinder the skin of the external ear canal.



A = Amplifier
B = Battery
M = Microphone
V = Vibrator
S = Stapes

the amplifier - battery complex, behind the ear, and the vibrator in the middle ear cavity to be attached to the head of the stapes. In the partial MEI only the internal induction coil (an additional part) and the vibrator are implanted, while the microphone, the battery-amplifier and external induction coil are installed in a capsule to be attached outside, on the skin behind the ear.



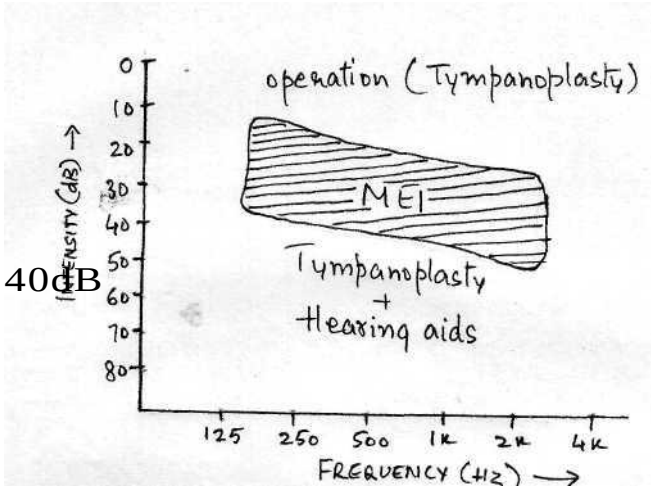
A=Amplifier
B=Battery
M=Microphone
C,C'=External canal and Internal induction coils
V=Vibrator
S=Stapes
1=External ear
2=Middle ear
3=Inner ear.

Principle and application:

The MEI exactly replaces the function of increasing the loudness of the normal middle ear. Hearing loss can either have conductive component where in the defect is either in external ear only or middle ear only or may be due to combined defect. Other type is pure involvement of inner ear. A combination of conductive and inner ear involvement gives rise to a mixed type of deafness.

The MEI is indicated for the mixed type of deafness. The efficiency of MEI is dependent on the bone conduction threshold. Now the question that will arise in your Mind will be "what is bone conduction thresholds" When sound strikes the ear, two types of sound waves travel. One is through the external ear canal via the eardrum through the middle ear cavity and later entering the inner ear. This type of sound conduction is called air conduction. When sound waves directly reach the inner ear by vibrating the skull, it is termed as bone conduction. The minimum level at which the client responds by indicating through gestures that he would hear the sound is termed as his 'threshold' .

In fitting the MEI the client must have a mixed type of loss as indicated.earlier and the bone conduction threshold must not exceed 40 dB in the speech range, that is, the



40dB threshold obtained at 500 Hz, 1 KHz, 2 KHz must not cross level.

Hence MEI can be indicated When the ear has mixed type of loss and bone conduction threshold is within 30-40 dB, When the bone-conduction threshold is between 20 dB - 40 dB in speech range where operations to restore middle ear functions cannot be successfully applied, then the MEI may be applied.

The best feature of MEI is that it transmits low-distorted and 'fine' sound to the inner ear. The MEI implanted subjects would enjoy the 'pure', 'clear' and less noise sounds compared to those subjects using other types of hearing aids.

COCHLEAR IMPLANT

Introductions

By now you must be familiar with the term 'Hearing aid'. The function of which is similar to that of a hand lens. A hearing aid helps in increasing the level of the environmental sounds and delivers them to the ear at a sufficient loudness to assist the remaining ear function. Basically the ear consists of three divisions - The outer ear, the middle ear and the inner ear. The outer-ear which we all can see is nothing but a flap extending inside in the form of passage known as ear canal which inturn ends in the ear drum. The middle ear starts at the level of the drum connected in the form of a chain to three tiny bones and the third bone is attached to a window like structure. The inner ear consisting of three semicircular tubes which is inturn connected to a snail like structure called "Cochlea". This cochlea contains several rows of hair cells. When these cells get damaged the hearing aid will not be of any help. In such a condition an alternative remedy has been found called the cochlear implant.

A cochlear implant puts small amounts of electrical current nearing the hearing nerve. The nerve Shears" this electrical energy as sound because when the nerve is activated a signal is transmitted to the brain. The brain interprets this signal as sound.

Parts included in cochlear implants

The cochlear implant is composed of two main parts:

1. The internal part or the part that is surgically implanted,
2. The external part, or the part that is worn on the outside of the body.

The internal part consists of an induction coil and/wire. During surgery this coil, called the internal coil, is placed on the bone behind the ear. The wire, the active electrode, is put into the inner ear, on the "cochlea". An electrical current passes into the inner ear and this activates or "fires" the hearing nerve. When the hearing nerve is activated one hears a sound.

The external part turns sound into electrical current. The part consists of a 'microphone[1], a 'signal processor' and an ' external induction coil'. The ' microphone' picks up the sound, changes it to small electric current and sends it to signal processor. The signal processor modifies the electrical energy. The electrical energy is then sent by way of a cord to the external coil and changed to a magnetic coil, the magnetic field causes current to flow through the internal coil and the electrode. The electric current activates the hearing nerve.

