Using the Tympanometer and Audiometer

Tympanometer/Audiometer

The tympanometer/audiometer is used to obtain information on medical conditions affecting the middle ear and to assess hearing.

Indications for Tympanometry

- Verification of middle ear abnormalities
- Check Eustachian tube patency
- Evaluate hearing loss/pain, especially in the young
Components of the Tympanometer

The tympanometer consists of a probe which is inserted into the external ear canal. The ear cuffs are soft molded plastic that provide an airtight fit in the ear canal. There are several different sizes of ear cuffs. The tympanometer needs to be calibrated, there is a calibration tool included in the kit.

Calibrating the Tympanometer

To calibrate:
- Select Tympanometer on the Add to Case screen
- Insert the probe into the calibration cavity
- Select CAL
- Remove probe tip from calibration cavity when prompted
- Accurate calibration is achieved when the physical volume equals 1.8-2.1 ml.

The Tympanometer Buttons

- Select this button to perform tympanometry
- Select this button to begin audiometry testing
- Select this button to calibrate the tympanometer by size of calibration cavity
- Select this button to perform fast tympanometry which is most useful in infants and toddlers
Seating the Ear Probe

Determining the direction of the ear canal. Look at the ear. Is the canal opening narrow, curved, very large, very small, or deeply recessed? Knowing what the ear canal opening looks like will assist you in placing the probe properly.

Pull up and back on the ear throughout the testing. Tympanometry works best when the ear canal is straightened out and supported during the test.

Seating the Ear Probe

Press the probe tip gently but firmly against the ear. When applying the probe to the ear, using too little force will allow air to escape from the ear canal. You need an airtight seal in order for the test to begin.

The Screen Graphics

AIR LEAK

Causes: inadequate seal between ear canal and ear canal. Try repositioning the probe, or use another ear canal.

BLOCK

A blocked probe is signaled by a high-pitched tone. Causes: the opening on the probe tip is blocked, try repositioning the probe, check tip for obstruction, check ear canal for impacted cerumen.
The computer on the telemedicine cart will automatically capture the tympanogram, display the results in the center of the screen, and produce a thumbnail on the left side of the monitor that is pre-checked.

- Label it Right or Left, and save the tympanogram to the case using the Save button on the right side of the monitor when you have completed all testing.
- You may have multiple tympanograms that you don’t want to save, simply un-check each box.

The Tympanogram

Normal: Middle ear pressure is graphically represented.

Hyperflaccid: notice the sharp peak which indicates scarring of the tympanic membrane.

Stiff Ear: notice the low peak which indicates conditions such as middle ear effusion or thickening of the TM.
**Tympanogram**

[Graph showing tympanogram]

**Tympanometry Terms**

- **Middle Ear Pressure (MEP)** - the existing air pressure in the middle ear cavity. Normal is “0” daPa.
- **Physical Volume (PV)** – the equivalent volume, or size, of the ear canal between the end of the probe cuff and the eardrum.
- **Compliance (Comp)** – the point of maximum mobility of the tympanic membrane. Compliance is measured in milliliters.
- **Decapascals (daPa)** – a unit of measurement for middle ear pressure.

**Acoustic Reflex Testing**

The acoustic reflex is the contraction of one or more muscles of the middle ear in response to a loud noise. Acoustic reflexes are usually elevated or absent in certain types of hearing loss and present at normal or lower levels of hearing loss. The tympanometer checks the acoustic reflex at 2 frequencies (1000 and 2000Hz).
Audiometry

- Audiometry quantifies an individual’s ability to hear sound through a range of intensities and frequencies. Audiometry can assist in diagnosis of the type of hearing disorder and assess the degree of impairment.
- The goal of audiometry is to measure the lowest decibel intensity that can be heard for each frequency tested.

Indications for Audiometry

- Suspected hearing loss
- Persistent serous otitis media
- General screening in children
- Patient complaints of dizziness, tinnitus, or vertigo
- Speech delay in children

The Audiometer Display
<table>
<thead>
<tr>
<th>Audiometry Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Testing should be done in a quiet environment. The test will take approximately 7 minutes from to finish.</td>
</tr>
<tr>
<td>• Seat the patient so he/she cannot see the audiometry display.</td>
</tr>
<tr>
<td>• The patient should remove any large earrings, glasses, hats, or other items that may interfere with headphone placement. The red headphone covers the right ear, the blue headphone, the left ear.</td>
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<td>• Instruct the patient to respond to the faintest detectable sound by pressing the response button. When the patient presses the response button, an asterisk will display in the audiometer display screen.</td>
</tr>
<tr>
<td>• Instruct the patient that a musical note will sound when the test is completed.</td>
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</tbody>
</table>

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<th>To Pause or Cancel Audiometry</th>
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<tbody>
<tr>
<td>• To place the Earscan module in pause mode, press the AUD button while an audiometry test is underway.</td>
</tr>
<tr>
<td>• To resume the test from where it left off, press AUD again. To cancel the test and reset the Earscan module, press SPEC.</td>
</tr>
</tbody>
</table>
**Error Messages-Response Button**

Patient holds the response button down too long.

**Error Messages-False Response**

The false response error indicates the patient may be guessing.

**Error Message-Not Consistent**

Indicates the patient may be inattentive or there may be background noise.
**Saving Results to the Case**

The computer on the telemedicine cart will automatically capture the audiogram and produce a thumbnail on the left side of the monitor that is pre-checked.

- Save the audiogram to the case using the Save button on the right side of the monitor.
- You may have multiple audiograms that you don’t want to save, simply un-check each box.

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**Normal Audiogram**

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**Abnormal Audiogram**
Cleaning the Equipment

Cleaning the Tympanometer probe tip:
1. Unscrew white probe tip counter-clockwise. If the tip is very tight, use a hex wrench to loosen. **DO NOT** use pliers as they will scratch the surface.

2. Use a pipe cleaner or similar object to push debris from the probe tip. The tip may be washed in a mild soap solution.

Cleaning the Equipment

3. **DO NOT** attempt removal of the hypodermic tube protruding from the probe housing. This should only be done by an authorized service center technician.

**CAUTION:** Always remove white probe tip before cleaning to avoid pushing debris into the hypodermic tube.

Cleaning the Equipment

4. Lubricate the threads of the probe tip with petroleum jelly before screwing the tip back onto the probe housing. This insures a tight seal. Remove Teflon tape from threads if present. **CAUTION: DO NOT** over tighten.

5. Proper reassembly can be verified by performing a tympanometry test with the supplied calibration cavity.

**Cleaning the ear cuffs and hand pieces**
Clean these by wiping them down with either alcohol or a surgical soap such as Hibiclens and let air dry.