



October 20-23, 2022
Grapevine/Dallas, Texas

The Business of Balance

*Adding Neurodiagnostic Vestibular Testing
Your Audiology Practice*

Moderators:

Christina Coppola, AuD & Richard E. Gans, PhD

Speakers:

Rachel Garcia, HIS., Marilyn Hinrichs, AuD, Craig Kasper, AuD,
Angelene Naro, AuD, Brian Naro, AuD, Ali Vega, AuD

Dizziness & Balance Conditions Throughout the Lifespan



birth – 5 years

- Syndrome & mitochondrial disorders
- Congenital hearing loss
- Delayed motor milestones
- BPV of infancy (pediatric migraine)



8 – 30 years

- Sports related head trauma-mTBI
- Cortical concussion
- Labyrinthine concussion
- Return to play decision



12 – 50 years

- Migraine related dizziness and vertigo, puberty to menopause.
- Affects 1 in 4 females and 1 in 6 males
- 25% of individuals with migraine will experience vertigo as an aura with or without headache
- BPPV is 3x more prevalent in migraine



50+ years

- Benign paroxysmal positional vertigo (BPPV) is the #1 cause of vertigo for individuals 50+ years
- Shingles - most common in individuals 50+, is related to vestibular neuritis, a common cause of vertigo
- Post menopausal migraine females may have dizziness and ataxic gait with stroke-like symptoms



65+ years

- By age 70, 50% of all individuals will have BPPV at least once
- Balance related falls is the leading cause of accidental death in individuals over age 65
- Dizziness is the #1 complaint for all individuals over age 70
- Undiagnosed and untreated BPPV in the older adult population leads to increased falls, depression and decreased quality of life
- mTBI post fall leads to loss of independence and ability to “age in place”

