

MINIMUM REQUIREMENTS FOR
SETTING UP A HEARING AID CLINIC

Reg.No,M9 307

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

ALL INDIA INSTITUTE OF SPEECH AND HEARING: MYSORE 570006.

MAY 1994

DEDICATED TO


"SAIBABA"

WITH YOUR BLESSINGS ALL IMPOSSIBLE THINGS
BECAME POSSIBLE IN MY LIFE

CERTIFICATE

This is to certify that the Independent Project entitled: MINIMUM REQUIREMENTS FOR SETTING UP A HEARING AID CLINIC is a bonafide work, done in part fulfilment for the first Year Degree of Master of Science (Speech and Hearing), of the student with Reg. No.M9307.


Mysore
May 1994


Dr. (Miss) S. Nikam,
Director,
All India Institute of
Speech and Hearing
Mysore-6.

CERTIFICATE

This is -to certify that: the Independent
Project entitled: MINIMUM REQUIREMENTS FOR
SETTING UP A GEARING AID CLINIC has been
prepared under ray supervision and guidance.

Mysore
May 1994


Or.(Miss) S.Nikam,
GUIDE

DECLARATION

I hereby declare that this Independent Project entitled: MINIMUM REQUIREMENTS FOR SETTING UP A HEARING AID CLINIC is the result of ray own study under the guidance of Dr.(Miss) S.Nikam, Prof, and Head of the Department of Audiology, and Director, All India Institute of Speech and Hearing, Mysore, and has not been submitted earlier at any University for any other Diploma or Degree,

Mysore
May 1994

Reg.No.M9 307

ACKNOWLEDGEMENTS

I am deeply indebted to Dr. (Miss) S.Nikam, Prof, and HOD of Audiology Department, All India Institute of Speech and Hearing, Mysore, for her invaluable guidance.

I would like to thank Dr.(Miss) S.Nikam, Director, All India Institute of Speech and Hearing, Mysore, for permitting me to take up this project.

Manjula mam, your sincerity amazes me : Thanks a ton for the help and the guidance.

Ammu, Pappu, I couldn't have asked God anything better than "Wonderful parents" like you.

Pung, Gouri your excellence in your fields motivates me to take up challenges, may be that's why I am here, love you.

Yashuli, life is just not the same after your arrival in this world.

Mals, I cann't imagine myself without you.

Niru, Bhavs, Bhavani, Monika my treasurehunt at AIISH is over after finding you people.

Akka, without your superfast hands my project would have been incomplete.

TABLE OF CONTENTS

	<u>Page No.</u>
1. Introduction	1 - 3
2. Setting up a clinic	4 - 13
Ethics	
Location	
Clinic	
Furniture	
Sound treated room	
Staff	
Instruments	
Stationery	
Finance.	
3. Type of hearing aids	14 - 19
4. Electroacoustic characteristics	19 - 21
5. Hearing aid selection procedure	21 - 23
6. Counselling	24 - 27
7. Trouble shooting	27 - 30
8. Different set-ups	30 - 31
9. Establishing case load	32
10. Administrative procedure	32
11. Record keeping	33 - 34
12. Earmolds	34 - 36
13. Handouts	36 - 37
14. Fees	37 - 38
15. Conclusion	38 - 39
16. Bibliography	40
17. Appendix	

INTRODUCTION

Hearing is a vital link of man to the communicative world and the hearing-impaired is robbed of this vital experience.

Hearing-impairment is one of the most commonly found handicapping conditions in this country. The effect of hearing loss is profound both in adults and in children. In children, it has an effect on the development of speech and language which is a basic mode of communication, whereas in adults it would interfere with the normal inter-personal communication, thus leading to social and psychological problems.

Aural rehabilitation has been defined as services and procedures for facilitating adequate receptive and expressive communication in individuals with hearing impairments. The tasks which are included in aural rehabilitative process are -

- i) Identification and evaluation of sensory capabilities
- ii) Interpretation of results
- iii) Counselling
- iv) Intervention for communication.

"The hearing aid is now recognised as an integral component of the audiological rehabilitation process".

The audiologist has basic responsibility of retaining social function of hearing. He assesses the practical usefulness of auditory capacity and undertakes to increase the ability of the hearing handicapped individual to cope with the situation of every day life.

An audiologist will have many options of utilising his knowledge and serving the society. He/she can join special schools for the deaf or a speech and hearing institution or be an industrial audiologist. There is one more outlet, that is to open a hearing aid clinic.

This project has been specially taken up to give guidance and enumerate minimum requirements to set up a hearing aid clinic which would ultimately help all those beginners who would like to take up this challenge.

In the initial stages of setting up a hearing aid clinic, a clinician has to use his discretion to make proper plan. He has to spend much energy and time in taking decisions such as, how to provide services. What equipment to purchase, how to acquire the maximum referral sources and of course how to arrange for the finance.

According to Resnick (1987) two fundamental concepts should be always kept in mind before setting up a clinic

Those are - one should have enough financial support. If not it can be the biggest set back for the practice, in its earliest stages also when implementing the instrumentation, be sure that needs of the practice are served by a major supplier who is more interested in your requirements than in what they can sell.

