

## KEMENTERIAN KESIHATAN MALAYSIA

# HEARING AID STYLES



Completely-in-Canal  
(CIC)



Canal



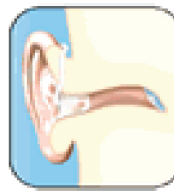
Half-Shell



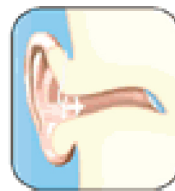
Full-Shell



Behind-The-Ear



Open Ear BTE



## STANDARD OPERATING PROCEDURE (SOP) FOR HEARING AID PRESCRIPTION AND FITTING

Diterbitkan Oleh :

Unit Rehabilitasi dan Ansilari  
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## **WELCOME NOTE FROM THE DEPUTY DIRECTOR GENERAL OF HEALTH (MEDICAL)**

Hearing, as we know, is one of the most precious senses that we have.

Through hearing we are able to develop our language and communication skills, to hear the disturbing sounds of machines, to enjoy wonderful sounds of music and are made aware of incoming harms. Most of us are extremely blessed to be born with perfectly normal hearing. However there are a few unfortunate ones who were born without this ability. Imagine to be born in a very silent and lonely world. There are also people who gradually lose their hearing abilities due to various reasons such as the aging process, infections, tumours, trauma, exposure to ototoxic drugs and also exposure to work / environment related hazards.

With the advancement of technology the disability resulting from hearing loss could be reduced. The hearing aid is actually a wonderful device that amplifies and changes sounds to allow for improved hearing

Currently there is a huge variety of hearing aids available in Malaysia, with variations specifications, sizes, shapes and prices. Audiologists are the ones who would be prescribing them to patients. The patients needs would differ individually. With the development of the Standard Operating Procedure for Hearing Aid Fitting and Prescription it would definitely assist audiologists to decide on which type of hearing aid is suitable for the patient.

Below is the Standard Operating Procedure for Hearing Aid Fitting and Prescription.

This Standard Operating Procedure for Hearing Aid Fitting and Prescription is a result of several meetings, workshops, and dedicated work from the collaboration between the Medical Development Division, namely the Rehabilitation Unit, and the Ministry of Health's Audiological Technical Committee, with the aid of Otorhinolarygology Specialists, Ministry of Health; the Department of Audiology and Speech Sciences, Universiti Kebangsaan Malaysia; and the Audiology Unit, Hospital University Kebangsaan Malaysia.

This Standard Operating Procedure for Hearing Aid Fitting and Prescription is to be used in all Ministry of Health hospitals, as in its context it covers various important matters namely :

- i. comprehensive audiological evaluation for patients of different age groups
- ii. candidacy for hearing aid prescription, selection and verification
- iii. hearing aid application guidelines

It took a great amount of time and depth of knowledge to develop this Standard Operating Procedure. I would like to congratulate all who were involved; it was a great job done.

It is fervently hoped that with this edition of the Standard Operating Procedure for Hearing Aid Fitting and Prescription that the audiological services in Malaysia would improve further to benefit the community.

A handwritten signature in black ink, appearing to be 'Dato' Dr. Noorimi Bt. Haji Morad'.

Dato' Dr. Noorimi Bt. Haji Morad  
Deputy Director General Of Health (Medical)  
Ministry Of Health, Malaysia  
24 January 2007



## **PREFACE FROM THE HEAD OF AUDIOLOGICAL SERVICES**

Thank you to all Audiologists from the Ministry of Health and Universities, Otorhinolaryngology Specialists and all Ministry of Health officers who have worked hard and made many useful suggestions in developing this **Standard Operating Procedure for Hearing Aid Prescription and Fitting**.

The Standard Operating Procedure is designed to provide audiologists with suggestions for fitting hearing aids to hard-of-hearing or deaf clients as part of a comprehensive audiologic rehabilitation plan. These guidelines are divided into seven major stages that constitute the hearing aid fitting process embedded in the rehabilitation plan: Comprehensive Audiological Assessment, Candidacy For Hearing Aid Prescription, Selection, Verification, Orientation, Validation and Referrals.

This Standard Operating Procedure is not intended to precisely dictate how hearing aids should be fitted. Rather, they are intended to suggest several strategies that audiologists may choose from to maximize the probability of user satisfaction and perceived benefit from amplification. Audiologists should exercise professional judgment in choosing which segments of the guidelines are appropriate to their clinical environment and individual client.

Although the emphasis of these guidelines is on the technical aspects involved in fitting hearing aids, audiologists are reminded that fitting hearing aids is an ongoing process that requires joint participation of the audiologist, client, and family/caregivers. Finally, it is not the purpose of these guidelines to discuss issues of marketing, business practice, and ethics in regard to dispensing hearing aids and other assistive listening systems

A handwritten signature in black ink, appearing to read 'Pn. Yusmeera Bt. Yusoff'.