The signal processor is about the size of a body type hearing aid. Patients carry the signal processor in the way they find most comfortable. Either in a coat or shirt pocket

as men do or put it in a cloth bag and tuck it or pin it to their cloths or clip it to one's belts. Young children can wear it strapped on the back.

The microphone is put in one of several places: (1) mounted on eye-glass frames (2) in a loose fitting ear mold which goes into the ear on the same side as the implant (3) clipped in the hair or to the collar (4) fit over the ear.

The external coil must go directly over the skin that covers the internal induction coil. Holding the external coil in place is crucial. Even by an eight of an inch displacement the sound will become softer or fade completely. The external coil is held in place by a magnet that is attracted to the implanted internal coil.

Currently the number of cords utilized are two: one from the microphone to the signal processor and one from the processor to the external coil. Usually cords are worn under the clothing. The processor requires two 1.4 volt alkaline batteries. the type used in body hearing aids. The life of batteries averages approximately 2-3 weeks. The signal processor can be removed at any time it is not wanted. It is important to turn off the volume control on the processor so that the batteries are not drained.

Having the implant will not interfere with sports such as football, cricket, swimming. When engaged in these sports, the external part is removed, ft blow on the side of the head would not be more serious after the implant than before. So a helmet should be worn in sports such as those mentioned above.

Regarding repairs, the signal processor does need repairs. Minor repairs can be done at the clinic where the patient receives the 'stimulation'. For all the major repairs the device must be sent to the manufacturer. The address for repairs will be provided in the wareanty furnished with the cochlear Implant. When the warranty expires the implant user is responsible for all costs. A booklet is available which outlines the warranty and lists the costs of all components,,

Patient selection criteria:

The common goal of cochlear -implant device is to provide the profoundly or totally deaf individuals with understanding of conversational speech through listening alone. Criteria for selection is done on the following basis :

A) Audiological:

If a valid response cannot be elicited even for loud sounds at low pitches or if the person is totally deaf where in he does not respond to more than two frequencies, then he is eligible for eochlear implant.

A second audiological consideration is time of onset of deafness. It has been found that suitable patients for coehlear implants are those who become deaf after learning to speak. The following are some of the conditions that render a person to deafnes;

- due to harmful drugs that affect our hearing mechanism.
- due to brain fever.
- due to accidents and injuries,
- German measles.
- Hereditory factors etc.

The loss may not be total in both ears but the person with deteriorating loss in one ear and total loss in the other ear is also a potential candidate for implant.

The patients who have lost their ability to hear before they learnt to speak that is, "prelingually deaf" cannot make effective use of implant. Such individuals are not commonly selected for implant,

B) Radiological:

One must rule out the solidification of the snail shaped structure in the inner ear and make sure that there is a clear opening into its internal structures because there is some evidence that implantation and/or electrical stimulation can lead to new bone growth, within the cochlea.

C) Neurological:

The most important requirement is a normally functioning hearing nerve. Functioning of these nerves can be tapped through sophisticated techniques. If the pathways of the nerve have been ruined then utilization of the electrical signal from the implant would be unlikely.

Advantages and disadvantages of the cochlear implant:

* Patients who have had normal hearing and lost it, that sound through an implant is very different from normal hearing. Gradually over a period of time the sound becomes clearer, and it is reported to be mechanical sound. This sound is also described as a radio out of time. Patients who have never heard before report sensations in the head that gradually, over a period of time become a sensation in the ear. These patients learn that the sensations are caused by sound.

* Learning to use the implant well is a long process of learning to use a new type of sound. A great deal of learning is done in the first year, but implant users never stop learning about sound through the implant. It is not unusual for a long time implant user (3 years or more) to report that they heard a new sound, or that they still cannot identify certain sounds.

* Host of the medium and loud sounds in the environment and some soft sounds can be heard through the implant. Those who have had the implant claim to hear footsteps, a door slam, motors, a phone ring, dogs barking, te kettles whistling, the wind in the trees, the click of a light switch and so on.

* At first, all the sounds will sound some what alike. With training and experience, patients learn to tell the differences between sounds. Generally, with practice, they can identify more and more sounds. Generally,with practice, they can identify more and more sounds. Patients who remember what sounds are like, learn to recognize some of the sounds around them fairly easily. Patients who have never heard before have no memory of sound; the sound has no meaning for them, These patients must first learn that sound can be meaningful, then they can learn to recognize some sounds.

* But the implant users cannot understand what people are saying without looking at them. They may know that someone is talking to them, but they do not know what the other person is saying unless they face the other person and read his/her lips.

* Implant users can hear the rhythm, pattern, and loudness of speech. They report that sound, together with watching a persons lips and face, makes lip reading easier. The amount of help will depend on the person's prior experience with sound and speech. Those patients who have never heard speech may not benefit as much as those who once had hearing.

* Many implant users report that all voices sounded the same at first. In time, most learn to tell the difference between a male and a female voice. Some of the implant users have learned to recognize a few familiar voices.