An individual preparing to start an independent clinic must be willing to take risks. Any risk can be minimized by good planning and an accurate forecast of one's personal and professional needs. Prior to establishing a full time practice one should objectify short-term and long-term financial, personal and professional goals and aspiration.

Setting up a hearing aid clinic:

Any individual who plans ; to set up a hearing aid clinic must follow some principles in order to be a good professional.

ETHICS:

1. Clinician should dispense the product to only that person who is served as a part of a program of comprehensive rehabilitative care.
2. Cost of the dispensed product should not exceed from that charged by the supplier, at the same time fees of other services like hearing evaluation should be independent of whether the product is dispensed.

3. Additional charges related to dispensing should be just sufficient to recover the cost directly attributable to the dispensing process.
4. Clients should be given the freedom to choose the source of service and product.
5. Before actually starting the rehabilitation program, client should be given an idea about the fees of rendering services and cost of products.
6. The cost of products and fees for services should be clearly differentiated before the service begins.
7. It is the clinician's duty to evaluate the effectiveness of service rendered and products dispensed.

LOCATION OF THE CLINIC:

This is the most difficult but most critical decision made during planning stage. For which following criterion should be taken into account.

1. Cost of the space should be within the budget.
2. Clinic should be accessible to major referral sources and to handicapped and elderly cases.
3. One should be sure that overall noise in the surrounding areas is less.

THE CLINIC;

The "look" or appearance of the clinic will dictate a great deal of one's style.

There should be adequate space and proper planning must be done to utilise this space well. Initially there can be two rooms in the clinic, one of which can be utilised for clinical purpose like taking audiogram, counselling, hearing aid evaluations and selection. Other room can be used as a waiting room which should be well furnished, comfortable and neat. The front door should be wide enough to easy access for wheel chairs of the handicapped also it should be such that the case would be able to look in and see a receptionist or person to talk to.

THE CLINIC OR THE LAB;

Before selecting a room for the lab listen carefully to extraneous sounds emitted from adjacent offices or surroundings. Those noises may actually affect the hearing and hearing aid evaluation. Room should be spacious to accommodate all the instruments and to carry out all the evaluations. It is better to carpet the lab which would not only keep the noise level down but it can cushion the hearing instrument from the inevitable drop onto floor. If work" on an instrument

is to be done standing up, place the countertop at a level which does not require an excessive amount of bending. If chairs and stools are used select ones with adjustable heights. The clinic should be well lit.

THE WAITING ROOM: The waiting room should be uncluttered and neat, as first impression are very important. There should be preferably two windows to maintain the ventilation. Lighting should be adequate which will certainly be appreciated by most of the hearing impaired people who may be visually impaired too and it is also requirement of staff numbers who would find working easier.

FURNITURE:

- 1) Chairs - Minimum three pairs of chair will be required which should be placed with their backs to the wall or secured to the floor which are less apt to slide as an elderly person attempts to stand. Choose chairs with arms which give elderly persons a way to "push up". There should be small chairs especially for children which would keep the children off the floor,
- 2) Sofa or couches also can be introduced in the waiting room to accommodate more clients.
- 3) 2/3 tables will be required to place the instruments and for the receptionist.

- 4)-Cabinets, shelves can supply innovative ways to store the never ending onslaught of forms and supplies.
- 5) There should be enough fans and lights in the room.

To carry out all the hearing and hearing aid evaluation successfully, another necessity in the lab is, it should be sound treated.

SOUND TREATED ROOM;

Acoustic environment plays an important role in the field of Audiology. As for carrying out free field tests, for measurement of hearing acuity, also for hearing aid trial a suitable acoustic environment is required. The best way to achieve the above requirement is to have a satisfactory sound treated room. The evaluations conducted in the clinic without considering the ambient noise conditions will not be valid.

ASA (1961) has specified the maximum ambient noise levels that can be tolerated in a sound treated room.

Frequency setting Hz	Octave band in Hz	SPL in dB
125	75 - 150	40
250	150 - 300	40
500	300 - 600	40
1000	600 - 1200	40
2000	1200 - 2400	47
4000	2400 - 4800	57
8000	4800 - 9600	67

Besides the above requirements sound treated room should be sufficiently spacious with good ventilation and diffused lighting for the comfort.

- a) Orientation: It can be set up in any ordinary building but it should not be in the vicinity of heavy traffic and any other noisy source.
- b) Size: Preferable size is 10' X B' X B' for conducting test, the dimensions may be changed in terms of users requirements.
- c) Walls: In moderate ambient noise level a single brick wall with two sides cement mortar plaster is adequate. Total thickness of the wall may be nine or ten inches. In case of excessive ambient noise level, it is advisable to have double walls of single brick in lengthwise construction separated by an air gap of 3"-4". The air gap between the

two walls should go deep into the floor at least by 12 inches which provides considerable isolation of the inner floor from the outer one.

