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Overview of Vestibular Education and Incorporating Fundamentals of Vestibular Evaluations in the General Audiology Population

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September 11, 2019

Learning Outcomes

After this course, participants will be able to:

1. Identify the inconsistencies in vestibular education that currently exists in AuD curricula
2. Identify methodological approaches to improve technical delivery of vestibular testing
3. Identify and describe when bedside vestibular evaluations are warranted in the general audiological population.
4. Properly perform various bedside vestibular evaluations; including Halmagyi Head Thrust and Fukuda Step Tests.

What Are We Teaching?[1]

- Recent survey electronically distributed to Current Au.D. Faculty and recent residential Au.D. graduates
- Preliminary partial results were presented at the 2019 University of Pittsburgh Audiology Teaching Conference – Poster
- Total of 38 respondents
  - 33 completed; 5 did not fully complete survey
  - 15 Faculty & 16 Recent AuD Graduates
  - 2 did not indicate Faculty or AuD Grad(not included)

What Are We Teaching?[1]

- "How many courses are taught in your Au.D. program in Vestibular Studies (with the main focus of the vestibular system - A&P, assessment, rehab, etc.)?"
  - 0-3 courses; 0-9 credits
- When compared to total number of credits (88-137) reported for each of the respondents
  - 0-8% of the total curriculum as the main focus of vestibular studies

What Is Important?[1]

- Faculty and recent Au.D. graduates were asked to rate the importance of vestibular topics as critically important, moderately important, slightly important, not important, or not sure.
- Those ranked critically and moderately important were also further defined as must be included or should be included in the curriculum.

What Should Be Included?[1]

Topic	Faculty Ratings of - Must/Should be Included(N=15)	Recent AuD Graduate Ratings of – Must/Should be Included (N=16)
Vestibular Anatomy & Physiology	100%	100%
Vestibular Case History	100%	100%
VNG/ENG	100%	100%
VEMP	100%	100%
vHIT	88%	100%
EcochG	73%	69%
Rotary Chair	100%	72%
Vestibular Pathologies	100%	100%
History of Vestibular Science	38%	56%
CDP	87%	88%
Falls Risk Assessment	100%	88%
Bedside Evaluations	80%	100%
Vestibular Case Studies	93%	100%
Vestibular Report Writing	93%	94%
Epley/CRT Treatment	100%	100%
Vestib Rehab/Balance Therapy	73%	81%

How Are We Learning?[1]

- Faculty and Au.D. graduates were asked how topics were covered.
  - General Vestibular Course
  - Advanced Vestibular Course
  - Hands on Lab
  - Other Course
  - Not Covered.
- Participants were instructed to choose all that apply.

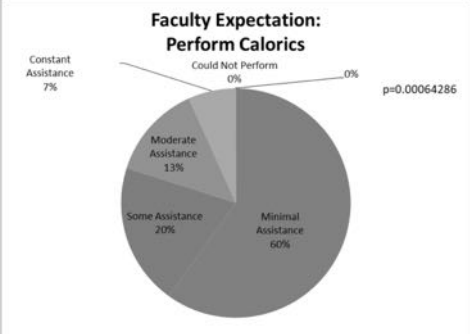
Hands on Learning[1]

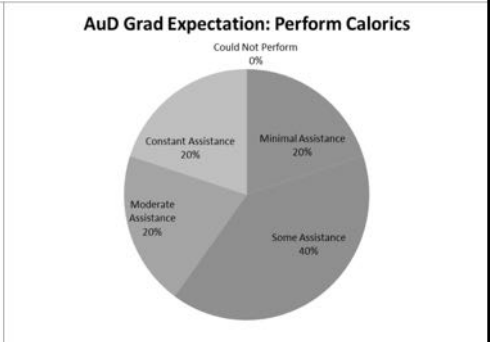
Topic	Faculty & Recent AuD Graduates Reporting Hands on Laboratory Instruction (n=31)
Vestibular Anatomy & Physiology	16%
Vestibular Case History	39%
VNG/ENG	84% *
VEMP	65% *
vHIT	61% *
EcochG	39%
Rotary Chair	42% *
Vestibular Pathologies	6%
History of Vestibular Science	0%
CDP	39%
Falls Risk Assessment	23%*
Bedside Evaluations	45% *
Vestibular Case Studies	19%
Vestibular Report Writing	35%
Epley/CRT Treatment	65% *
Vestib Rehab/Balance Therapy	16%