* Many patients say the sound of their own voice is strange at first. One patient said her voice sounded like Donald Duck! Quack Quack I suppose !! After several weeks these patients usually say that the sound of their own voice is more than natural*

* The implant allows the patients to control the volume of their voice in 2 ways:.

1) Since they can hear their own voice they can learn whether or not they are speaking softly or loudly.
2) The implant allows them to hear background noise. Most patients learn to control the loudness of their voices depending on the level of the background noise.

* Implant users cannot use the telephone to carry on a normal conversation but they use their telephone in a limited way.

* They can hear the telephone ringing, and they can tell the difference between a dial tone, a busy signal, a ring, or a voice on the phone. However, it may be necessary to use a telephone amplifier to hear these sounds. Implant users can usually tell how many words or syllables the other person says. This allows them to give or receive a limited message by using a code. If you have the implant, you will be given instructions in the use of this code during therapy and will have an opportunity to practice.

* Many of the implant patients have not found the implant helpful when watching T.V. It must be borne in mind that they need to combine speech reading with the input from the implant. Most T.V. characters, including broad casting, personnel, are very difficult. Competing sounds such as lighter, applause, and background music also cause interference.

* Implant users do hear music which is usually described as a "jumble of noise". They can hear the rhythm of the music, and this helps them to distinguish music from speech. They cannot discriminate between different pitches however, and cannot tell one song from another. Some of the implant users enjoy being able to hear the rhythm, and many can tell the difference between two instruments. Other implant wearers do not feel they get enough information to enjoy

music. The congenitally deaf, who are therefore not accustomed to the sound of music with normal hearing, seem to enjoy it more than the adventiously deaf.

* The implant allows the patient to hear sounds that are of a medium or high level. Very soft sounds such as a whisper or can hear in the distance, will not be heard.

* By means of test we find out when sound becomes uncomfor= table for the patient. We then adjust the signal processor internally so that no sound reaches that level certain electronic equipment may over-ride the settings on the unit or affect the internal coil. We warn all implant wearers to be careful of certain equipment,

* If the signal processor is on and the implant user is within 50 feet of a powerful two-way radio transmitter they may hear a loud sound. Powerful transmitters are usually found in police cars, ambulances or construction equipment.

Using any electric device, such as their clippers, hear the internal coil may cause the implant user to hear a sound like a hum, Usually this sound is soft, but if the electric device is powerful, the sound may be loud. No damage is done to the internal coil by hearing this sound, but it may be comfortable.

* Many of the cochlear implant patients have found that they have less head noise while using the implant. Usually the reduction only occurs on the side with the implant. With some patients, head noise is also reduced for several hours after removing the processor. Not all patients have a reduction in head noise. Some users have noticed no change at all in their head noise.

* The implant users cannot tell the direction from which the sound is coming. The exception is if a hearing aid is worn on the opposite ear or if the patient has implants in both ears. Under these conditions, localization of sound improves.

* The principle risks of cochlear implant are - The surgical approach for the cochlear implant is essentially an operation of the behind the external ear and involves the following risks: infection, facial paralysis and anesthetic risks. These are all unusual complications and have not been a serious problem in any of the patients implanted to date.

Other conceivable risks of cochlear implantation might be an increase in symptoms such as dizziness or buzzing sound in the ear but there has been no permanent increase in such symptoms as a result of the cochlear implant.

* A manner of patients have experienced an implanted coil devicefallure. Most have had revision surgery under a local anesthetic and now have functioning implants.

* What a cochlear implant patient hears - Patient can tell differences in intensity and timing very well. Pitch discrimination is good for low pitch sound but poor at higher pitches. It is in this respect cochlear implant differs from using a hearing aid. The cochlear implant enables the patient to hear sounds that he/she is unable to defect through a hearing aid,

* The cochlear implant is a rehabilitative device, No matter what "benefit" can be shown on objective measures, no benefit will occur unless the patient uses the prosthesis. Willingness to use the implant is an important indication of its subjective value to the patient. Less than 13% of the patients implanted have chosen not to use their implants. The vast majority of patients are currently wearing their cochlear implant signal processor on a regular basis. Most wear the device all day long, every day. This inspite of its rather bulky size and the frequent expense of buying batteries. The use of the implant by profoundly deaf individuals must be regarded as the ultimate judgement that it is of significant benefit.

* The benefit to be expected from the cochlear implant in children is not yet known. But it can be judged from the results obtained in adults combined with knowledge of the impact of deafness. Since children learn to use new information better than adults, it might be expected that the potential benefit to be gained by the child is even greater than obtained by the adult.

- It is usually found that the child who can make some use of hearing with a hearing aid is much more successful in acquiring language skills than the profoundly deaf child. Even a little auditory input ear make a significant difference in language acquisition and educational success. The cochlear implant gives additional auditory input.

* Besides these benefits related communication skills, there are a number of other areas for potential benefit to children from the implant. sound is important for the quantity, quality and effectiveness of the child[1] s experience with objects. Noises made by objects and by actions upon objects. Stimulate the child toward exploration.

Early experience with sound may be important in developing basic concepts about sound and its meaningfulness. Some early opportunity to learn that objects produce sounds, that sounds signal an action in the environment, and therefore,

that sound contains meaningful information about events in the environment may be an important determinant in whether a child can later in life make effective use of auditory input.