- d) Ceiling: It should be of higher density materials such as reinforced cement concrete. For double wall construction the outer wall should carry the concrete slab and the inner wall should support the false ceiling. The space between the concrete roof and false ceiling may be filled with sound absorbing material.
- e) Floor: The floor may be covered with a carpet.
- f) Doors: It is preferable to have double doors fixed in such a way that one opens into the room and the other opens outwards. Door may be made of teakwood. Teakwood planks should bear an air gap between them. Air gap may be filled with sound absorbing material such as glass wool or fine river sand. A thick rubber lining along the edges of the door would avoid leakage of sound wave.
- g) Internal acoustical treatment: It is important that the ceiling and all the four walls of the room should be treated acoustically for this purpose, one inch thick compressed fibreglass wool plus an air gap of one inch with a facing of acoustic tiles should be fixed on all the walls and ceilings.

h) Ventilation: Air conditioning could be made by suitable ducting system which should be designed properly to keep the noise level to a minimum level. The cheaper alternative is to have a suitable air cooler in the control room which may be operated keeping the door between control and test room open.

i) Electrical connection: It should be made through suitable jacks.

STAFF: Any individual who has proper training in hearing evaluations, hearing aid fitting and dispensing can start a hearing aid clinic.. Since in initial stages of the clinic it is not affordable to hire too many clerical staff. It is advisable to hire only one staff who would fulfill the duties of receptionist, accountant also the staff should keep account of How many hearing aids have been ordered, gone for repair and arrived from the manufacturer. All other clinical and administrative jobs the clinician will have to manage. Peon and Sweepers should be appointed for the clinic.

INSTRUMENTS :

1) Basic audiologic test equipment which are the necessary for a budding hearing aid clinic are:

For hearing evaluation:

(i) Audiometer - which can be portable or screening type.

There are dual channel audiometers also available in the

market. Audiometers should have masking and SISI facility. Paediatric audiometers can be used for hearing evaluation of paediatric age group.

- (ii) Impedance meter: This is used to diagnose the middle ear pathology and also for differential diagnosis of cochlear/retrocochlear loss. Since it is not manufactured in India, it has to be imported from U.S.A., Denmark, Italy, etc.
- (iii) Electroacoustic hearing aid test equipment - (IGO/FONIX 6500): One piece of major equipment that is not routine in many audiology practices is electroacoustic hearing aid test equipment. It is essential that this equipment be available either within the clinic or close by in a facility that will allow it to be used when needed. While most of the clinics will not be able to afford this type of system at first, it should be budgeted as soon as possible.

This equipment provides information about -

- 1) Performance characteristics of hearing aids.
- 2) Acoustic effects of earmoulds.
- 3) Nature of amplification delivered to the subnormal ear which enables the clinician to know whether the amplification goals set for the client satisfy his needs.

- 4) Can performance of the older fitted aid be improved by adjusting controls and modifying the earmoulds.
- 5) Last but very important whether hearing aid exhibits all the characteristics specified by the manufacturer.

To carry out all the evaluations a sound treated room as mentioned before is required.

OTHER GENERAL REQUIREMENTS :

- 1) Hearing aid receivers
- 2) Receiver washers and savers.
- 3) Earmould adaptors to change postauricular molds to receiver molds and vice the versa.
- 4) Hearing aid cords and hearing aid cord gasket.
- 5) Head bands and head band tips for use with bone conduction receivers.
- 6) Spare batteries.
- 7) Hearing aid bags.
- 8) Battery tester
- 9) Tone hooks for all the hearing aid service
- 10) Screws
- 11) Hearing aids.

STATIONERY:

- Case history forms
- Audiometry, impedance results reporting papers
- Separate book for bills
- Registers for registration of new patients.
- Pens, pencils

FINANCE: In any kind of set-up, a clinician should anticipate the financial problems in the early stages. It requires a massive planning and good financial background. The budget should take into account a lag between collection of fees for services and products and expenditure of funds for operating and purchasing expenses.

Costs must be set-up for following things:

- Purchasing space to set-up the clinic.
- To purchase additional equipment and supplies.
- To purchase initial inventory
- To purchase stock aids
- Printing costs for new forms
- Administrative costs
- Loan and fund raising cost
- In case, decision has been taken to take a clinic on rent then rent to be paid every month should be included.

- Instead of buying hearing aids, if clinician wants to take dealership then amount spent for that also should be considered.

TYPE OF HEARING AIDS;

Wide variety of hearing aids are available in the market:

- a) Body level hearing aid
- b) Eye glass aids
- c) Behind the ear aids (BTE)
- d) All in the ear aids (ITE)
- e) Contralateral routing of signal (CROS)
- f) Bone conduction aids
- g) Digital hearing aids
- h) Master hearing aids.