What Are Our Expectations?[1]

- Following successful completion of your (programs) vestibular course(s), what do you expect of a student clinically? Pick all that apply.
- Following successful completion of your vestibular course(s), what did you feel could be appropriately expect of you as a student clinically?
  - Consistent, minimal assistance
  - Adequate, some assistance
  - Present, moderate assistance
  - Emerging, constant assistance
  - Could not perform
- Chi Square analysis Faculty vs Recent AuD Grads ($p < 0.05$)

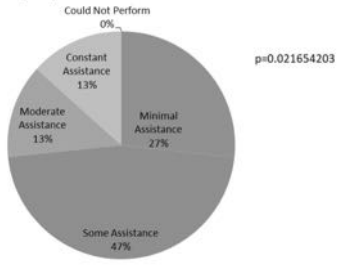
Significantly Different Expectations[1]





Significantly Different Expectations[1]

Faculty Expectation: Perform VEMPs



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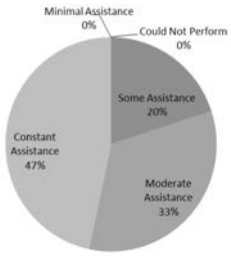
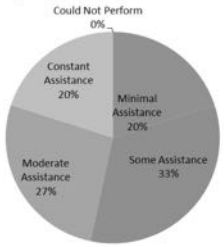
AuD Grad Expectation: Perform VEMPs



Significantly Different Expectations[1]

Faculty Expectation: Perform vHIT



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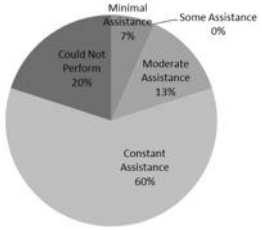
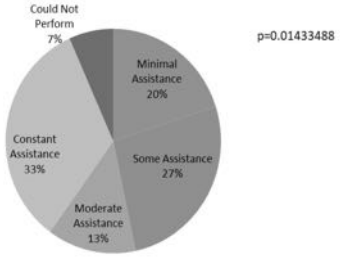
AuD Grad Expectation: Perform vHIT



Significantly Different Expectations[1]

Faculty Expectation: Perform Rotary Chair



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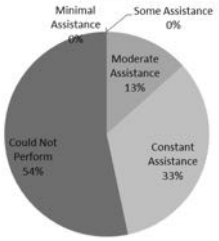
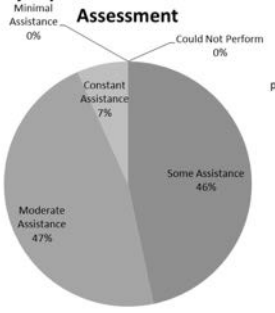
AuD Grad Expectation: Perform Rotary Chair



Significantly Different Expectations[1]