Pn. Yusmeera Bt. Yusoff  
Head Of The Audiological Services  
Ministry Of Health  
Malaysia  
28 January 2008

## **GUIDELINES FOR HEARING AID PRESCRIPTION & FITTING**

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- **INTRODUCTION**
- **DEFINITION**
- **COMPREHENSIVE AUDIOLOGICAL ASSESSMENT**
- **CANDIDACY FOR HEARING AID PRESCRIPTION**
- **HEARING AID SELECTION**
- **HEARING AID VERIFICATION**
- **HEARING AID ORIENTATION**
- **VALIDATION**
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- **FLOW CHART OF HEARING AID MANAGEMENT**
- **TABLE OF STANDARD HEARING AID APPLICATION GUIDELINES**
- **REFERENCES**

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## INTRODUCTION

Hearing aid is an option to improve the quality of life of hearing-impaired persons. **Audiologists are the professionals singularly qualified to prescribe and fit all forms of amplification for hearing-impaired persons** ( , Chisolm et al. 2000). The proper prescription and fitting of hearing aids are important, as it is not a straightforward step that ends at a specific point in time.

Rather, it is a continuous process that involves the patient, family, parents/caregivers (for the pediatric patient), and medical/non-medical professionals especially in rehabilitation programs. Improper assessment, prescription and fitting of hearing aids will lead to certain problems, resulting in failure of using hearing aids. This guideline can be used as the current best practice for audiologists in prescribing and fitting hearing aids.

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DEFINITION

- **“Hearing aid”** is defined as any electronic device fitted to the ear and designed to amplify and deliver sound to the ear (Stach 1997).
- **“Hearing aid prescription”** is defined as the process of selecting the device, including the verification and validation of the selection. Hearing aid provision includes the prescribing and dispensing of hearing aids. It is an ongoing process requiring the joint participation of the audiologist, patient/client, family/caregivers, dispenser and others.
- **“Audiologists”** are professionals engaged in an autonomous practice, who, by virtue of an academic degree in Audiology, clinical training to practice, or by professional credentials, are qualified to provide comprehensive professional services related to the prevention of hearing loss and the audiologic identification, assessment, diagnosis and management for people of all ages with impairment of the auditory system (Stach 1997).
- **Severity of hearing loss**

Degree of hearing loss	Speech understanding	Amplification consideration
Mild (20-40dBHL)	Difficulty in hearing soft sounds e.g. whisper. For children: Mild language retardation. For adults: Mild speech problem.	Fitting hearing aid will help those who are acquiring speech & language High range or middle range recommended
Moderate (40-60dBHL)	Difficulty in hearing normal conversation, especially in background noise Misses most speech sounds at normal conversations	Fitting hearing aid will be of benefit in gaining speech& language Some intervention related to language may be necessary High range or middle range of hearing aid recommended due to the residual hearing
Severe (70-90dBHL)	Speech is inaudible even loud speech at close distance	Hearing aids and intervention are necessary if a child is to learn speech& language. With amplification given to the residual hearing, all sounds of speech should be audible; however the quality of the child's voice may be affected. Mid or high range hearing aid may be recommended.

Profound (90-120dBHL)	Hears no speech or other sounds	Success of hearing aids depends on an individual basis for these children, as the residual hearing varies. Intervention in regards to speech, vocal quality and lang. are necessary, as for natural speech acquisition is extremely difficult. May be a candidate for cochlea implant.
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- **Type of hearing loss**

Sensorineural hearing loss : hearing loss due to cochlear (sensory) or VIIIth nerve (*neural*) auditory dysfunction.

Conductive hearing loss : hearing impairment due to interruption of sound transmission through an abnormal middle ear.

Mixed hearing loss : hearing loss with both conductive (middle ear pathology) and sensory (cochlear or VIIIth-nerve pathology) components.

- **Categorization of patients**

Patients may be categorized into five groups; i.e:

- Infants and toddlers (0-5 years old)
- Primary school age children (6 - 12 years old)
- Secondary school age children (13 – 17 years old)
- Adults (18 – 64 years old), and
- Elderly (65 years old and above)



## COMPREHENSIVE AUDIOLOGICAL ASSESSMENT (PEDIATRIC)

The purpose of the audiological assessment is to assess the possible causes and extent of the hearing problem, estimate ear specific and frequency specific thresholds, and assess the function of the middle ear.

The recommended test battery is divided into four age groups:

- 0-6 months developmental age
- 6-30 months developmental age
- 30 months – 6 years old developmental age
- 6-17 years old

### 1. 0 to 6 months developmental age

The required test battery:

- Comprehensive case history, including parent/caregiver and/or professional observation of child behavior, antenatal, post natal, medical, otologic history, language development, family and developmental history.
- Otoscopic examination to inspect ear canal and tympanic membrane.
- Behavioral observation audiometry (BOA).
- Air conducted frequency specific Auditory Brainstem Response (ABR) or Auditory Steady State Response (ASSR) preferably with insert earphone. If frequency specific Auditory Evoked Potential (AEP) is not available, it should be in conjunction with Otoacoustic Emissions (OAE) and behavioral air and bone conduction thresholds where indicated.
- OAE measurement to exclude auditory neuropathy.
- Measurement or age appropriate prediction of Real Ear to Coupler Difference (RECD) prior to hearing aid selection.
- Immittance measurement with 660Hz probes frequency.

