Appendix B

1. Case History

A case history will contain but not be limited to the following patient/client information:

a. Name, address and phone number
b. Date of Birth
c. OHIP number
d. VAC or WSIB insurance number
e. Third party insurance number when billed directly by the Member
f. History of hearing loss, onset, duration
g. Medical history infections, allergies, surgeries, medications
h. Family history of hearing loss
i. History of noise exposure
j. History of tinnitus, pain, dizziness, vertigo
k. History of hearing aid use
l. Expectations and needs of the patient/client, lifestyle
m. Date of last history taken

2. Otoscopy

An otoscopic exam must be completed prior to any hearing assessment, impedance audiometry, real ear measurement and before and after impression taking.

The purpose of the otoscopic exam is to:

a. Evaluate the possibility of ear canal collapse
b. Observe any external and/or middle ear condition
c. Determine the presence of cerumen
d. Determine the size of the external canal and its ability to accommodate a dome, earmold or hearing instrument
e. Determine the location of the second bend of the ear canal and other landmarks when taking an ear impression

3. Impedance Audiometry (Acoustic Immittance)

a) Tympanometry

Tympanometry is a measurement that gives information regarding the condition of the tympanic membrane and middle ear space.

b) Acoustic Reflexes

The acoustic reflex threshold is the lowest intensity needed to elicit a contraction of the stapedius and tensor tympani muscles using a pure tone stimulus.

Acoustic reflex measures can be conducted either through an ipsilateral or contralateral presentation.

Contralateral reflexes are measured by stimulating one ear and measuring the reflexes of the opposite ear.

Ipsilateral reflexes are measured by stimulating and measuring the same ear.

4. Pure Tone Audiometry

a) Air Conduction Testing (AC)

The purpose of air conduction testing is to specify the amount of hearing sensitivity at various frequencies. If there is a hearing loss, air conduction test results can specify the degree of hearing loss but not whether the deficit is produced by abnormality in the conductive mechanism, sensorineural mechanism, or both.

b) Bone Conduction Testing (BC)

The purpose of bone conduction testing is to determine sensorineural sensitivity. The prominent bone behind the ear (mastoid process) is the common place from which the bone conduction measurements are made. The range of frequencies to be tested and the maximum intensities emitted are more limited for bone conduction than for air conduction.

5. Speech Audiometry

a) Most Comfortable Level (MCL)

Intensity level at which sound is perceived to be most comfortable
Measurement of MCL is obtained using a continuous-discourse stimulus to give the patient/client the opportunity to listen to speech as it fluctuates over time

b) Speech Reception Threshold (SRT)

The lowest level at which speech can be understood 50% of the time. SRT is obtained using spondaic words. Words may be presented to the patient/client through monitored live voice or by the use of pre-recorded word list.

c) Speech Awareness Threshold (SAT)

The lowest level at which speech can barely be detected. SAT is obtained using spondaic words. Words may be presented to the patient/client through monitored live voice or by the use of pre-recorded word list.

d) Word Recognition Scores (WRS)

The test presentation level is at the patient's/client's MCL. WRS is obtained using single-syllable words. Words may be presented by monitored live voice or pre-recorded word list.

e) Speech-in-Noise (SIN)

Speech-in-noise testing measures the ability to hear in noise. Speech understanding in noise cannot be reliably predicted from the pure tone audiogram or other standard audiometric tests. SIN testing results will help in the selection of the most appropriate amplification strategy and counselling about realistic expectations.

f) Loudness Discomfort Level (LDL)

The hearing level at which a patient/client finds speech uncomfortably, but not painfully, loud. LDL provides an estimate for the dynamic range for speech which is the difference between SRT and LDL.

6. Masking

Masking is the act of applying a signal (usually noise) to the non-test ear, to keep it from responding for the ear being tested.

Both unmasked and masked thresholds are shown on the audiogram.

There is no one universally correct procedure for masking. The most common masking procedure is the plateau method.

See charts #1 and #2 which summarize masking protocols, based on the plateau method of masking for TDH39 and insert earphones.