Faculty Expectation: Perform Falls Risk Assessment



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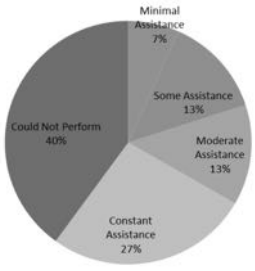
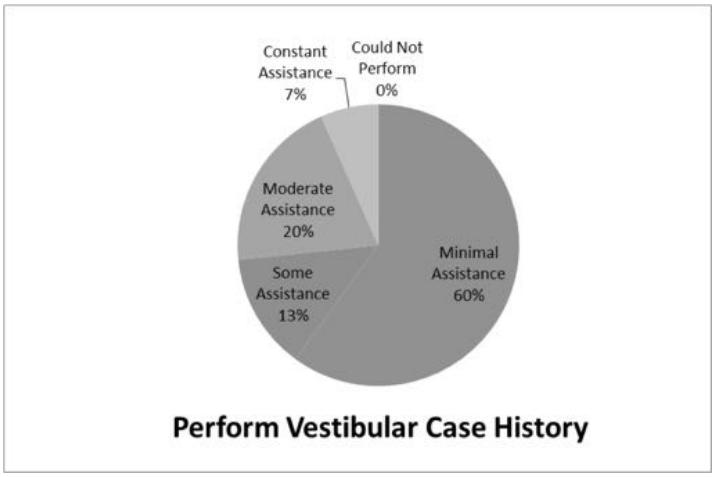
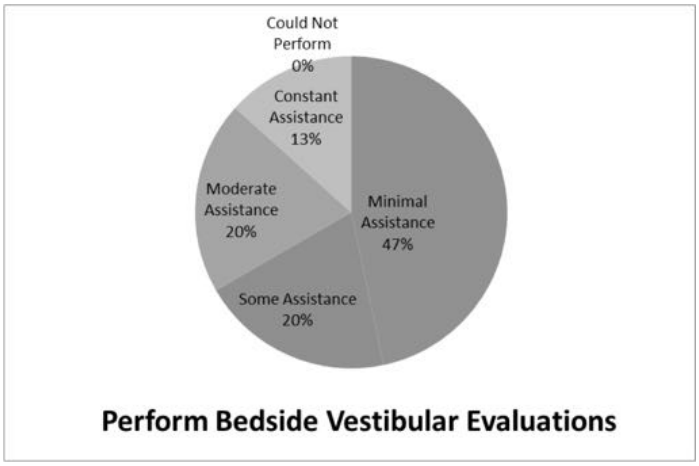
AuD Grad Expectation: Perform Falls Risk Assessment



Faculty Expectations[1]



Faculty Expectations[1]



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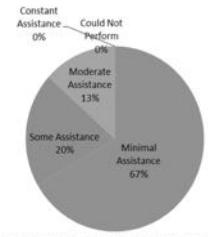
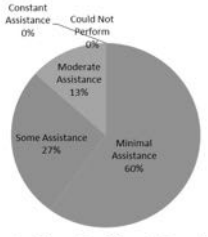
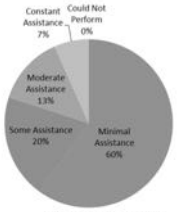
Faculty VNG Expectations[1]



Perform Ocular Assessment



Perform Positional Testing



Perform Calorics

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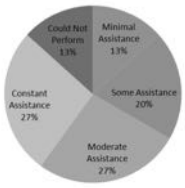
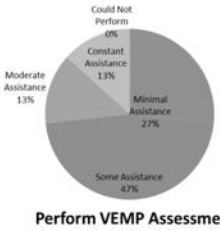
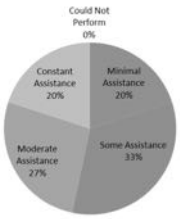
Faculty Advanced Vestibular Expectations[1]



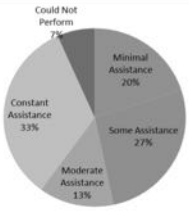
Perform Computerized Dynamic Posturography



Perform VEMP Assessment



Perform vHIT



Perform Rotational Chair

CONTINUED

Conclusions

- Vestibular focused courses make up a small percentage of total AuD curriculum
  - 0-8%
- Lack of consistency across survey respondents
  - Topics covered – viewed as important
  - Hands on learning experiences
- Expectations of performance
  - Varied between groups
  - Varied within a given task

Learning Outcome 2

- Identify methodological approaches to improve technical delivery of vestibular testing
  - Increase Hands On Learning
  - Simulation
  - Skills Assessment Checklists
  - Defining Expectations
- Vestibular “specialty tracks”
  - 3% (1) reported having option [1]
- Post graduate certificate programs
- Continuing education

Learning Outcome 3

- Identify and describe when bedside vestibular evaluations are warranted in the general audiological population

Vestibular assessment in the general audiological population

- Bedside (In Office) Vestibular/Balance Screenings appropriate for:
  - Pediatric
  - Adult
  - Geriatric