* Children who had developed speech and language prior to losing their hearing (postlingually deaf) respond with the implant much like postlinguaily deaf patients. "Prelinguaily deaf adults" , those who were born deaf or last their hearing at a young age, report being able to respond to attention getting sounds, have experienced some change in voice quality, and report feeling more independent, more social and even less lonely. Most of these patients believe the implant has made a positive contribution to their lives; However, the implant itself does not take the prelinguaily deaf adult out of the world of deafness, non does it significantly alter their life style. Although it is not known what the total impact of cochlear implant use by prelinguaily deaf children will be, it is hoped that the early introduction of sound will enable these children to integrate sound into their lives and to use it in a meaningful way.
* The best way to help children get the most from implant use is to make listening fun. It takes a lot of practice to learn how to use the auditory information the implant can provide. It is most important to set realistic goals

for the child. All sounds heard through the implant are initially quite similar. For this reason the child should not be expected to respond to his/her name being called in a noisy classroom or to make sense of any sounds occuring simultaneously. With practice, these goals can be accomplished. We suggest spending a short period of time everyday on auditory training tasks that are within the child[1] s capabilities. Tasks such as developing spontaneous awareness to sound or environmental sounds from one another would be appropriate. This should be done with sets of two, three or four sounds.

* The child may be expected to make gross discriminations about environmental sounds. For example, the child may be asked to distinguish one from two door knocks, or a door knock from a bell. The number" of items included in the set at one time may be gradually increased. Next, discrimination of some speech sounds from environmental sounds, for example the difference between a dog barking and a name being called. This type of activity should be continued until the child is quite proficient at making these discriminations. With continued practice, the child should eventually be able to tell some difference in speech sounds. Thus a child might be able to discriminate between an one-syllable word and a two-syllable word based upon timing and loudness information eg. length of each word and differences in stress patterns and so on.

A child should not be expected to make fine discriminations without speech reading cues. For example, a child would be unable to discriminate between several one-syllable words with similar vowels. The child should be expected to meet realistic goals so that frustration does not occur and listening is fun.

The cochlear implant program:

There are six parts to the program -

i) selection - 2 days

ii) Pre-surgery appointments, surgery and hospital stay - 5 days

iii) Basic-guidance - this occurs 2 months after surgery and takes approximately 20 hours of time with a therapist,

iv) 6 months follow-up - this occurs six months after the first day of rehabilitation and takes approximately one or two days.

v) Annual follow-up - this occurs at one-year intervals from the first day of rehabilitation and takes approximately one or two days each year,

* Before surgery the patients must go through tests to find out if they are eligible for surgery and apart from these tests, blood tests must be taken and a complete medical examination must be done.

* Usual stay in the hospital is three or four days.
* It is not possible to hear immediately after surgery. The external coil and stimulatory must be used to hear sound. Patients do not receive stimulation units until the first day of basic guidance,
* It is necessary to wait until the incision heals completely. This usually takes about 2 months. When the incision is healed and the swelling is gone, electrical activity can begin.
* During basic guidance programme we tell the patients regarding-
  i) Fitting the device - This involves setting and adjusting the signal processor so that sound is comfortable.
  ii) Audiological testing - This is done to see if the setting are correct and to measure what the patient is hearing before any training.
  iii) Learning to use the device - This involves training that will teach the patient how to use sound heard through the signal processor. Different techniques that help make communication easier will also be taught. If at all possible, a person who is close to the patient (spouse, parent, close friend) etc. should come during the basic guidance period. This person will take part in some of the therapy sessions and can assist the

patient with home assignments. He/she will learn about the cochlear implant and be able to give support and help at home.

This period is called "basic guidance" as this is the least amount of training and instruction that is necessary in order to learn the proper use of the cochlear implant. That is, just the basics of implant use are taught.

* During 6 month follow up the following occurs:

1) Updating of equipment
2) Adjusting and resetting of the signal processor
3) Testing
4) Additional training if necessary

* The first annual follow up is one year after the patient receives the cochlear implant signal processor. That is, one year after tne basic guidance period. The patient is expected to report to the clinic once a year for as long as the doctor feels it is necessary.

SPEECH CONSERVATION PROGRAM FOR ADVENTITIOUSLY HEARING IMPAIRED

Speech is the vehicle of communication. It is constantly monitored by our bearing system which in turn aids in continuing the speech process. Any disruption in this hearing system will thus disrupt the speech process too. So is it, in the case of the adults who have developed hearing problem at a-later stage. In order to sonserve their speech,the adventitious adults need to undergo a program. This program does not require any specialized equipment. The elements included in the program are Auditory training and speech reading.

Auditory training:

This kind of a training enatol.es a hearing impaired adult learn to take full advantage of sound clues still available to them. Auditory training provides the following (a) learning to recognize through hearing, those speech sounds which are incorrectly discriminated (b) Improving adjustment to hearing aid fitting (c) Provide recommendations for strategies and/or assistive devices to resolve the client's specific situational communication programs. For those clients who have severe loss of hearing, additional activities can be provided through visual mode.

