

STUDY OF OSTEOPOROTIC FRACTURES (V4)

Hearing Assessment Protocol

1. Introduction

Hearing, one of the five major senses, declines with age. Declines in hearing may be related to declines in functional ability in the elderly and thus, also to fall and fracture risk. This protocol is adapted from one provided by Michael Lichtenstein, MD, MSc, University of San Antonio.

2. Equipment

1. Welch-Allyn AudioScope 3
 - a. Calibration: U.S. Occupational Safety and Health Administration (OSHA) recommends that audiometers be calibrated annually (see page 23 of the AudioScope3 Operating Instructions booklet). Arrangements for calibration can be made by returning the instrument registration card. In addition, for this examination bi-weekly biological checks should be performed on a person (preferably the same person each time) with normal hearing who listens to the tones for intensity and quality.
 - b. Recharging: When not in use, the audioscope should always be left in the charging stand so that it is always charged and ready for use.
2. Quiet testing room - maximum of 53 dB - which is about equivalent to normal conversation in the background.

3. Measurement Procedures

- A. Make sure the room is as quiet as possible. This is extremely important as the measure will be inaccurate when measured in a noisy area.
- B. Select a small, medium, or large AudioSpec ear speculum (the tip which fits on the end of the Audioscope that will be inserted in to the participant's ear). For the majority of adults the large speculum will be appropriate, however, in a few cases you may need a smaller size. Secure the AudioSpec to the audioscope by twisting it clockwise onto the instrument. Use the largest speculum that can be inserted comfortably into the ear canal, yet still allow visualization of the tympanic membrane. A snug fit assures an acoustic seal of the speculum in the ear and occludes ambient noise.

Clean the speculum with alcohol in front of the participant before inserting into her ear.

- C. Turn the AudioScope3 on by sliding the selection switch to the 40 dB HL setting. The white indicator band should completely fill the square next to the 40 dB reading. Check to make sure that the green "ready" light is illuminated. If the

yellow "lo batt" indicator comes on, the instrument needs recharging and should be placed in the charging stand. A completely discharged battery will be fully recharged overnight.

D. Ready for testing.

"I am going to test your hearing ability using this audioscope. First I will just look into your ear. Then you will hear a loud tone followed by some fainter tones. Every time you hear a tone I want you to put a finger up like this (*demonstrate*). After the tone goes away, put your finger back down in your lap. Are these instructions clear? What will you do when you hear a tone? And what will you do after the tone disappears? First I will test the right ear and then the left ear."

E. Turn the AudioScope3 to the **40 dB HL** setting.

"We will be testing the hearing in both of your ears. We'll start with the right ear. Do you have any ringing or hissing sounds in your right ear?"

Record response on form.

"Do you wear a hearing aid in your right ear?"

Record whether or not the participant usually wears a hearing aid in this ear. If she does, ask her to remove the aid for testing.

The examiner should try to be at the same level as the participant to facilitate peering into the participant's ear, rather than bending over and reaching down to her ear or reaching up. This could be achieved by a chair on rollers if the participant is sitting, having the participant on an examination table, or having the participant stand (unless she is much taller than the examiner).

Holding the audioscope delicately, like a pencil, insert the audioscope into the **right** ear by retracting the participant's pinna with the thumb and index finger, firmly pulling it slightly up and back. Don't be afraid to be firm in retracting the pinna by pulling UP and BACK. This is the only way to ensure that you'll adequately determine the amount of cerumen in the ear (if any) and ensure correct placement of the speculum. Position the tip of the speculum so that the tympanic membrane or a portion of it can be visualized.

Was the tympanic membrane visible? Record yes or no on the form. If not, record whether or not you could see a partial or complete obstruction or no obstruction (\pm just a little wax) at all.

"Now we are ready to begin our first set of tones. Remember, when you hear the tone, raise your finger up like this (*demonstrate*). When the tone stops, lower your finger. Are you ready? Okay let's begin."

Push the start button. The audioscope will now go through the series of five tones automatically. The green ready light will go out, and tone indicators, which show the tone being presented, will light sequentially. Note the participant's response to each tone.

Record the participant's response - heard, not heard, equivocal on the examination form. Equivocal means that you truly could not tell whether the participant raised her finger in response to hearing the tone.

In the series of 5 tones, if the participant misses any of the tones (doesn't respond appropriately - i.e. not heard or equivocal), then repeat the series of tones at that decibel level. This is to confirm/validate that the participant truly could not hear the tone, and not that she just got distracted for a moment. Hence, for the tones that the participant missed on the first try, if she misses them on the second trial, then record them as "not heard". However, if she responds correctly on the second trial then record the tone as "heard". If a participant happens to miss a tone on the second trial that she heard correctly on the first trial then this should be coded as "heard".

If at any time, participant forgets to lower her finger after a tone, remind her to lower her finger. Repeat instructions as needed.

If the test gets disrupted for any reason, it may be restarted at any time by depressing the "start" button again.

It is important to keep the audioscope still during the test to prevent generation of noise.

"Now we'll do a second set of tones the same way, still on the right ear. Ready?"

REPEAT PROCEDURE AT 25 dB.

REPEAT WHOLE PROCEDURE (BOTH 40 AND 25 DB) FOR LEFT EAR.

F. Cleaning and storage.

After each participant, clean the tip of the audiospec with any of the agents listed on page 20 of the operating instruction booklet. Place the AudioScope3 in the charging stand when not in use to ensure that the audioscope will be charged and ready to go when needed.