Pediatric Vestibular Screenings

- Hearing loss and comorbidity of vestibular/ balance issues
- Vestibular deficits implicated in some fine and gross motor delays
  - Compounding educational barriers associated with language and speech delays typically associated with hearing loss

Epidemiology of Vestibular Impairments (VI) in Pediatrics[2]

- Precise prevalence is difficult due to lack of patients being able to express symptoms
  - Acute VI may be misdiagnosed as gastrointestinal
  - Congenital complete VI may be classified as neurological
  - Estimates range from 5.7-17% in children 3-adolescence

Epidemiology of VI in Hearing Impaired Pediatrics[2]

- Total of 2,528 children 3 months to 15 years
  - 1037 referred for balance disorders
  - 1491 referred for hearing loss
    - 68.5% were tested without cochlear implantation (CI; *n* =1,022).
    - In this group, 54.5% presented with VI (*n* =557).
    - Cytomegalovirus infection, inner ear malformation, and genetic syndromes.

Profound Hearing Loss[2]

- 40% had normal vestibular function
- 20% had complete bilateral vestibular loss
- 40% had partial, bilateral, or asymmetric vestibular loss

Post Cochlear Implantation[2]

- VI was found after CI in 50% on the side of the implant (partial in 41% and complete in 9%).

Unexpected Finding[2]

- For those referred for Balance Disorders a Vestibular Impairment was present in 36.5% of children
- For those referred for Hearing Impairment a Vestibular Impairment was present in 54.5% of children.

Incidence of Pediatric Vestibular Disorders[3]

- 14 year study, 2000 pediatric chart review
  - 25% Migrainous equivalent
  - 20% Paroxismal benign vertigo in childhood
  - 10% Cranial trauma (TBI)
  - 10% Opthalmologic disorders
  - 5% Vestibular Neuritis
  - Others: Malformations, Chronic otitis media, psychiatric, orthostatic hypotension, BPPV, Meniere's

Clinical Observation

- Infancy
  - Nystagmus, horizontal, vertical or torsional
  - Lack of tone, righting reflexes, torticollis
  - Delayed gross motor skills

Clinical Observation

- Toddler – later childhood
  - Nystagmus
  - Delayed motor development, “clumsy”
  - Periods of “sickness,” vomiting, etc
  - Headache
  - Reporting “spinning”
  - Wanting to lay still
  - Light /motion sensitivity

Symptoms of Vestibular Disorders in Children

Peripheral

- Nystagmus w/head movement
- Visual instability w/head movement, blurred vision
- Below age level balance abilities
- Complaints of spinning
- Hearing loss/Tinnitus
- Complaint of incoordination

Central

- Delayed gross motor tasks, visuo-motor, visual perception, DVA
- Persistence of tonic reflexes
- Sensory Integrative Dysfunctions

Adult Vestibular Screenings

- Study of the prevalence of vestibular dysfunction in US using National Health and Nutrition Examination Survey (NHANES)[5]
  - 35% of US adults 40 and older have evidence based on postural metric (modified Romberg)
  - Odds increased with age
  - Odds of balance dysfunction was 70% higher in those with Diabetes Mellitus

Hearing Loss and Falls

- Another study using the NHANES data found a 1.4 fold increased odds of falling for every 10dB of hearing loss over 25 dB in adults 40-69 years of age independent of other risk factors.[6]

Geriatric Vestibular Screenings

- Using the NHANES data, a study revealed 85% of those over 80 years exhibited balance dysfunction[5]
- The American and British Geriatric Societies (AGS/ABS) recommend annual screenings of adults 65 years and older[7]
- A 2012 Cochrane review found 24% reduction in falls in elderly if health care providers performed clinical assessments, identified risk factors and had referral and follow up care[8]

Conclusions

- Regardless of age, a significant number of your patients have some type or, are at risk for vestibular and/or balance dysfunction
- Quick and simple screening assessments are warranted in an otherwise “hearing-centric” audiological practice
- Potential referral sources should be known by practitioners and pathway to care explained to patients

Learning Outcome 4

- Properly perform various bedside vestibular evaluations including Halmagyi Head Thrust and Fukuda Step Tests.