Body level hearing aids: It's a small instrument which can be clipped to a shirt pocket or can be inserted into a harness in young children. These aids are better for children as they are easier to handle due to larger and prominent operating controls. These give less acoustic feedback problems due to increased distance between microphone and receiver. As they provide higher gain and broader frequency responses these are preferred by cases who have severe hearing loss body aids are sturdier and more damage resistant than smaller aids. The disadvantages of this type of aid are noise produced by clothing contacting the microphone opening is often distracting also the aids lack cosmetic appeal.

Behind-the-ear Hearing Aids: With the advances in micro-technology, behind the ear hearing aids are now capable of delivering high gain across a wide range of frequencies, can be used by individuals with hearing impairments ranging from mild to severe. In this aid all the essential components are enclosed in a plastic case that rest, on the top and back side of the pinna. Amplified sound travels from the receiver through a plastic ear hook that passes over the top of the ear. plastic tubing is connected to the ear hook and channels the sound into and through the earmold to the tympanic membrane. Advantages of this aid are, since it is worn at the ear level it has a cosmetic value. Binaural arrangement of this aid enhances localization and improves speech intelligibility also noise produced by clothing and body movement are eliminated. The major disadvantage with these aids are acoustic feedback, the squeal is due to smaller size of the aids which do not allow much separation of microphone and receiver.

Eye glass type hearing aids - Here all the components are built within the temple bar of an eye glass frame. Advantages of this aid are similar to those of behind the ear hearing aids but the serious disadvantages of this are difficulty involved in keeping the frames adjusted so that they fit properly on th

bridge of the nose, also removal of the glasses means removal of hearing aid. As maintenance problems involved with this type of hearing aid are more they are less popular among cases.

All-in-the-Ear hearing aids: These types of hearing aids are the smallest currently available. All components of the system are located in the concha and the external ear canal of the wearer, in this microphone is located on the outside surface of the concha portion of the case and faces in the same direction as the opening of the auditory canal. This arrangement takes advantage of the sound focusing characteristics of the pinna and more closely simulates the function of the normal ear in terms of the head shadow effect. Major advantages to this type of aid are the cosmetic aspects of its size and the location of its components when worn and disadvantage are the limited gain available, the size of its controls and the restriction imposed by the semipermanent attachment of the hearing aid to the earmold.

Bone conduction hearing aids: These are similar to the body level hearing aids except the receiver. In this type of aid bone conduction vibrators are used. These aids are used mainly for the cases of bilateral atresia or in cases of otorrhoea where earmould usage is a medical contraindication.

CROS Hearing aids - in the basic CROS design, a microphone is placed on the side of the head with the bad ear delivering

amplified sound to the better ear. A non-occluding or open eardrum is necessary with CROS to allow natural sound to reach the good ear and to reduce amplified low frequencies. These are usually recommended in unilateral hearing loss cases.

Advantages: (a) Increased ease in hearing especially when speaker is speaking from the side of the poorer ear also auditory localisation abilities improve with these aids.

Types of CROS are -

- 1) Classic CROS
- 2) High CROS - For bilateral high frequency hearing loss.
- 3) Mini CROS
- 4) Focal CROS
- 5) Power CROS
- 6) Bi CROS
- 7) Open CROS
- 8) Uni CROS
- 9) Multi CROS
- 10) IROS
- 11) CRISCROS
- 12) FROS
- 13) BIFROS

Digital Hearing Aid - A true digital hearing aid is a wearable computer that will allow for software adjustment of a hearing aid parameters. It is a controlled microprocessor. From outside it does not look any different from other hearing aids. The essential difference lies in the interior circuit design of the aid and its function. The electroacoustic characteristics of a digital hearing aid are reproducible and do not change with time as its characteristics are determined by a stored program, which is independent of manufacturing tolerance. Advantages of these hearing aids are it can extract speech from noise by identifying speech temporal characteristics it also eliminates acoustic feedback and rejects unwanted harmonics, it can smoothen the frequency response and the biggest advantage is it can be programmed or reprogrammed any number of times, but power consumption of these hearing aids is greater thus in terms of performance, the overall turn out is less economical, these are also very expensive.

Master Hearing Aid - These are the instruments, which simulate some of the operating characteristics of hearing aids. In this maximum gain, maximum power output, frequency response can be varied. It serves as an substitute for an array of hearing aids that are typically evaluated one by one on the basis of speech audiometric scores. Also audiologist can simply have the client to manipulate the gain control while cold

running speech is directed into the test room at conversational level, with master hearing aid time required to change from one hearing aid to another and making initial gain adjustment is considerably reduced. Critics believe that master hearing aid approximates rather than duplicating characteristics of specific hearing aids.

ELECTROACOUSTICS CHARACTERISTICS OF THE HEARING AIDS :

As hearing aid makes and models continued to proliferate, the need to compare the performance of different models and also of units of some model became apparent*

Electroacoustic characteristics of hearing aid is nothing but the method of expressing hearing aid performance.

Testing is carried out in a sound treated room. Input is given through a dynamic loudspeaker, having a nearly uniform output over the 200-5000 Hz. Either a discrete or sweep frequency oscillator is used which provides test signal to the speaker. Inside the test enclosure, the input is amplified by the hearing aid, the output of which is delivered to a standard 2cc coupler. From this point the amplified signal is metered and in automatic systems printed out by a graphic level recorder.