Chart #1 and #2: masking values and protocols were provided to AHIP by the Hearing Aid Practitioner program at MacEwan University in March 2015. The information is consistent with the MacEwan University curriculum taught in the winter 2015 term but is subject to change.

Masking Protocol: TDH39

Chart #1

TE: Test Ear **NTE**: Non-test Ear **OE**: Occlusion Effect

AB: Air-Bone Gap **IA**: Inter-aural Attenuation **PL**: Presentation Level

Test	When to Mask	Initial Noise Level	Process
Air Conduction Pure Tones	$AC_{(TE)} - BC_{(NTE)} \geq 40dB$	$AC_{(NTE)} + 10dB$	Plateau Method Increase the noise by 5dB for each response and increase the signal by 5dB for each non-response, until the signal remains constant for a 15dB increase in noise.
Bone Conduction Pure Tones	$ABG_{(TE)} \geq 15dB$	$AC_{(NTE)} + 10\ dB + OE^*$	
SRT	$SRT_{(TE)}$ – best $BC_{(NTE)} \geq 40dB$	$SRT_{(NTE)} + 10dB$	
Word Recognition	$PL_{(TE)}$ – best $BC_{(NTE)} \geq 40dB$	$PL_{(TE)} - 20dB$ *or* $PL_{(TE)} - 30dB$ If can't tolerate PL – 20dB	Turn on the noise at the initial intensity level. Complete the test with the noise constant at the initial masking level.

*Occlusion Effect: 30dB at 250Hz 20dB at 500Hz 10dB at 1000Hz	Inter-aural Attenuation: Air Conduction Average = 40dB Bone Conduction = 0dB Speech Testing = 40dB

Masking Protocol: Insert Earphones

Chart #2

TE: Test Ear **NTE**: Non-test Ear **OE**: Occlusion Effect

AB: Air-Bone Gap **IA**: Inter-aural Attenuation **PL**: Presentation Level

Test	When to Mask	Initial Noise Level	Process
Air Conduction Pure Tones	$AC_{(TE)} - BC_{(NTE)} \geq 75dB$ ($\leq 1000Hz$) $AC_{(TE)} - BC_{(NTE)} \geq 50dB$ ($\geq 1000Hz$)	$AC_{(NTE)} + 10dB$	<u>Plateau Method</u> Increase the noise by 5dB for each response and increase the signal by 5dB for each non-response, until the signal remains constant for a 15dB increase in noise.
Bone Conduction Pure Tones	$ABG_{(TE)} \geq 15dB$	$AC_{(NTE)} + 10dB + OE^*$	
SRT	$SRT_{(TE)}$ – best $BC_{(NTE)} \geq 60dB$	$SRT_{(NTE)} + 10dB$	
Word Recognition	$PL_{(TE)}$ – best $BC_{(NTE)} \geq 60dB$	$PL_{(TE)} - 20dB$ *or* $PL_{(TE)} - 30dB$ If can't tolerate PL – 20dB	Turn on the noise at the initial intensity level. Complete the test with the noise constant at the initial masking level.
*Occlusion Effect: 10dB at 250Hz		Inter-aural Attenuation: Air Conduction Average = 60dB Bone Conduction = 0dB Speech Testing = 60dB	

References

Donaldson, L. (1999). *Masking: Practical Applications of Masking Principles and Procedures* (3rd ed.). Livonia, MI: International Hearing Society.

(1993). *Distance Learning for Professionals in Hearing Health Sciences* (5th ed.). Livonia, MI: International Hearing Society.

(2013). *Trainer Manual*. Livonia, MI: International Hearing Society.

Katz, H., Medwetsky, L., Burkard R., & Hood L. (2009). *Handbook of Clinical Audiology* (6th ed.). Baltimore, MD: Lippincott Williams & Wilkins.

Martin, F. N., & Clark, J. G. (2003). *Introduction to Audiology* (8th ed.). Boston, MA: Pearson Education, Inc..