### 2. 6 to 30 months developmental age

The required test battery:

- Case history, including parent/caregiver and/or professional observation of child behavior, antenatal, post natal, medical, otologic history, language development, family and developmental history.
- Otoscopic examination to inspect outer ear condition.
- Visual Reinforcement Audiometry (VRA) using insert phone/TDH headphone and bone conduction to obtain ear specific and frequency specific threshold.
- ABR or ASSR if VRA is not possible.
- OAE measurement to exclude auditory neuropathy
- Immittance measurement with 226 Hz probe tone (tympanometry) and acoustic reflexes where clinically relevant.
- Measurement or age appropriate prediction of RECD prior to hearing aid selection.
- ABR to cross check diagnostic result.

### **3. 30 months to 6 years old developmental age**

The required test battery:

- Case history, including parent/caregiver and/or professional observation of child behavior, antenatal, post natal, medical, otologic history, language development, family and developmental history.
- Otoscopic examination to inspect outer ear condition.
- Conditioned play audiometry (CPA) or pure tone audiometry using insert phone or TDH headphone to get ear specific and frequency specific threshold (masked bone conduction threshold as appropriate).
- ABR if CPA is not possible.
- OAE measurement to exclude auditory neuropathy.
- Immittance measurement with 226Hz probe tone (tympanometry and acoustic reflexes where clinically relevant).
- Measurement or age appropriate prediction of RECD prior to hearing aid selection.

### **4. 6 to 17 years old (school going age)**

The required test battery:

- Case history, including parent/caregiver/teachers and/or professional observation of child behavior, identifying information purpose of referral, communication history, audiological history, otologic history, school performance and medical history.
- Otoscopic examination to inspect outer ear condition.
- Pure tone audiometry using insert phone or TDH headphone to obtain ear specific and frequency specific threshold (masked) bone conduction threshold as appropriate).
- Immittance measurement with 226Hz probe tone (tympanometry and acoustic reflexes where clinically relevant).
- Uncomfortable listening level (UCL) measurement if possible.
- Speech recognition test.
- Measurement or age appropriate prediction of RECD prior to hearing aid selection.

## COMPREHENSIVE AUDIOLOGICAL ASSESSMENT (ADULT)

The definition of adult has been kept consistent with the definition used by the Ontario Ministry of Health for the purpose of hearing aids provision, that is 18 years of age or older (Sutherland et al. 2000).

The required test battery:

- Case history, including identifying information, purpose of referral, communication history, audiological history, otologic history, evidence of Central Auditory Processing Disorder (CAPD), assessment degree of handicap motivation towards hearing aids, occupational history and medical history.
- Otoscopic examination to inspect outer ear condition.
- Pure tone audiometry (air conduction and bone conduction with masking).
- Suprathreshold measurement includes uncomfortable listening level (UCL).
- Immittance measurement: static compliance, acoustic reflex.
- Speech recognition test.

## CANDIDACY FOR HEARING AID PRESCRIPTION

### PEDIATRIC

Any child with a significant hearing loss is a candidate for amplification. The criteria for pediatric amplification include any of the following condition:

#### **If the child has**

1. Permanent, bilateral hearing loss of 25 dB HL or greater in the 1000 - 4000 Hz, amplification should be considered.
2. Unilateral hearing loss in the affected ear confirmed by ABR and behavioral testing, amplification in this ear may be beneficial. Monitored trial use of hearing aids is suggested during the toddler or preschool years.
3. Unusual configuration of loss e.g.: cookies bite, the need of amplification should be made on a case by case basis. The decision for amplification should be based on
  - Child's audiological data
  - Speech and language development
  - Home performance
  - Family preference
  - Existence of other medical condition or special needs.

The summary can be seen in appendix.

## CANDIDACY FOR HEARING AID PRESCRIPTION

### ADULT

Hearing aids fitting and orientation are the most common forms of audiological rehabilitation. There are 2 factors for hearing aids candidacy for adults.

#### 1. **Audiological factors**

- Pure tone audiometric results are important in determining hearing aids candidacy.
- The result of the speech test such as the speech reception threshold and uncomfortable loudness level is helpful in determining the dynamic range and selection of signal processing.
- Individuals with sensory neural hearing loss who have a large dynamic range are likely to be more successful hearing aid users than those with a severely reduced dynamic range.

#### 2. **Motivational factors**

- Motivational factors are often influenced by the degree of hearing handicap.
- The audiologist needs to be aware of the perceived need for amplification on the part of the potential hearing aid candidate.
- Individuals who are highly motivated are likely to perform well with hearing aids.
- Degree of hearing handicap and motivation are critical factors in determining hearing aid candidacy for adult.

#### 3. **Social factors**

- The assessment protocol should define effects of the impairment at personal activity level and/or social role level.
- Examples of assessment tool:
  - Hearing Handicap Inventory for the Elderly (HHE)\*
  - Hearing Handicap Inventory for Adult (HHIA)\*
  - Client Oriented Scale Improvement (COSI)\*
  - Abbreviated Profile of Hearing Aids Benefit (APHAB)\*

## AMPLIFICATION PLANNING

### Pediatric

After completing the assessment process,

- The audiologist and family/caregivers should discuss the finding and identify areas of difficulty and need.
- In many cases the fitting of hearing aids will be incorporated as an early component of the plan.
- Audiologist makes decisions on specific aspect of electroacoustic performance. However, family/caregiver participates is strongly encouraged to participate in other planning before decision making.
- Before initiating the fitting of hearing aids it is important to make sure that family/caregiver develops realistic understanding of the potential benefit, limitation and costs associated with procuring amplification.