(Electroacoustic characteristics - Appendix-A).

All manufacturers provide technical specification data sheets for each model of hearing aid they produce which contains all the

required information about gain, output, frequency response etc. However, individual aids of that model may vary greatly in terms of gain, output, frequency range. Thus, it is advantageous for a clinician who is running a hearing aid clinic to be provided with or himself to obtain, individual performance data of each aid.

It is really a boon for a clinician to know about electro-acoustic characteristics of the hearing aid for the reasons:

1. He/She can know, whether manufacturer's specification are matching with that of actual electroacoustic characteristics of the hearing aid.
2. Selecting an appropriate hearing aid for a particular loss that is for evaluation.
3. To- know about any problem exists in the hearing aid itself.

Clinical activities which can be performed in a hearing aid clinic are

- 1) Hearing evaluation
- 2) Hearing aid trial
- 3) Counselling
- 4) Earmold making
- 5) Rehabilitative therapy.

Once hearing evaluation is done by the Audiologist and Otologist strongly feels that no further medical or surgical intervention can be done, the only option left to the client is to opt for hearing aid which will help him to restore his communicative skills. Thus selection and fitting of the appropriate hearing aid will be the major task carried out in the hearing aid clinic. It is fully clinician¹'s responsibility to choose 'the best' for his client.

HEARING AID SELECTION PROCEDURES

"If a deaf person has talent and cannot use it, we have failed, if a deaf person has talent and uses only half of it, we have partly failed, if a deaf person has talent and learns somehow to use the whole of it he and we have gloriously succeeded and won satisfaction and triumph few people even know.

Tomas Wolfe (Cited by Prisina) 1976.

When hearing impaired individual approaches an audiologist, once the audiological evaluation is over; clinician needs to show a lot of patience and has to exhibit skills in order to select the best suitable hearing aid for his client.

One of the prerequisite for the prospective hearing aid client is to undergo an otological evaluation to rule out pathology of the ear.

There are different hearing aid evaluation procedures described, but always a clinician will take following points into account -

- 1) Type of hearing loss - conductive/sensorineural/mixed
- 2) Degree of hearing loss - mild/moderate/severe/profound
- 3) Unilateral hearing loss/Bilateral hearing loss
- 4) Electroacoustic characteristics of hearing aids.

A clinician also has to decide about binaural or monaural hearing aid prescription. In case of monaural fitting, always the ear with better speech discrimination and wide dynamic range is chosen,.

Hearing aid selection procedures can be categorised as -

- 1) **Comparative procedure**
- 2) **Prescriptive procedure**
- 3) **Objective procedure**

Comparative procedure - Which compares hearing aids with each other as the basis of selection. Now based on speech audiometry selective procedures from already preselected 3/4 hearing aids, clinician will give that hearing aid which will give -

- 1) Greatest improvement in SRT
- 2) Best discrimination score

- 3) Widest dynamic range
- 4) Satisfactory speech discrimination thresholds even in the presence of noise.

Prescriptive procedure: This focusses on determination of appropriate electro-acoustic characteristics of an hearing aid and frequency gain function which is necessary for an individual.

Objective procedure: Few of the-objective procedures which can be used for the selection of the hearing aid are -

- Real ear gain measurement
- Immitance
- B.S.E.R.A

Speciality of these procedures is active participation of the client is not required in the selection. For eg. the advent of practical real ear measurement system offers an objective means of quantifying, describing, evaluating the sound received at the level of the eardrum. These measurements allow dispensers to visualise what the hearing aid user is experiencing and thus allowing him to proceed with a higher, degree of confidence.

Some of the formulae used for this procedure are -

- i) Lybarger' s half gain rule
- ii) McCandless and Lyreggard's PoGo I and PoGo II

iii) NAL

iv) Berber's comparative procedure:

COUNSELLING:

Is the backbone of all the rehabilitative procedures. It not only helps the clinician to build up rapport with his client but also helps him to know how to respond to their patients by listening closely to their expressed concerns. Counselling can be started from the day one when client visits the clinic for hearing evaluation. Though in traditional hearing aid clinics, informational advising was done in the time allotted for counselling after the hearing or hearing aid evaluation, which was generally inadequate compared to the quality of information must be explained and understood by client and also his family members. During the trial period with the aid essential counselling can be provided. During this time patient's progress can be carefully monitored, all the questions can be answered, also the skills related to the use of the aid and earmold can be taught and illustrated through out the trial period.

Also by counselling, it is easier to convince the patient that hearing aid is not a "miracle"¹¹ and he will take some time to get adjusted to it. Client must be told to have realistic

expectations from hearing aid. That is, it must be clear to the client that if sound is coming from beyond 3-5 ft, hearing aid will not be of much use; also in the noisy environment it can be a trouble maker rather than a facilitator. Client can be shown the existing benefits with the hearing aid through unaided and aided responses. It is essential to tell the client about use, care and maintenance of hearing aids and molds.