Basically the training program activities proceed from what is easier to what is more difficult for the client. The

eventual goal is to enable the client to communicate more effectively by means of improved listening skills.

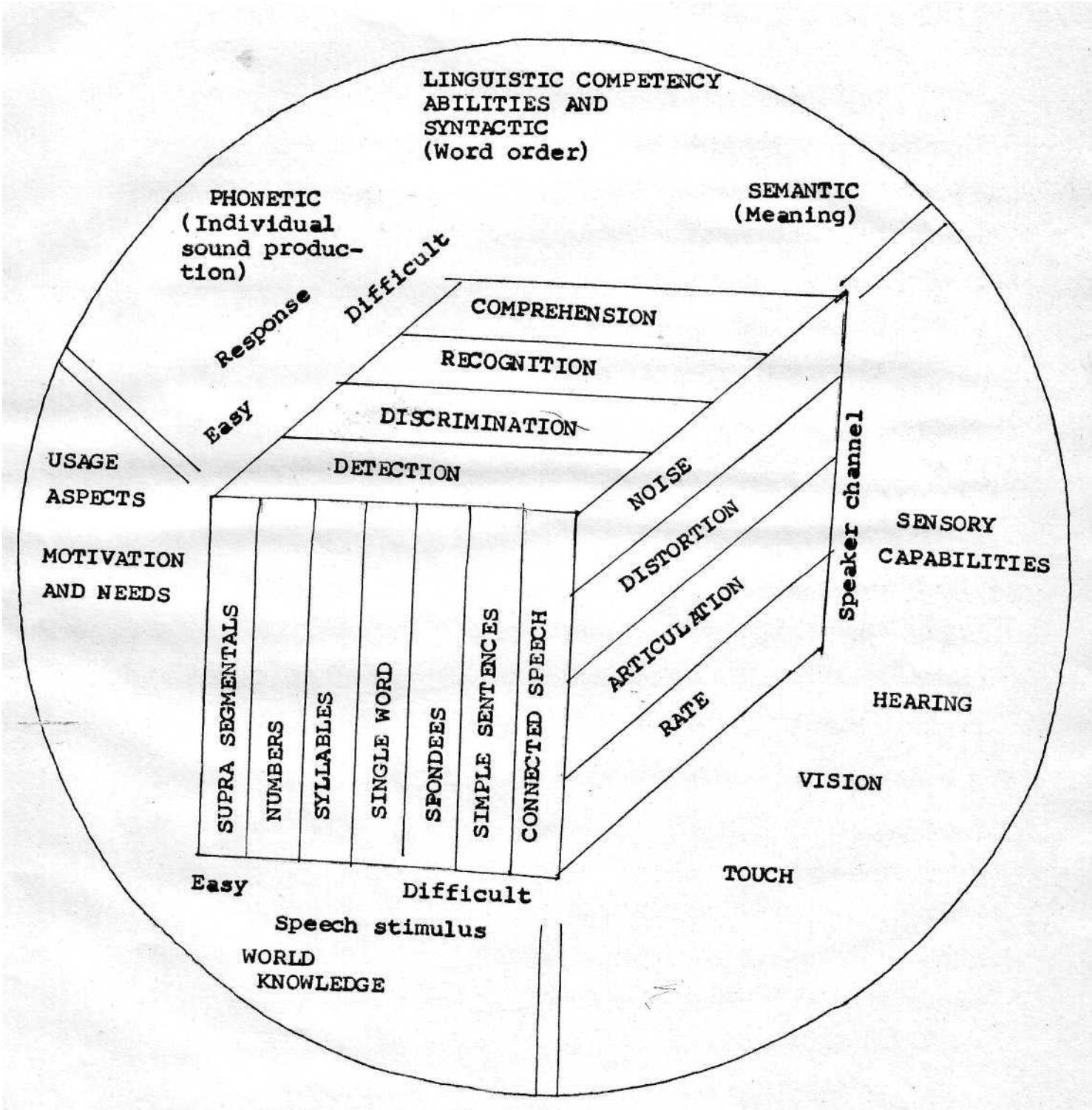
Before proceeding with therapy a pre therapy evaluation will be conducted to assess the client's communication status say for example, he can discriminate between individual sounds e. /P/ , /b/, /m/, then the starting point of therapy will be at the word level if he has difficulty here.

Parameters involved in speech conservation program:

Fig. (see next page)

The sphere represents the client[1] s ability in language, in terms of receiving information from hearing vision and touch and presence of motivation and needs for training. These abilities and needs are used to modify the training methods. The cube depicts the model of drill and practice for speech stimuli which will be manipulated by the clinician to order the exercises from easy to difficult. For instance, if the client reports that he faces difficulty when communicating in groups in a noisy environment, affecting his job performance, such a client will be highly motivated.