### Adult

After completing the assessment process,

- The audiologist and client should discuss the findings and identify areas of difficulty and need, including audiological, motivational and social factors.
- In many cases the fitting of hearing aids will be incorporated as an early component of the plan.
- Audiologist makes decisions on specific aspect of electro acoustic performance. However, client should participate in other planning before decision making.
- Before initiating the fitting of hearing aids it is important to make sure that client develops realistic understanding of the potential benefits, limitations and costs associated with procuring amplification.

## HEARING SELECTION

### Non electroacoustic Characteristic

#### 1.0 Hearing Aid Types

FACTOR	CIC	ITC	ITE	BTE	BODY
Ease of insertion and removal	///	///	///		/
Ease of manipulating user controls		/	//	///	///
Invisibility	///	//	/	/	//
High gain and maximum output			/	//	///
Insensitivity to wind noise	///	//	//		
Directivity for (omni-directional microphone)	///	//	/	/	
Directivity for (directional microphone)			///	///	
Reliability				///	///
Compatibility with telephone	///	/	/	///	/
Flexibility (for non programmes)			/	//	//
Flexibility (for programmables)	///	///	///	//	//
Ease of cleaning				///	/
Cost		/	//	///	///
Occlusion and feedback		/	/	/	/

Table 1 : Relative advantages of different HA styles. Greater advantages relative to the other styles are indicated by greater number of check marks.

- 1.1. Behind the ear (BTE) aids are the preferred choice for most children.
- 1.2. Hearing aids for children should be durable, have flexible features and suitable for growing ears. ITE cannot be recommended for use with infants and young children due to the small size and rapid growth of outer ear.
- 1.3. For adults, decision for hearing aid style should be made based on the degree of hearing loss, patient's preference and social activities.

#### 2.0 Monoaural vs binaural

- 2.1. Bilateral amplification should be prescribed for children and adults in cases with bilateral hearing loss unless there is a clear contraindication.

#### 3.0 Coupling to assistive listening devices

- 3.1. For children, hearing aids should be equipped with direct audio input (DAI), MT switch because the need for FM system coupling to get access to a better S/N ratio in unfavorable listening conditions.

## Electroacoustic Characteristic

### 1.0 Gain

The required gain is calculated by using acceptable formulae that are supported by previous researchers. The gain calculated is to ensure that average speech is heard at a comfortable level and loud sounds don't reach uncomfortable levels.

For linear hearing aid, single gain is calculated for a normal conversational level of 60 – 70 dB SPL. For non-linear hearing aid, the desired frequency responses at higher (80 – 85 dB SPL) and lower (45 – 50 dB SPL) levels are also calculated.

- Correction factor of –3 to –6 dB should be applied to the prescribed gain in each ear in cases of binaural amplification to compensate for binaural summation.
- For conductive losses and mixed losses should be increased 20 – 25% of the air bone gap (Valente et al. 1998).
- NAL–R formulae apply correction factors for profound hearing losses (Byrne and Dillon 1986).
- Individual RECD or age specific RECD must be applied when calculating gain for young children as SPL in the ear canal is always higher due to the small canal size.

### 2.0 Input-output characteristic

#### 2.1 Suitable candidates for using

Linear hearing aid:

- a) Severe to profound losses without recruitment.
- b) Conductive or mixed losses.
- c) Individuals who are comfortable with linear growth.

Non-linear hearing aid:

- a) Individual with significant reduce dynamic range.
- b) Individual exhibit high level of recruitment.



### 3.0 Microphone

- 3.1. For older children and adults directional microphone is preferred because it improves Signal to Noise Ratio (SNR) by 3 – 6 dB (Rickettes 2001).
- 3.2. Omnidirectional microphone is indicated for infants and toddlers (Dillon 2001a) as they will not look at the person to whom they are trying to listen to (Stelmachivic 1996).

### 4.0 Adjustment & flexibility

Hearing aids suggested to patients must be flexible to accommodate for future needs:

- a) the range of gain
- b) the limit of Maximum Power Output (MPO)
- c) frequency shaping responses
- d) ability to assertive listening devices

### 5.0 Signal processing

Digital signal processing is more preferred compared to analog:

- a) Clearer and better quality of the sound
- b) Ability to perform features that are not possible with analog hearing aids.

# HEARING AID VERIFICATION

## 1.0 Quality Control

It is necessary to test the electroacoustic characteristic according to the ANSI-S3.22-1996b to determine whether the hearing aids meet their intended design parameters. From this measurement, the gain, MPO, frequency response, battery drain and distortion should follow the manufacturer's specifications for the brand and models.

For example, the tolerance requirements for SSPL 90 curve should not be more than 3 db above the manufactured stated maximum value (ANSI S3.22-1987, ASA 70-1987). The requirement for each specification could be referred to in the Appendix.

Listening checks also must be done before fitting the hearing aids, to check for excessive electrical noise and intermittency. It is important to ensure that characteristic match what was ordered.

## 2.0 Physical Fit

It is important to determine the physical fit of the earmoulds or hearing aids by assessing the cosmetic appeal, physical comfort, absence of feedback, ease of insertion and removal, security fit, microphone location and ease of hearing aids control operation.