Lifespan

Space & Equipment

One Room 10' x 10' = 100 sq.ft.
Can accommodate

Rotary Chair

VNG

BAER

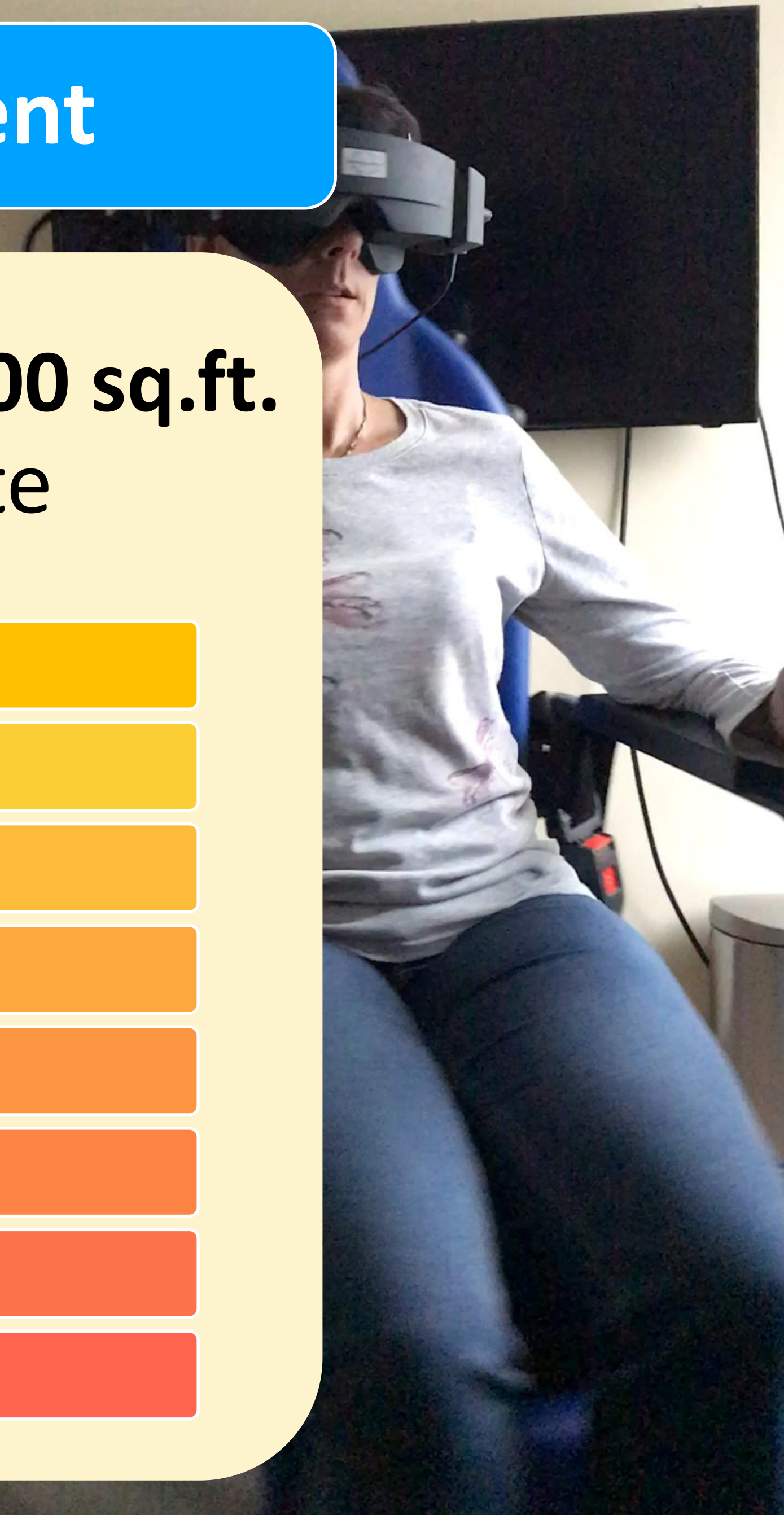
EChOG

VEMP

vHIT

Tymp/ART

OAE



Clinical & Technical



Neurodiagnostic vestibular evaluation is perhaps the most important step in resolving complex profile of complaints

Evaluation not only facilitates accurate medical diagnosis and triage, **but also identifies specific non-medical management strategies when warranted, and improves rehabilitation outcomes**

Role of the Neurodiagnostic Evaluation



Provide the attending physician or practitioner with an objective and measurable assessment of vestibular function

Offer insight as to the nature of involvement and determine which modalities of equilibrium function (vision, vestibular, proprioceptive, CNS) are contributory to the patient's functional impairment(s)

Facilitate effective diagnosis, triage, and management of the dizzy, vertiginous, and imbalanced patient

Generate a prescriptive, diagnosis-based, approach to vestibular rehabilitation therapy and other non-medical management

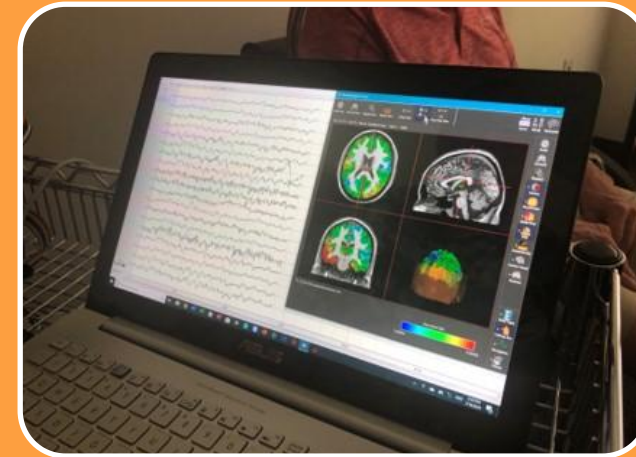
Diagnostic Protocol	Sensitivity	Pros	Cons	Diagnosis Based VRT Strategies	Post VRT Outcome measures
Posturography (CDP or Gans SOP)	Peripheral and Central Vestibular and Neurological	<ol style="list-style-type: none"> Identifies vestibular loss, dysfunction with visual and surface dependence Descending Neural pathway (CDP) 	<ol style="list-style-type: none"> Requires patient to stand independently. May be influenced by neuropathy and other biomechanical comorbidities 	<ol style="list-style-type: none"> Indicates need for Substitution protocols Fall risk management 	Recovery of postural stability
vHIT Horizontal Vertical	UVD and BVD	<ol style="list-style-type: none"> Highest sensitivity indicative of active or uncompensated peripheral vestibular conditions 	Dependent on administrator technique	Gaze stabilization- direction of impairment (horizontal-vertical or both) and whether unilateral or bilateral	Covert corrective saccades disappear after compensation
VEMP cVEMP oVEMP	Peripheral Vestibular and Neurological	Documents wide variety of otologic and non-otologic conditions that cannot be assessed by any other tests. Specifically provides information about saccule, utricle and both superior and inferior branch of vestibular nerve and upper and lower brainstem	<ol style="list-style-type: none"> May be difficult with heavy thick necks. Does not show compensation but may show recovery of nerve function following v. neuritis over time. 	May show utricular dysfunction and can then initiate utricular VRT protocols	VRT will not demonstrate recovery of VEMP but may occur post neuritis.
Rotation Testing Passive Active	Unilateral and bilateral vestibular dysfunction	Provides true physiologic stimulus especially in active head movement	Passive- only at lower limits of VOR Active- requires patient compliance at increased velocities	May require gaze stabilization, habituation and substitution protocols	Gain recovers (Phase may not) Demonstrates compensation
Dynamic Visual Acuity Test (DVA)	Oscillopsia	Only true test to demonstrate the presence of oscillopsia	Based on patient's visual acuity- may be restrictive	Gaze stabilization in specific plane of head movement and velocity of therapy	Recovery of visual acuity with active head movement
VNG w caloric	Vestibular and Neurological	Only test to isolate each ear's labyrinthine reactivity Identifies presence of nystagmus without concern with visual suppression	Does not use a true physiologic stimulus and caloric test only horizontal canal at ultra-low frequency of .003Hz	Presence of spontaneous or provokable nystagmus indicates need for habituation or canalith repositioning maneuvers	Treatment efficacy exhibited by extinguishing nystagmus and any correlating vertigo.
ABR/EcochG	Demyelination, neuropathy, lesions greater 1 cm, hydrops	Provides an inexpensive non-invasive screening tool for many conditions e.g. tinnitus	Not as efficient as MRI w/contrast at identification of space occupying lesions smaller than 1 cm.	Use of VRT and balance retraining activities can be better focused on nature of loss or dysfunction	Change in EcochG May be seen during or following medical treatments e.g. hydrops