The therapist then ponders the 'cube' and selects a speech stimulus at a simple sentence level for training and drill the syllables either in consonant-vowel (CV) or VC


LINGUISTIC COMPETENCY
ABILITIES AND
SYNTACTIC
(Word order)
PHONETIC
(Individual
sound produc-
tion)
SEMANTIC
(Meaning)
Response
Difficult
Easy
COMPREHENSION
RECOGNITION
DISCRIMINATION
DETECTION
USAGE
ASPECTS
MOTIVATION
AND NEEDS
NOISE
DISTORTION
ARTICULATION
RATE
Speaker channel
SENSORY
CAPABILITIES
HEARING
VISION
TOUCH
SUPRA SEGMENTALS
NUMBERS
SYLLABLES
SINGLE WORD
SPONDEES
SIMPLE SENTENCES
CONNECTED SPEECH
Easy
Difficult
Speech stimulus
WORLD
KNOWLEDGE

combination. When the client succeeds with a particular task, the next most difficult and appropriate task is selected; and when the client fails, an easier task is used.

Depending upon the hearing loss, the mode of gaining information varies. In clients with severe to profound loss, a combination of hearing and vision is used to minimize frustration and maximize face validity.

Suprasegmental auditory training:

Focus of auditory training is on understanding recognising, discriminating and detecting or identifying the environmental sounds and supra segmental features. Supra-segmental aspects of speech include the rising and falling tone rate of speech, stress applied on sounds and time taken to produce the same.

Self-instruction: Auditory training exercises can be pre-recorded on audiocassettes which then can be used for programmed self-instruction.

Visual distinctive features: Exercises that would teach the adults to classify the consonants according to the visual distinguishing characters such as consonants that makes use of (1) lips eg./p/ /b/ /m/ (2) use of tongue tip eg. /tip/ /dip/ (3) Both lip and teeth eg. /fish/, /van/ (4) Back

portion of the tongue eg, /goat/, /kite/. The visual exercises either is used concurrently with listening exercises or prior to them.

Communication strategies: Include the client in group discussions, live conversations with hearing persons, Captioned videotapes of successful and unsuccessful communication situations allow the clients to evaluate critically the use of strategies such as speaking with short concise sentences, use of natural gestures, aid if communication fails, the use of repetition, rephrasing, oral spelling or visual tracing of the letters and finally use of telegraphic writing.

Speech reading:

Speech reading is a visual oral language communication skill that enables a person to obtain information about the language by watching the ordered movements of the speaker's lips, tongue, jaw and facial expressions. Speech reading training may be beneficial to the client who must communicate in highly noisy situations, or for those clients who have severe hearing loss and performs poorly using hearing aid. This visual clue acts as a supplement to hearing and not as a replacement for communication. Even normal persons need to speech read in a noisey environment other than hard of hearing. So here it becomes a natural phenomenon.

Basically this technique involves cooperation of both the speaker and the listener. To start with the adventitious adult should be subjected to listening situation which is comfortable for him to understand the speaker.

To begin with the adult client is made to lip read the more visible sounds such as /p/ /b/ /m/. For those sounds that involve nose as in /m/,clue is given by pressing one of the nostrils. Then gradually the more difficult or less visible sounds will be taught such as A/ /g/ A/ etc. Training will be given initially by the speech therapist and the technique will be demonstrated.

Once the client learns to speech-read the individual letters, the next step is to make him listen to words that increase in complexity and later on small simple sentences to longer ones.

The role of the listener is to cooperate well with the speakers. He should have a positive opinion about this technique. He must not loose his confidence if he commits mistakes while lipreading. He should not exhibit frustration when he is made to lip read in difficult situation such as under noisy background. He should immediately report to the speaker if he faces any difficulties while lip reading. He should always be attentive and relaxed. He should practice

to speech read with different kinds of people under different situations. He should make use of contextual clues in understanding long conversations. The role of the speaker is to make sure that he is speaking in a well-lit room with the light falling or his face. He should draw attention of the speech reader before talking. With respect to the distance, he should maintain a distance of 3-12 feet and speak without any obstruction such as cupped hands in front of his mouth or a cigarette. His speech should be clear without any exaggerated movements. While speaking he should maintain a normal speed but if the listener finds even this difficult, then he must reduce his speed. He should use normal gestures facial expressions while speaking and avoid unnecessary body movements. While conversing he must make use of simple words and the sentences should not be too long. As far as possible the speaker should draw the listeners attention towards the object or person about which he is talking. He must repeat or rephrase his sentences if the listener finds it difficult to understand. He should not discourage the listener when the latter commits mistakes.

FACTS ABOUT DEAF-BLIND

Introduction:

The combination of hearing impairment and visual impairment constitutes of most severs of handicaps known to man kind. Individuals afflicted witn this dual disability face unique problems of communication and mobility that deprive and limit their sources of information and experience. Deaf-blindness is a severely isolating handicap that leads to greater dependence on others and often promotes an intense sense of isolation and lonliness.

Because of these limitations encountered by the deaf blind population, it is of utmost importance that deaf-blind persons receive comprehensive, intense training in that will help them to regain their self reliance and self-confidence. This can be attained only through highly specialized programs of service. It is therefore the obligation of specialized agencies to provide such intensive programs for the benefit of the handicapped.