Bedside Vestibular Assessments

- Pediatric
  - One leg stance
  - Questioning the caregiver
- Adult
  - Halmagyi Head Thrust
  - Fukuda Step Test
- Geriatric
  - Falls Risk Assessments: Timed Up and Go
  - Screening Questions

Pediatric Screening Procedures

- Single Leg Stance
  - The most sensitive subtest of the Bruininks Oseretsky Test of Motor Proficiency II (BOT-2)
  - 4 .8 years and above
  - Single leg stance, eyes closed on a firm surface:
    - < 4 seconds: referral for diagnostic vestibular testing
- Simple Screening Questions when hearing loss is 66dB or greater: If parents say yes to any of these questions, referral for diagnostic vestibular testing
  - Age of Sitting: >7.25 months
  - Age of Walking: >14.5 months
  - Parental concern for gross motor delay

Adult Screening Procedures

- Halmagyi Head Thrust
  - Can also be used on older adolescent patients
- Link to Halmagyi video

Adult Screening Procedure

- Fukuda Step Test
- Link to Video Fukuda Normal
- Link to Video Right Turn Fukuda

Falls Risk Assessments

- Timed Up and Go (TUG)
  - Functional Mobility
  - Patient is timed as they stand up from a chair with armrests, walk 10 feet at their normal pace, turn, return to chair and sit down
  - Greater than or equal to 12 seconds suggests high fall risk

Fall Risk Questions[7]

- Fall History: Number of falls within the past year
  - 2 or more and/or fear of falling warrants further assessment
  - 1 without injury: balance and gait evaluated, if balance and gait is fine, no further assessment
- Medication review: Increase the odds of incurring a fall
  - Psychoactives, such as antidepressants, antipsychotics, Benzodiazepines
  - Antihypertensives, Nonsteriodal anti-inflammatory drugs, Diuretics

Final Summary

- Concerning Vestibular Education
  - Need for increased consistency between programs
  - Increased awareness of bedside evaluations for the hearing-centered clinician
- Application to Clinical Practice
  - Incorporating Vestibular/Balance/Falls Risk Screening without huge investments of capital or time
  - Future may see reduction in falls, increased quality of life measures in our patients

References

1. Criter, R., Hogan, A., Myers, B., *Vestibular Sciences in the AuD: What are we teaching?* University of Pittsburgh 8th Biennial Audiology Teaching Conference, June 2019. Poster Presentation.
2. Wiener-Vacher, S. R., Quarez, J., & Priol, A. L. Epidemiology of Vestibular Impairments in a Pediatric Population. *Seminars in Hearing*, *39*(3), 2018, 229–242. doi:10.1055/s-0038-1666815
3. Wiener – Vacher, S.R., Vestibular Disorders in Children, *International Journal of Audiology*, 47(9), 2008 578-583.
4. Castiglione, M., & Lavender, V. (2019). Identifying Red Flags for Vestibular Dysfunction in Children. *The Hearing Journal*, *72*(3), 32-34.
5. Agrawal, Y., Ward, B. K., & Minor, L. B. (2013). Vestibular dysfunction: prevalence, impact and need for targeted treatment. *Journal of vestibular research : equilibrium & orientation*, *23*(3), 113–117. doi:10.3233/VES-130498
6. Lin, F. R., & Ferrucci, L. (2012). Hearing loss and falls among older adults in the United States. *Archives of internal medicine*, *172*(4), 369–371. doi:10.1001/archinternmed.2011.728
7. Phelan, E. A., Mahoney, J. E., Voit, J. C., & Stevens, J. A. (2015). Assessment and management of fall risk in primary care settings. *The Medical clinics of North America*, *99*(2), 281–293. doi:10.1016/j.mcna.2014.11.004
8. Gillespie LD, Robertson MC, Gillespie WJ, et al. Interventions for preventing falls in older people living in the community. Cochrane Database Syst Rev. 2012;(9):CD007146.

Questions?

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