# DIAGNOSTIC AUDIOLOGY POCKET GUIDE

*Evaluation of Hearing, Tinnitus, and Middle Ear Function*

Editor-in-Chief for Audiology
**Brad A. Stach, PhD**

# DIAGNOSTIC AUDIOLOGY POCKET GUIDE

*Evaluation of Hearing, Tinnitus, and Middle Ear Function*

**James Steiger, PhD**
**Erin L. Miller, AuD**

Plural Publishing Inc.

PLURAL PUBLISHING
INC.

5521 Ruffin Road
San Diego, CA 92123

e-mail: info@pluralpublishing.com
Website: http://www.pluralpublishing.com



Typeset in 11/13 Garamond Book by Flanagan's Publishing Service, Inc.
Printed in the United States of America by McNaughton & Gunn, Inc.



Library of Congress Cataloging-in-Publication Data

Names: Steiger, James, author. | Miller, Erin L., author.
Title: Diagnostic audiology pocket guide : evaluation of hearing, tinnitus, and middle ear function / James Steiger, Erin L. Miller.
Description: San Diego, CA : Plural, [2017] | Includes bibliographical references and index.
Identifiers: LCCN 2016056743| ISBN 9781944883973 (alk. paper) | ISBN 1944883975 (alk. paper)
Subjects: | MESH: Audiometry—methods | Hearing Disorders—diagnosis | Handbooks
Classification: LCC RF294 | NLM WV 39 | DDC 617.8/075—dc23
LC record available at https://lccn.loc.gov/2016056743

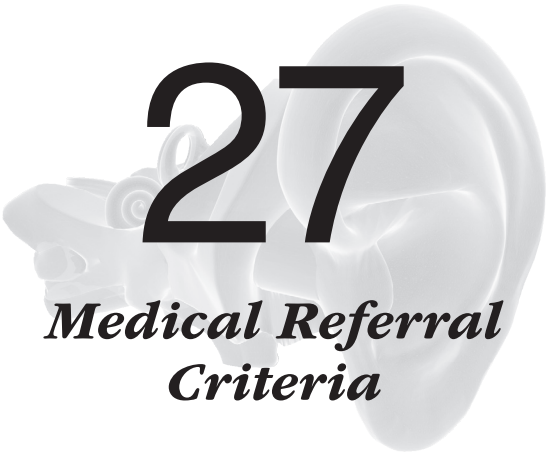
# *Contents*

# *Preface*

This text is intended for use as a lab-coat pocket reference, aimed first at AuD students and recent graduates, though more experienced audiologists might also benefit from having easy access to the information herein. Chapters 1 through 17 of this text pertain to specific tests or test groupings. Those chapters are followed by Chapters 18 through 25 on disorders. Chapter 26 is comprised of example audiograms. Finally, Chapter 27 provides information on medical referral decision making. We hope that the audiologist that has this text in his or her lab-coat pocket will have a valuable and quick reference for every day audiologic diagnosis and referral.

# *Acknowledgments*

The authors thank the many Northeast Ohio AuD Consortium students who have contributed to this text by teaching us through their presentations in grand rounds and clinical learning labs. Special thanks to Kate Weatherholt for her technical help and Kaylee Miller for her drafting, editing, and research. Finally, Emily Rospert deserves special thanks; she did all of the above and more.



# 27 Medical Referral Criteria

## OVERVIEW

Steiger (2005) proposed an outline of audiometric referral criteria for audiologists. Below we repeat, update, and expand on those criteria.

## CRITERIA FOR MEDICAL CLEARANCE FOR HEARING AID FITTINGS

Here we report criteria often used to determine the need for medical clearance for hearing aid fittings. The criteria need not be limited to hearing aid patients; it can serve as a more general screening of the need for medical evaluation. We recommend that the long-accepted FDA (1977) guidelines as the primary consideration of audiologists. The FDA will no longer enforce those guidelines for adults (FDA press release 2016), and as of this writing the outcome at the state level is uncertain. But regardless of legal or regulatory enforcement, the efficacy

and sufficiency of the guidelines has been demonstrated for four decades. We also report the more strict guidelines from the American Academy of Otolaryngology Head and Neck Surgery (AAO-HNS, 1993, 1994) and the AAO-HNS (2015) whenever they differ significantly from the FDA criteria. However, we do not recommend strict adherence to AAO-HNS guideline, as they would result in overreferrals.

### Refer When History Indicates:

- Active drainage from the ear within the previous 90 days (FDA, 1977) or within the previous 6 months (AAO-HNS, 1993, 1994) Drainage includes blood (AAO-HNS, 2015)
- Sudden or rapidly progressing hearing loss within the previous 90 days (FDA, 1977) or within the previous 6 months (AAO-HNS,1993,1994)
- Acute or chronic dizziness (FDA, 1977) or recurrent episodes of dizziness (AAO-HNS 2015)
- Otalgia or discomfort in the ear (FDA, 1977)
- Child under 18 years of age (FDA, 1977)
- Complaint of hearing impairment with positive history of tuberculosis, syphilis, HIV, Ménière's disease, auto-immune disorder, otosclerosis, von Recklinghausen's neurofibromatosis, or Paget's disease of the bone (AAO-HNS, 1993, 1994) or positive history of ear infections, noise exposure, familial hearing loss, ototoxic medication use, otosclerosis, or head trauma related to onset (AAO-HNS 2015)