## 3.0 Performance

Performance of the hearing aids could be assessed by considering measurement of **audibility, comfort and tolerance**. It could be tested through the Real Ear Measurement (REM) or Functional Gain measurement.

Verification for non linear hearing aids should include audibility, comfort and tolerance, whereas verification for linear hearing aids only includes comfort and tolerance.

### 3.1 Audibility

Audibility Verification through REM:

- Measure for soft sound with 50 dB SPL input.
- Obtain the Real Ear Aided Response (REAR) value and compare with the predicted threshold in dB SPL (predicted correction factor or Real Ear-to Dial Difference (REDD) calculation)

Verification through sound field measurement:

- Tested with aided and unaided response using specific signals.
- The measured threshold should be 20-30 dB HL at 250 – 6000 Hz.(Valente and Van Vliet 1997).

### 3.2 Comfort

Comfort Verification through REM :

- Measuring the Real Ear Insertion Gain (REIG) by using speech weighted presented at 65 dB SPL.
- Measured REIG (65 dB SPL input signals) matches the NAL-R target.
- Adjust the hearing aid parameters until the real ear gain followed desired prescriptive gain targets.
- The amplified sound can be judged as comfortable (Byrne and Dillon 1986)

### 3.3 Tolerance

It is important to ensure that high level stimuli will not exceed the threshold of discomfort. Tolerance Verification through REM :

- Measure the Real Ear Saturation Response (RESR) by using 90 dB SPL input sweep pure tone signal.
- Hearing aids must be set at user volume control position or volume control setting just below the audible feedback.
- The output targets or actual threshold discomfort should not exceed at any frequencies.
- However, if REM can be performed on infants and children, it is suggested to measure Real Ear to Coupler Difference (RECD) for verification measurement.

RECD consideration in verification measurement for Output

$$\text{OSPL 90} + \text{RECD} = \text{Predicted RESR}$$

RECD consideration in verification measurement for Output

$$\text{2cc Coupler Gain} + \text{RECD} = \text{Predicted Real Ear Aided Gain}$$

## APPENDIX 1

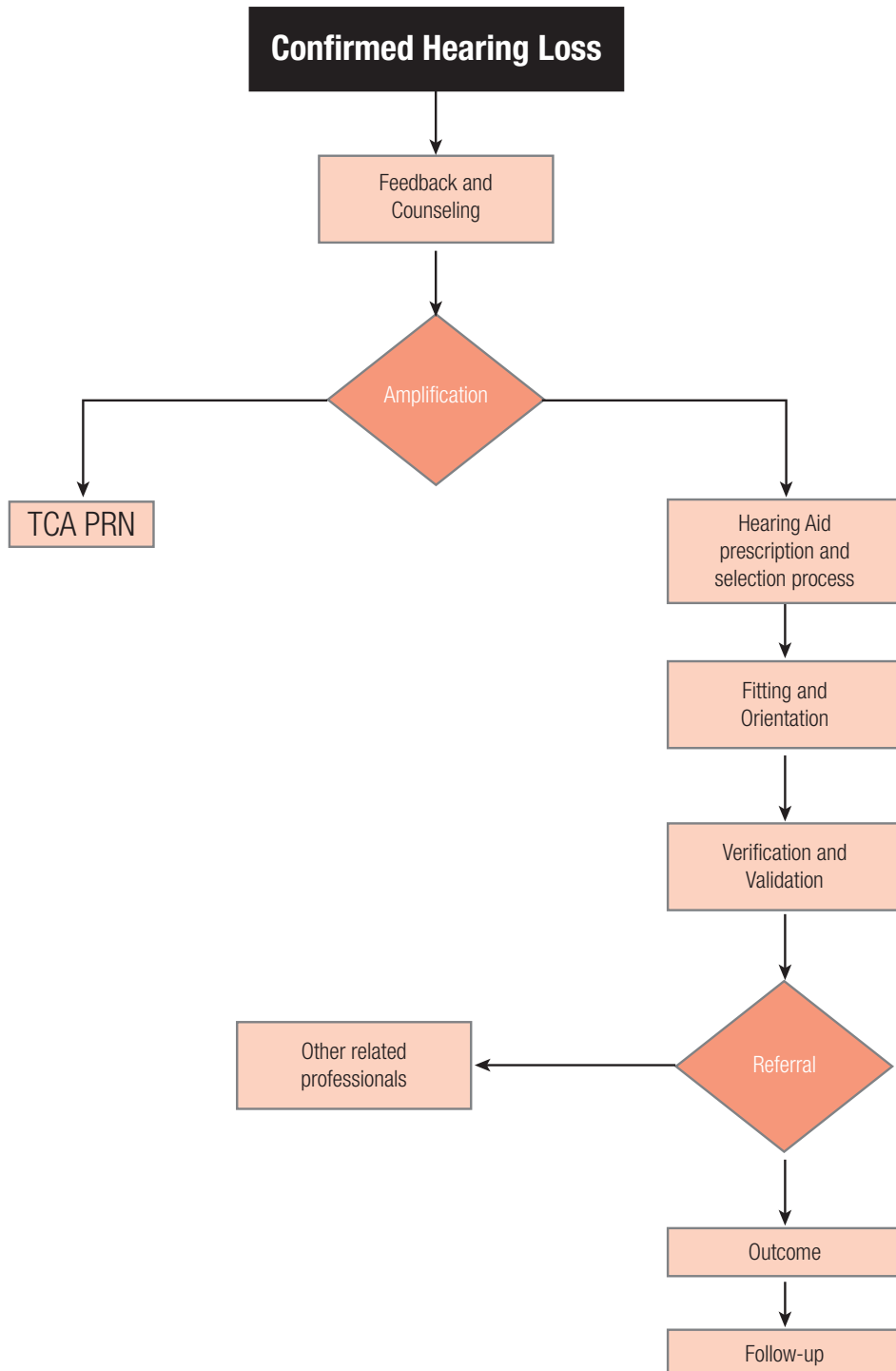
### Real-Ear Coupler Differences (RECDs) for Different Ages\*