Though in the initial stages such intense programs may appear to be expensive it may be realized that when a handicapped person over comes the deficiency and becomes useful to the society, instead of being a burden, the benefits more than effsets the initial expenditure. For the purpose of a successful outcome. it is necessary that all the agencies including the

handicapped cooperate in a complimentary way, because no single agency can offer a complete method of treatment,, The reason behind this is the defect that has manifested may be due to the interaction of/many aspects; emotional, psychological, physical, physiological, environmental etc.

Causes:

There are many different causes of deaf blindness. The rubella epidemic also commonly known as German Measles causes deaf-blindness in newly borns. Certain genetic conditions result in eventual deaf-blindness such as - Usher's syndrome that causes congenital hearing impairment and progressive blindness.

At any age, a hearing sighted person can become deaf-blind from accident or illness for eg, from the high fever of spiral meningitis.

Deaf people can lose their vision from cataracts, and other medical conditions or injuries; blind people may become deaf from bone diseases in the ear, high fevers and other common causes of hearing loss. These defects may occur at any stage in life. It may be during birth or early childhood or adulthood or due to aging.

The period of life at which an individual becomes deaf-blind has enormous impact on his subsequent understanding of the environment mode of communication and general problems

and needs. For those who had been afflicted during their adulthood it may be difficult to adjust themselves to a helpless situations. This may result in emotional problems also.

In the case of children born with these defects, the training needs to be given with careful attention. Because they are not exposed to the benefits that a normal child has enjoyed.

A person who has been afflicted by these defects during adulthood may have to get treatment on a different plane as compared to a child born with these defects because the youth would have already been opposed to normal language communication.

This individual who retains his hearing long enough to learn a language can continue to express himself through speech after becoming deaf-blind, although he has to learn a new mode of receiving language. The person who is first deaf and later becomes blind, if he already knows sign language, can learn to read it in his hands, tactually and can continue to sign in the space in front of him.

However, his communication with people who donot known sign on finger spelling is limited. These communication differences account for some workers in the field of deaf-

blindness distinguishing between the "deaf-blind" and "blind-deaf" placing emphasis on primary disability.

Communication:

In relation to communication especially. While serving deaf- blind persons it is necessary that we interact with each individual as an individual. Communication must be conducted at the clients level in a mode that he/she prefers and is most comfortable with. The service providers must therefore be aware of the developmental implications of deaf-blindness and must also be familiar with the wide range of language abilities and communication modes used by deaf-blind persons.

Modes of communication: The following list identifies the different methods currently in use by deaf-blind persons for communications

- oral speech
- cut-out letters
- Braille hand speech
- Braille alphabet card
- finger spelling (Indian/American one hand manual alphabet)
- Indian/American two-hand manual alphabet,
- Printing in the palm of the hand
- American sign language.

The most preferred modes are the finger-spelling, American sign language and printing in the $alm of the hand.

Caution must be taken in relation to the use of finger spelling. This is on surface, a deceptively easy solution to a much more difficult problem. Finger spelling takes a relatively short time to learn and consumes less energy and effort on the part of the learner. However, a hearing impaired persons has a tendency to spell the same may be speaks, eften incorporating complex sentence structures and expressions. On the receiving end, the average, "pre-linigually" deaf person may often be at a complete loss.

Sign language interpreting services: It is not necessary that all staff in all agencies should devote the time and energy to become fluent in a wide variety of methods as well as in a foreign language such as "American sign language". A few alternatives are possible. A higher concentration of persons skilled in communication could be available in specialized facilities geared to providing a range of services to the deaf-blind. Another solution to the occa-sional deff-blind client might be the use of interpreters.

Family Services:

The combination of deafness and blindness frequently affect and obstruct the entire spectrum of activities in

relation with in the family and also with respect to the community. This may in turn affect the process of treatment.

The family service needs of the deaf-blind person vary in terms of the age and developmental stage of that individual as well as the age of onset and cause of the combined impairments. For example, the family needs of/for the deaf-blind infant will differ greatly from those of families where a member becomes deaf-blind later in life due to the aging process on genetically related causes. Further distinctions must be made in describing the family service focus of families having a deaf-Blind parent(s).

Family education: It is generally found that the family having handicapped members lack the fundamental knowledge about such defects and also the modes of training and treatment available. Therefore such families need to be educated as a first step about the availability of facilities. They must also be taught to evaluate the potentialities and limitations of their handicapped children. Such understanding by other family members will go a long way increating proper atmosphere and environment to accelerate the mode of training and therapy.

The focus will shift when the target population consists of persons who become deaf-blind later in life. Those who are

endowed with minimal power of sight and have to be treated with an alternative mode of communication system like introducingLBraille, sign language and/or finger spelling.

Genetic counseling should be an integral part of these educational family services addressing the possible inherited causes of deaf-blindness as well as probabilities of subsequent children inheriting the same difficulties. In addition, family services should provide information to families having deaf-blind parent(s), educational training would be directed to the parents themselves to aid in successful parenting efforts as well as to the children to answer questions they may have about the abilities or limitations of their parents.

Family counselling: It is further recommended that the social service system provide counseling services for families having a deaf-blind member to further aid in facilitation of family adjustment and subsequent support for that member. Often, these services can be provided as an integral part of educational activities. Again, the type of service will vary in accordance with the needs of a specific family.