### Refer When Otoscopy and Examination Indicates:

- Visible congenital or traumatic deformity of the ear (FDA, 1977). We add our own recommendation to include previously undiagnosed tympanic membrane perforations. This finding requires medical referral with a recommendation of dry-ear precautions. Occluded pressure equalization tubes also require medical referral. Tests such as tympanometry, acoustic reflex evaluation, and wideband acoustic immittance can aid assessment as discussed in Chapters 10, 11, 12, and 15 of this text.
- Visible evidence of significant cerumen accumulation or a foreign body in the ear canal (FDA, 1977). *Note*. Cerumen management is now within the audiology scope of practice for most, if not all, states.
- Visualization of blood, pus, cerumen plug, foreign body, or other material in the ear canal (AAO-HNS, 2015)

### Refer When Audiologic Evaluation Indicates:

- Unilateral hearing loss of sudden or recent onset within the previous 90 days (FDA, 1977)
  - AAO-HNS (1993, 1994) clarification of unilateral hearing loss was air-conduction pure-tone PTA (500, 1000, 2000, and 3000 Hz) difference of 15 dB or greater. The AAO-HNS (2015) did not identify

test frequencies. The AAO-HNS (2015) also added unilateral or asymmetrically poor word recognition scores defined as a difference between the ears of greater than 15%.

- Bilateral hearing loss greater than 90 dB (AAO-HNS, 1993, 1994), frequencies not specified.
  - AAO-HNS (2015) guidelines were given as hearing loss greater than 30 dB, frequencies not specified, or bilateral word recognition scores poorer than 80% (AAO-HNS, 2015)
- Audiometric air-bone gap of 15 dB or more at 500 Hz, 1000 Hz, and 2000 Hz (FDA, 1977). The AAO-HNS (2015) added unexplained conductive hearing loss or abnormal tympanogram; see Chapters 10 and 11 of this text for a discussion of tympanograms.

## CONSIDERATIONS SPECIFIC TO MAGNETIC RESONANCE IMAGING TO RULE OUT VESTIBULAR SCHWANNOMAS

In addition to the criteria above, Welling, Glasscock, Woods, & Jackson (1990) offered criteria more specific to the recommendation for MRI to diagnose retrocochlear disorder, specifically vestibular schwannomas.

## History

- Suspicious information obtained by case history might include (Welling, Glasscock, Woods, & Jackson, 1990):
  - Unexplained unilateral or asymmetric hearing loss
  - Persistent unilateral or asymmetric tinnitus or vertigo/dizziness.
  - Aural fullness
  - Facial paralysis, paresis or weakness

## Audiologic Evaluation

- Asymmetric pure-tone air-conduction thresholds options:
  - AAO-HNS criteria: The average difference in air-conduction thresholds between ears of 15 dB or greater at 500 Hz, 1000 Hz, 2000 Hz, and 3000 Hz
  - Obholzer, Rea, and Harcourt (2004) recommendations that have sensitivity (97%) higher than the AAO-HNS criteria and specificity (49%) lower than the AAO-HNS criteria:
    - 15 dB threshold difference between ears at two adjacent frequencies for patients with unilateral hearing loss
    - 20 dB threshold difference between ears at two adjacent frequencies for patients with bilateral hearing loss
- Asymmetric word-recognition scores:
  - One analysis option is the Thornton and Raffin (1978) statistical approach to the identification of significant WRS

asymmetry when measured with NU#6 word lists, see Chapter 7 for details.
    - Another analysis option is the AAO-HNS (2015) criterion of a difference between the ears of greater than 15%.
- Additional tests: Audiologists may add other test to their battery, such as rollover, acoustic reflex thresholds, acoustic reflex decay, and auditory brainstem response (ABR). Test battery sensitivity and specificity can be manipulated (Turner, Frazer, & Sheppard, 1984; Turner, 2013). Generally, the more positive tests an audiologist requires to initiate referrals, the lower the test battery sensitivity (yielding higher miss rates) and the higher the test battery specificity (yielding fewer false alarms).

## STRIAL AUDIOGRAMS AND CARDIOVASCULAR DISEASE

Sensorineural hearing loss presenting with flat or gently sloping audiogram configurations could be due to microvascular strial damage; Friedland, Cederberg, and Tarima (2009) reported an association between such hearing loss and cardiovascular compromise. Accordingly, these authors opined that patients presenting with such audiograms be considered for evaluation of cardiovascular disease and risk factors.

## CONSIDERATIONS SPECIFIC TO SUDDEN SENSORY/NEURAL HEARING LOSS (SSNHL)

Sudden sensory/neural hearing loss warrants *immediate* referral; therefore the definition (AAO-HNS, 2012) of sudden sensory/neural hearing loss suffices as minimal referral criteria.

- Sudden pure-tone threshold decrease of at least 30 decibels (dB)
  - If previous audiograms are not available, unilateral sudden hearing loss can be defined by comparison to the better ear. For bilateral sudden hearing losses without previous audiograms, some uncertainty is inevitable; see discussion of diagnostic certainty below.
- At least at three consecutive test frequencies
- Over no more than 72 hours.

### Levels of Diagnostic Certainty

Clinicians are encouraged to adopt more liberal criteria as case history, test results, and clinical judgment indicates. Accordingly, the AAO-HNS (2012, p. 11) guideline gives levels of diagnostic certainty:

- Very certain: The patient had previous audiometric evaluation.
- Certain: The patient had no prior otologic history and feels his or her premorbid hearing was normal bilaterally.
- Fairly certain: The patient had a long-standing hearing problem and reports