	Frequency (Hz)								
	250	500	750	1000	1500	2000	3000	4000	5000
<b>HA-1 coupler</b>									
0-12 months	5.4	9.8	10.0	13.0	14.4	14.5	18.5	21.6	22.4
13-24 months	7.3	10.2	9.9	12.6	13.7	14.2	16.1	18.5	15.5
25-48 months	4.0	8.5	8.7	11.8	13.2	13.2	15.5	16.2	15.4
49-50 months	2.8	8.0	8.5	9.8	11.9	12.7	14.0	15.0	14.8
> 60 months	2.2	4.6	4.3	6.3	7.7	8.8	11.2	13.1	13.7
<b>HA-2 coupler</b>									
0-12 months	5.5	9.7	9.6	11.9	11.6	10.5	16.2	19.4	17.8
13-24 months	7.4	10.1	9.5	11.5	10.9	10.2	13.8	16.3	10.9
25-48 months	4.1	8.4	8.3	10.7	10.4	9.2	13.2	14.0	10.8
49-50 months	2.9	7.9	8.1	8.7	9.1	8.7	11.7	12.8	10.2
> 60 months	2.3	4.5	3.9	5.2	4.9	4.8	8.9	10.9	9.1

\* adapted from Seewald et. al, 1997.

## APPENDIX 1

## Flowchart Of Hearing Aid Management



## GLOSSARY

### ■ Multiband

- few sets of inputs of stimulus

### ■ Multiple program

- HA that have the ability to store different listening programs

### ■ Microphone

- An electroacoustic transducer that changes a sound stimulus to electrical energy.
- Omnidirectional : is sensitive to sounds from all directions.
- Directional : focuses on sounds in front of a person and reduces the loudness of sounds from behind the person.

### ■ Direct Audio Input

- A circuit that directly connects H.A to assistive listening devices and also radios, television.

### ■ Feedback Manager

- A program designed to reduce whistling noise coming out from H.A, especially when earmould is loose, or if using high-powered H.A.

### ■ Dynamic Range

- Difference in dB between hearing threshold and discomfort level.

### ■ Digital Noise Canceller

- A process of acoustical treatments and structural modifications whereby the intensity in dB of unwanted sound is reduced.

- Wide dynamic range compression (WDRC)
  - Circuit in hearing aids designed to provide more amplification for soft sounds than for loud sounds to meet the needs of many hearing aid wearers, who primarily need amplification of the soft sounds.
  
- Telecoil
  - A series of interconnected wire loops in hearing aids that respond electrically to a magnetic signal.
  
- Soft / Hard Band
  - A loop around head, which connect two hearing aids to each ear, usually soft band is preferred for infants or children, while hard band is usually worn by adults.
  
- Linear Amplification
  - Non-adjustable circuit. Provide same amount of amplification for all types of sounds, regardless of the loudness of sound, until up to the point of the H.A maximum power.

# TABLE OF STANDARD HEARING AID APPLICATION GUIDELINES

Age	Type of Hearing Loss	Audiometric Configuration	Degree of Hearing Loss	Typr of Hearing Aid	Exclusion Criteria	Recommended Technical Specification	Application Limit of Hearing Aid (RM)
Infant and Toddler	Conductive					<ul style="list-style-type: none"> <li>- Channel: 3-6</li> <li>- Microphone: Has option for Directional and Omnidirectional</li> <li>- Feedback manager</li> </ul>	3,000.00 per piece
	Sensorineural	Any audiometric configuration	Any degree of hearing loss	Behind-the-ear Custom-made H.A is not recommended	Bilateral atresia of ear canal/microtia Bed-ridden patient. (Recommendation : Body-Worn hearing aids)	<ul style="list-style-type: none"> <li>- Circuitry: WDRC and Linear (Linear circuitry only is enough for profound loss)</li> <li>- Output Limiting: Super Compression or dLimiting</li> <li>- Digital Noise Canceller</li> <li>- Multiple program</li> <li>- FM System Connectivity</li> </ul>	
	Mixed						