Guidelines for how to use the hearing aid:-

- 1) Client should be motivated to use the aid by showing the benefits of its using.
- 2) He should be well verse with parts of hearing aids like volume control, tone control, on-off switch, cords, battery compartment etc.
- 3) He should be given enough practice in how to operate, insert and remove the aid.
- 4) Inserting mold just with the feel of it, is another task he has to learn.
- 5) Battery information ie type of battery used, the battery number, life of battery, the types of batteries which may be substituted for the usual one and how to insert the battery in the battery compartment, should be given to him.

About the care of the hearing aid:

- i) It should not be exposed to moisture

- ii) Precaution should be taken that it is not banged against hard surface.
- iii) He should know about which controls should and should not be touched.

Initially instructions should be given to wear the aid only for an hour thus the probability of rejection of the hearing aid is reduced. Usage wearing time can be increased gradually according to the schedule decided by the clinician. New hearing aid user should initially be told to use the aid only at home or in quiet one to one situation, before wearing it to noisy environment. It must be kept in mind that most people are initially disappointed by the results of their aid in difficult listening situations.

Tips of talking to the hearing impaired:

Friends and relatives of the hearing impaired person can counselled on this aspect .

- 1) Speak in a normal fashion without shouting.
- 2) Face the hearing impaired person directly whenever possible.
- 3) See that light is not shining in the eyes of the hearing impaired person.
- 4) Reduce background noises when carrying on conversation.
- 5) If you are eating, chewing or smoking while talking your speech will be more difficult to understand.

- 6) *Keep your hands away from your face while talking.*
- 7) If a person has difficulty in understanding something find a different way of saying the something rather than repeating the something over and over,
- 8) Never talk from another room, be sure to get the person's attention before you start speaking to him.

TROUBLE SHOOTING:

Refers to tracing and correcting faults in machinery. It is process of tracing and rectifying defects in hearing aids by learning to trouble shoot a hearing aid, the user can detect the sources of defect and rectify them.

1. NO SOUND:

Following things can be checked:

- 1) Whether seal on the cell has been removed
 - 2) Whether cell has been placed correctly
 - 3) If battery is leaking or battery terminals are corroded then it can be replaced with a fresh one.
 - 4) If all the above mentioned things are fine and still any signal cannot be heard, the cell may be dead so replace it with fresh cell and recheck.
2. Tubing - If tubing appears to be bent or crumbled it is probably because client is not still used to insert the

aid correctly in the ear. In this case tube can be replaced, client is instructed in methods of getting hearing aid on without spoiling the tube.

3. Replacing tone hook - Since tone hook is a very fragile part, if it is damaged it can be replaced.
4. Cord, receiver - A breaking in the cord may result in intermittent signal, clinician can make it out if he rubs the cord up and down the length and listens to the aid. When one reaches the point of break, the signal is likely to shut off. Here cord can be replaced also if receiver is broken he will get a distorted sounds, then receiver can be changed.
5. Dirt in the controls - Dirt in tone or volume control will give rise to intermittent signal or cutting the signal or cutting the signal off, it can be solved by rubbing the control back and forth a number of times to dislodge the dirt.
6. Earmold - The mold may be clogged with wax/debris then detach it from the receiver wash the mold with soap and luke warm water. Dry it thoroughly, replace and recheck if the aid works.
7. Weak sound - If hearing aid is delivering the sound softly, and it continues to be soft even on turning up the volume.

- the cause may be run down cell or a partially blocked earmolds, thus cell can be replaced and mold can be cleaned to rectify the problem.
8. Distorted sound - People tend to cover their aids with their cloth, which will not only reduce the loudness of the signal but also bring about distortion, thus covering microphone with clothing should be avoided. A rundown cell, broken and loose switches and receivers and dirty microphones will also give distorted sound for which appropriate measures can be taken as mentioned above.
 9. Intermittent sound: A common cause is broken cord which can be replaced, for poorer contact of the battery terminals commercially available cells are used. If problem is due to broken/loose switches, help must be sought from a trained professional in replacing these.
 10. Feedback - A squeal is normally heard when the receiver is too close to microphone to avoid this aid is worn at a lower level or on the opposite side, ill fitting of mold to the receiver, too high volume control can give rise to feedback. Poor insertion of mold into ear is another cause. If mold is loose then new mold has to be made.

Internal feedback can be checked by removing the earmold, placing a finger securely over the tone hook/receiver with the opening securely covered, turn the volume of the aid up. If feedback is still present then problem is internal and must be returned to the factory for repairs.

A) Do's and Don'ts:

- 1) Remove the cell if aid is not in use for a long time, use leakproof cells.
- 2) Don't wind the cord tightly around the aid.
- 3) Don't disconnect the cord from the aid frequently.
- 4) Don't drop the aid or receivers,
- 5) Avoid dropping food and water on the aid.
- 6) Wipe the aid and clear it frequently.
- 7) Wash the mold regularly, dry them thoroughly before fixing them to receiver.
- 8) Have the aid serviced at least once a year.