Families with a deaf-blind infant may initially require counselling to assist in understanding, coping with, and accepti the deaf-blind diagnosis. Occasionally, it may be necessary to see parents alone without the rest of the family, to deal

with the self-inflicted guilt and blame concomitant to the birth of a handicapped child. In some cases, the nature of the couple's counseling will reveal a more deep seated marital conflict, in these circumstances, the couple should be referred to the appropriate specialist for intensive psychotherapy.

In cases where the onset of deaf-blindness occurs later in life (adult), family counselling can also address educational needs. Along with information on the process of progressive deaf-blindness, family members require an outlet for dealing with related reactions and emotions. Counsel

In summary, family services for deaf-blind persons should include a system of interrelated educational, informal and counseling services which encompass the life span of the deaf-blind person. It is recommended that provision of these services be included as an integral part of the social service delivery process for these persons.

Independent living services:

Independent living centers are designed to meet the current and future needs of individual whose disabilities are so severe that they do not presently have the potential for employment, but may benefit from rehabilitation services which will enable them to live and function independently.

Independent living rehabilitation (ILR) is a program to provide services to severely handicapped individuals with the non-vocational goal of being more fully functioning members of the society. Independent living rehabilitation services may also be appropriate for individuals with vocational potential where problems of daily living are preventing full relization of this potentials.

The basic distinction between the independent living program and the vocational rehabilitation services program is providing services to assist the individual to improve and maintain his/her ability to function independently in family and community rather than to achieve a vocational goal.

There is no hard and fast rule for making age an eligibility criterion, therefore, there is no upper or lower age limit for receipt of services. Thus this implies that services are to be rendered to those who have the potential "to improve significantly either his ability to engage in employment or his ability to function independently in his family or community". The close working relationship and involvement between education and vocational rehabilitation agencies should be maintained to insure a smooth transition and progression of services upon the students completion of the IEP.

CONCLUSION AND SUGGESTIONS

Hope. . . . . .

- In creating awareness among the afflicted and the non-afflicted ignorant.

- As baseline data in improvising the current trends in the outreach programs dealing with hearing impairment in terms of developing audio and audio visual (posters, slides, cassettes. documentaries, etc.).

- ..... the compiled data has served its purpose.

BIBLIOGRAPHY

Eddington, D.K. et al (1973): Auditory prosthesis research with multiple channel intracochlear stimulation in man. Ann. Otol. Rhinol. Laryngol. Suppl. 53, 87(6). In Lynch,W (Ed) Implants: Reconstructing the human body, Ed.l, 120-147 Van Nostrand Reinhold Company, Hew York.

Facts about deaf-blindness. (1985): Sixth print. An unpublished pamphlet. Hearing vision impaired programs of Gallaud et College, Washington, D.C.

Goldmine the backyard ( ) • An unpublished public education pamphlet prepared by Audiology Department, AIISH, Mysore.

Harnbrecht, E.T (1979): Current status of multichannel cochlear prostheses. Ann. Otol. 88, 729-733. In Lynch. W (Ed). Implants: Reconstructing the human body. Ed. 1,120-147, Van Nostrand, Reinhold Company, New York.

Johnson, D.D. (1978): The adult deaf client and rehabilitation Chapter-8, 172-221. In Alpiner, J.G. (Ed). Handbook of adult rehabilitative audiology, Ed.l. The Williams and Wilkins Company,Baltimore.

Horthern, J.L., Downs, M.P. (1978); Development of auditory mchanism. Cnapter *2,* 17-37, In Hearing in children, edn. 2, The Williams and Wilkins Company, Baltimore.

Ohno, T., Kajiya, T. (1988); Performance of the middle ear implants; Chapter 8, 85-96. In J.I.Suzuki, edn.l. Middle ear implant: Implantable hearing aid.(Ed) M.Hoke, Advances in Audiology, Vol.4, Karger, Basel.

Pamela, L.J. (1982): Techniques for speech conservation. Chapter 10, 129-152. In Hull,R.H.(Ed), Rehabilitative audiology. Ed. *1,* Grune and Stratton, **Hew York.**

Prescod, S.V. (1978): Audiological handbook of hearing disorders. 1st Edn. Van Hostrand Reinhold Company, New York.

Rochrig, A.A. (1983): A deaf person's adjustment to Ushers syndrome. An unpublished pamphlet. Hearing vision Impaired programs college for continuing education, Gallaudet College, Washington,

Sims, D.G, (1935): Adults with hearing impairment. Chapter 52, 1017-1045. In Kate, J. (Ed), Handbook of clinical audiology, 3rd Edn, Williams and Wilkins, Baltimore.

Suzuki, J.I., Yanagihara, K,, Toriyama, M,, Sakabe, N, (1988): Principle, construction and indication of the middle ear implant . . . Chapter2, 15-21, in J.I. Suzuki, Edn.l, Middle ear iimplant: Implantable hearing aid. Editor. M.Hoke. Advances in Audiology, 4, Karger, Basel.

Wyatt,H.J. (1978): You and your deaf patients: An unpublished pamphlet. Hearing-Vision Impaired Programs of Gallaudet College, Washington.