Age	Type of Hearing Loss	Audiometric Configuration	Degree of Hearing Loss	Typr of Hearing Aid	Exclusion Criteria	Recommended Technical Specification	Application Limit of Hearing Aid (RM)
School age or Primary School	Conductive	Any audiometric configuration	Mild to severe	Behind-the-ear and In-the-ear	Bilateral atresia of ear canal/microtia	- Channel: 3-6	3,500.00 per piece
					Bed-ridden patient. (Recommendation : Body-Worn hearing aids)	- Microphone: Has option for Directional and Omnidirectional	
	Sensorineural		Profound	Behind-the-ear (especially for severe and profound loss)	Persistent ear discharge.  Reversible hearing loss.  Progressive hearing loss (for ITE).  Patient with bilateral dead ear or 'No Response' ear via behavioral test	- Feedback manager  - Circuitry: WDRC and Linear (Linear circuitry only is enough for profound loss)  - Output Limiting: Super Compression or dLimiting  - Digital Noise Canceller  - Multiple program  - FM System Connectivity	
	Mixed						

Age	Type of Hearing Loss	Audiometric Configuration	Degree of Hearing Loss	Typr of Hearing Aid	Exclusion Criteria	Recommended Technical Specification	Application Limit of Hearing Aid (RM)
Secondary School	Conductive				Bilateral atresia of ear canal/microtia Bed-ridden patient. (Recommendation : Body-Worn hearing aids)	<ul style="list-style-type: none"> <li>- Channel: 3-6</li> <li>- Microphone: Has option for Directional and Omnidirectional</li> <li>- Feedback manager</li> <li>- Circuitry: WDRC and Linear</li> </ul>	3,500.00 per piece
	Sensorineural	Any audiometric configuration	Mild / Moderate	Behind-the-ear or In-the-ear / In the canal	Persistent ear discharge. Reversible hearing loss. Progressive hearing loss (for ITE).	<ul style="list-style-type: none"> <li>(Linear circuitry only is enough for profound loss)</li> <li>- Output Limiting: Super Compression or dLimiting</li> <li>- Digital Noise Canceller</li> <li>- Multiple program</li> <li>- FM System Connectivity</li> </ul>	
	Mixed						

Age	Type of Hearing Loss	Audiometric Configuration	Degree of Hearing Loss	Typyr of Hearing Aid	Exclusion Criteria	Recommended Technical Specification	Application Limit of Hearing Aid (RM)
Secondary School	Conductive	Any audiometric configuration	Severe and Profound	Behind-the-ear	Bilateral atresia of ear canal/microtia	- Channel: 3-6	3,500.00 per piece
					Bed-ridden patient. (Recommendation : Body-Worn hearing aids)	- Microphone: Has option for Directional and Omnidirectional	
	Sensorineural				Persistent ear discharge.  Reversible hearing loss.	- Feedback manager  - Circuitry: WDRC and Linear (Linear circuitry only is enough for profound loss)	
	Mixed				Progressive hearing loss (for ITE).  Patient with bilateral dead ear or 'No Response' ear via behavioral test	- Output Limiting: Super Compression or Limiting  - Digital Noise Canceller  - Multiple program  - FM System Connectivity	

Age	Type of Hearing Loss	Audiometric Configuration	Degree of Hearing Loss	Typr of Hearing Aid	Exclusion Criteria	Recommended Technical Specification	Application Limit of Hearing Aid (RM)
Adult	Conductive				Poor manual dexterity	- Channel: 3-6	3,500.00 per piece
					Bilateral atresia of ear canal/microtia	- Microphone: Has option for Directional and Omnidirectional	
	Sensorineural	Any audiometric configuration	Mild to Severe	Behind-the-ear	Bed-ridden patient. (Recommendation : Body-Worn hearing aids)	- Feedback manager	
				In-the-ear	Reversible hearing loss.	- Circuitry: WDRC and Linear (Linear circuitry only is enough for profound loss)	
				In-the-canal	Persistent ear discharge (for ITE)	- Output Limiting: Super Compression or Limiting	
	Mixed				Progressive hearing loss (for ITE)	- Digital Noise Canceller - Multiple program - FM System Connectivity	

Age	Type of Hearing Loss	Audiometric Configuration	Degree of Hearing Loss	Typr of Hearing Aid	Exclusion Criteria	Recommended Technical Specification	Application Limit of Hearing Aid (RM)
Adult	Conductive					<ul style="list-style-type: none"><li>- Channel: 3-6</li><li>- Microphone: Has option for Directional and Omnidirectional</li><li>- Feedback manager</li><li>- Circuitry: WDRC and Linear</li></ul>	3,500.00 per piece
	Sensorineural	Any audiometric configuration	Profound (Hearing thresholds within fitting range of hearing aid)	Behind-the-ear	Patient with bilateral dead ear or 'No Response' ear via behavioral test.	(Linear circuitry only is enough for profound loss)	
	Mixed				Bed-ridden patient due to feedback	<ul style="list-style-type: none"><li>- Output Limiting: Super Compression or Limiting</li><li>- Digital Noise Canceller</li><li>- Multiple program</li><li>- FM System Connectivity</li></ul>	