B) Major hearing aid repairs: In cases where aid has to be opened it is better to be sent to the manufacturer or for hearing aid repair services.

DIFFERENT TYPES OF SET UPS:

Hearing aid clinic can be opened in different practice setting.

Hearing Aid dealership: As extensive equipments are needed to provide diagnostic and rehabilitative audiology services which may be out of budget. Purchasing an existing hearing aid-dealership is one way to assure more immediate cash flow and clientele, which gives the clinician time to expand and improve the hearing aid services provided.

Hospital based hearing aid clinic:- This set up will have to involve and coordinate input from a number of levels of staff. This will be more advantageous for patients as all the necessary medical help can be available in same place. There is also a greater opportunity for research and development.

Community based hearing aid clinic:- It requires cooperation at many levels, that is interaction with other audiologist, area physicians and commercial hearing aid sales people.

Interpersonal communication is required by all the hearing health care professionals in any kind of above mentioned setting for two reasons:

- i) To implement in-service programs for allied professionals working with the hearing impaired.
- ii) To interview and counsel hearing impaired clients and their families.

Other major responsibilities of the clinician are -

- ESTABLISHMENT CASE LOAD

Establishing, maintaining and expanding the daily case load requires professional decisions and understanding of an awareness of community attitudes for promoting the practice which ,one is trying to build. Following promotional approaches can be used :

- Word of mouth referrals.
- Printed, announcement.
- Yellow pages listing.
- Inservice at schools and hospitals.
- News paper advertisement.
- Direct mail or news paper insert.
- Personally meeting ENT Surgeons and Physicians in that particular area.

Administrative procedures which the clinician has to take care of are -

- 1) Arranging for finance.
- 2) Deciding about which equipment to be purchased and from which manufacturer.
- 3) Ordering hearing aids -
 - a) Keeping track of hearing aids required.
 - b) Ordering hearing aids from manufacturer.

- c) Recording the arrival of hearing aids,
 - d) After it arrives, checking it to make certain that it is functioning in compliance with manufacturers specification.
- 4) Arranging for repairs: If the clinician is unable to detect the problem, the hearing aid should be returned to the manufacturer, before that the make, model, serial number of the aid and patient¹s information must be noted. A procedure also should be developed to record that hearing aid has come back from the manufacturer and the certain problem has been rectified.

RECORD KEEPING:

In order for a hearing aid clinic to run efficiently, it is essential to develop a good record keeping system which will allow easy access to patient's information. Records must be kept in such a fashion as to allow for easy retrieval. Patient's files are usually kept in alphabetical order. Which will give all the information about client, outcome of hearing evaluation and advice given about the hearing aid.

For research purposes, it may be valuable to have the records kept by hearing aid recommended or by severity of loss.

age, type of fitting etc. It will also be useful to keep information about hearing aid brand, model, with patient's name, dispensing date, date ordered and repaired information.

All these records can be kept in cabinets or shelves, the areas above and between the cabinets also can be used. If possible these records, stationary and commonly used items should not be stored in an area where clients are being served. Either the clinician will have to interrupt the task or counselling session or he/she will have to wait for a considerable length of time before proceeding with their job. Establish a procedure for dealing out older files, so that additional cabinets are not required.

EARMOLDS:

The earmold forms an integral part of the personal amplification system.- The main purpose of earmold is to provide feedback free transmission of sound from the hearing aid to the eardrum, also it has a great influence on the modification of the acoustic properties of the mold. A hearing aid clinic must include manufacturing of earmolds; which will be convenient for the clinician as he can choose the best mold with modification for his client. It is easier for client, as he does not have to run around places for his mold.

Different types of earmolds Which can be made -

- Standard
- Skeleton
- Shell
- Canal lock
- 3/4 skeleton
- Semi skeleton
- 1/2 shell
- 3/4 shell etc.

Molds can be -

- 1) Hard acrylic earmolds - These are easy to clean and they provide good support.
- 2) Soft earmolds - made up of silicon rubber. These are more flexible and they stay firmly.

Modification of acoustic properties - The acoustic transmission of the sound spectrum of the selected hearing aid can be influenced by the earmold and this has to be taken into account in the adjustment of the acoustic properties.

These modifications can be done by variations in -

- 1) Tubing diameter
- 2) Tubing length
- 3) Length of earmold canal

- 4) Bore diameter
- 5) Bore length
- 6) By selecting a vent.

Before actual making of the earmold a correct impression of the external ear is necessary. Before 'Which the visual examination of the ear canal is necessary for Which otoscope can be used.