Age	Type of Hearing Loss	Audiometric Configuration	Degree of Hearing Loss	Typy of Hearing Aid	Exclusion Criteria	Recommended Technical Specification	Application Limit of Hearing Aid (RM)
Elderly (65 years old and above)	Conductive				Poor manual dexterity	- Channel: 3-6	3,000.00 per piece
					Bilateral atresia of ear canal/microtia	- Microphone: Has option for Directional and Omnidirectional	
	Sensorineural	Any audiometric configuration	Mild to Severe	Behind-the-ear	Bed-ridden patient (Recommendation: Body-Worn hearing aids)	- Feedback manager	
				In-the-ear* (depends on social activity)	Reversible hearing loss	- Circuitry: WDRC and Linear (Linear circuitry only is enough for profound loss)	
	Mixed			Body Worn	Persistent ear discharge (for ITE)	- Output Limiting: Super Compression or Limiting	
					Progressive hearing loss (for ITE)	- Digital Noise Canceller	
						- Multiple program	
						- FM System Connectivity	

Age	Type of Hearing Loss	Audiometric Configuration	Degree of Hearing Loss	Typr of Hearing Aid	Exclusion Criteria	Recommended Technical Specification	Application Limit of Hearing Aid (RM)
Elderly (65 years old and above)	Conductive					<ul style="list-style-type: none"><li>- Channel: 3-6</li><li>- Microphone: Has option for Directional and Omnidirectional</li><li>- Feedback manager</li></ul>	3,000.00 per piece
	Sensorineural	Any audiometric configuration	Profound (hearing thresholds within fitting range of hearing aid)	Behind-the-ear	Patient with bilateral dead ear or 'No Response' ear via behavioral test	<ul style="list-style-type: none"><li>- Circuitry: WDRC and Linear (Linear circuitry only is enough for profound loss)</li></ul>	
	Mixed				Bed-ridden patient due to feedback	<ul style="list-style-type: none"><li>- Output Limiting: Super Compression or Limiting</li><li>- Digital Noise Canceller</li><li>- Multiple program</li><li>- FM System Connectivity</li></ul>	

## SPECIAL CASES

Age	Type of Hearing Loss	Audiometric Configuration	Degree of Hearing Loss	Type of Hearing Aid	Exclusion Criteria	Recommended Technical Specification	Application Limit of Hearing Aid (RM)
Any Age	Conductive		Mild		Atresia/Microtia of the ear canal	- Soft band / Hard Band/Spectacle	3,000.00 per piece
			Moderate	Bone Conduction Hearing Aid	Persistent ear discharge	- On/Off switch Telecoil	
	Mixed	Any audiometric configuration	Severe		Perforated ear drum	- Volume control - MPO and Gain Control - Tone Control	



SPECIAL CASES

Age	Type of Hearing Loss	Audiometric Configuration	Degree of Hearing Loss	Typyr of Hearing Aid	Exclusion Criteria	Recommended Technical Specification	Application Limit of Hearing Aid (RM)
Adult	Bilateral Conductive		Mild		Bilateral Atresia/Microtia of the ear canal	- Frequency range from 0.25 - 7 kHz	20,000.00 per piece
	Bilateral Mixed	Any audiometric configuration	Moderate (BC threshold less than 65 dBHL)	Bone Anchored Hearing Aid (BAHA)	Persistent ear discharge	- Signal processing: Linear or compression	
	Unilateral profound Sensorineural / Single-Sided Deafness				Post-operative ear defect *(bilateral large mastoid bowl)	- Volume control	
Children above 5 years old (operation-age)					Air-conduction hearing aid is contraindicated	- Tone Control	

CROS / BiCROS Hearing Aid

Age	Type of Hearing Loss	Audiometric Configuration	Degree of Hearing Loss	Typr of Hearing Aid	Exclusion Criteria	Recommended Technical Specification	Application Limit of Hearing Aid (RM)
Adult	Conductive	Normal hearing one ear and severe, profound or dead ear in another ear	Unilateral hearing loss	Contralateral Route of Signal (CROS)	Patient with normal hearing in one ear, and severe, profound or dead ear.  Patient shows remarkable adverse performance when listening to speech, especially in noisy environment.	<ul style="list-style-type: none"><li>- Multichannel</li><li>- Microphone: Directional or Omnidirectional</li><li>- Feedback Manager</li></ul>	3,500.00 per set
		Mixed	Asymmetrical hearing loss	BiCROS	Significant hearing loss in one ear, and severe or profound hearing loss in the worst ear	<ul style="list-style-type: none"><li>- Wide Dynamic Range Compression</li><li>- Multi program</li></ul>	
	School Age						

FM SYSTEM

Age	Type of Hearing Loss	Audiometric Configuration	Degree of Hearing Loss	Typr of Hearing Aid	Exclusion Criteria	Recommended Technical Specification	Application Limit of Hearing Aid (RM)
Any Age	Conductive		Normal hearing (≤20 dBHL)	FM System	FM system must be compatible with patient's current hearing aid.	- Transmitter	10,000.00 for bilateral FM System  7,000.00 for unilateral FM System
			Mild		Patient could not get optimum benefit by using hearing aid only.	- Receiver	
			Moderate			- Adaptor (without hearing aid)	
	Mixed	Any audiometric configuration	Severe		Patient showed poor performance listening in noisy situation, especially at workplace and in work nature, or in education setting		
			Profound				

**This Standard Operating Procedure (SOP) for hearing aid prescription and fitting is effectively started on September 2007. It is part of a continuum of policy document related to Audiological practice.**

**Updates are needed from time to time to assure that the SOP is consistent with current needs and practice.**

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