Other general requirements for manufacturing of the earmolds are -

cotton roll, white cotton thread, plugger, measuring cups, alginate impression, rubber bowl, plaster spatula, brown paper sheets, earmold flask, plaster knife, 450 ml cold mould seal, black brush, plaster of parls, vaseline bottles, probes double, wax knife, clamps, press spring loaded, variable thermostat hot ovens or heaters, surgical hammers, hanging motor with hand piece, earmold rings, soldering iron rod with stand, acrylic powder, pumic powder, dust protectors,

HANDOUTS:

A number of handouts can be prepared for clients giving information about-

- 1) How to prevent hearing loss
- 2) If hearing loss has already occurred how to prevent it from deteriorating further

- 3) Various parts of hearing aids.
- 4) Care and maintenance of the hearing aid.
- 5) Maintenance of earmold.
- 6) Tips for the client - how to gain maximum benefit with the hearing aid and how to make communication easier.
- 7) Tips for the relatives of the hearing impaired on right way of talking to hearing impaired.

FEES:

Following consideration should be given while deciding the charges -

- Reasonable profit
- Time and professional expertise required to perform the test.
- Over head expenses met.

Decision must be made about the fee structure and actual fees which will be charged for diagnostic evaluative, fitting, counselling and repair services. One should have a set of charge for evaluations based on the amount of time spent with the patient regardless the type of patient. A preprocedure charge must be developed that takes into account money required for purchasing and maintaining equipment, space and other supplies.

A bill should show following items for a new hearing aid user.

Charges for

- Audiological evaluation
- Hearing aid evaluation
- Hearing aid price
- Price for spares/accessories
- Dispensing fee
- Charges for earmold
- Follow up visits

CONCLUSIONS;

Taking into account the tough competition for securing good and satisfactory jobs, starting a hearing aid clinic of your own or with partnership would be definitely a better alternative. There is no doubt that massive planning will be required before starting a clinic. A correct decision at right time and proper utilisation of available things would make running a clinic much more easier. Clinician has to give special attention arrange finance, select location, purchase instruments, establish the case load. A good clinician always thinks about how to provide best to his client. His primary objective should be to satisfy client's needs rather

- than just to find a source to mint money.

The above mentioned factors are the minimum requirements to start a hearing aid clinic. The aim of the clinician should be to provide maximum benefits with the minimum infrastructure.

BIBLIOGRAPHY

- Anita, V. (1993). Insertion gain measurement for hearing aid selection. An Independent Project submitted as part fulfillment for the First Year M.Sc., (Speech and Hearing) to the University of Mysore.
- Cranmer, K. (1932). Hearing aid dispensing. Hearing Aid Journal, Vol.33, No.5, 11, 29.
- Electroacoustic Characteristics, Michael Pollack (1980). Styles of personal amplification systems, Amplification for hearing impaired. 2nd Edition, Grune and Stratton Inc, New York, 22.
- Elison, C.L. (1990). Tips for designing the dispensing office of 1990's. Hearing Aid Journal, Vol.41, No.7, 6,
- Freeman, B.A., and Cohen, R. (1987). The initiation of private practice - concerns - considerations. Vol.38, No.3, 29.
- Gitles, T. (1990). Tools and equipment for in office modification. Hearing Aid Journal, Vol.41, No.1, 14.
- Indian Standard Specification for electroacoustic characteristics of hearing aids IS 10775-1984.
- Lovenbruck, A., Madell;T. Hearing aid dispensing for audiologist - A guide for clinical service, Grune and Stratton Inc, New York.
- Murthy, S«, and Jacob, K.T. (1970). Sound treated room in speech and hearing clinic. JAIISH, Vol.1, 87-91.
- Walsh, S. (1988). Starting a dispensing business/practice. Hearing Aid Journal, Vol.39, No.9, 8.
- Suchitra, N. (199 2). Guidelines to set-up a speech and hearing center. An Independent Project submitted as part fulfillment for the First Year M.Sc, (Speech and Hearing) to the University of Mysore.
- Vinita, T. (1993). Guidelines to set up an earmold laboratory. An Independent Project submitted as part fulfillment for the 1st year M.Sc, (Speech and Hearing) to the University of Mysore.

APPENDIX-A

- PULL ON ACOUSTIC GAIN - At a specified frequency and under essentially- linear input-output conditions the acoustic gain obtainable from the hearing aid measured with the gain control at full on and at stated setting of the other hearing aid control.
- REFERENCE TEST GAIN - The setting of the hearing aid gain control which provides an output sound pressure level in the coupler of 15 ± 1 dB less than $OSPI_{90}$ for an input sound pressure level of 60 dB at the reference test frequency.
- CONTROL POSITION - It is the sound pressure level produced in the acoustic coupler with an input sound pressure level of 90 dB at the specified frequency and the control in the full on position.
- $OSPI_{90}$
- MAXIMUM POWER OUTPUT - It is the greatest sound pressure level, the aid is capable of producing regardless of the amount of gain and the intensity of the input signal.
- FREQUENCY RANGE - This expresses the low and high frequency limits of usable amplification.

- HARMONIC DISTORTION - It is distortion products generated by the action of a nonlinear transfer function at integer multiples of the test signal frequency.
- INTERMODULATION DISTORTION - These are the distortion products generated the action of nonlinear transfer function on an input signal composed of atleast two signals of different frequencies.
- FREQUENCY DISTORTION - It occurs when frequency response and band width of the output are different from the input.