Protocols



CRAWL

video goggle and basics e.g. mCTSIB



WALK

add VNG, BAER, ECoChG, VEMP




RUN

add Rotary Chair, vHIT, & Technologies

Protocols

	Equipment/Cost	Revenue/Patient	Time	Annual Revenue (60 patients/month)
Crawl	Video Goggle \$5,100	\$60	20 min	\$43,000
Walk	VNG/EP \$52,000	\$458	75 min	\$329,760
Run	VNG/EP/KRC \$94,000	\$575	80 min	\$414,000

Integration of Results & Reporting


Neurology Consultants of Arizona
 Patient **Test Test** Test Date **01/01/2021**
 D.O.B **02/02/1980** Physician **Shayya Luay M.D.**
 Technician - Brandon
 725 E. Shae Blvd, Suite 114, Scottsdale, AZ 85260 | P: 480-977-6844 | F: | dizzy.com

Summary of Electrophysiological Testing

X Denotes Abnormality or Positive Finding

Brainstem Auditory Evoked Potentials (AEPs)					Performed	Finding
Rarefaction click stimulus of 90dBHL was utilized with 60dBHL masking in the non-test ear.						
	Absolute Latency	Interwave	Clearly Defined	Slightly Degraded	Poor	
Right Ear				●		YES NORMAL
Left Ear				●		

Electrocochleography (ECoG)				Performed	Finding
Hydromechanical status of the cochlea. It is reported as a ratio of the Summating & Action Potentials SP:AP. Ratio greater than .5 is an abnormal indicator.					
		Right Ear	SP:AP.Ratio	YES	NORMAL
		Left Ear	SP:AP.Ratio		

Videonystagmography (VNG)					Performed	Finding
Multiple sub-tests identify peripheral and/or central VOR abnormalities. Caloric weakness of 23% or greater is abnormal.						
Oculo-Motor		Saccades	Pendular	Opto-Kinetic	YES	NORMAL
Gaze		Nystagmus Right - Left	Up - Down	Vision Yes - No	Deg./Sec.	
	X Center	●			5°	
	X Right	●			2°	YES ABNORMAL
	X Left	●			8°	
High Frequency Head Shake		Nystagmus Right - Left			Deg./Sec.	
	X Response	●				YES ABNORMAL
Modified Hallpike		Nystagmus Right - Left	Vertigo Yes - No		Deg./Sec.	
	Right					YES NORMAL
	Left					


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Positional	Nystagmus Right - Left	Up - Down	Vision Yes - No	Deg./Sec.	Performed	Finding
X Supine	●			4°		
X Head Right	●			6°		
Body Right					YES	ABNORMAL
X Head Left	●			2°		
Body Left						

Calorics	Fix.Index Yes - No	Performed	Finding	
X Unilateral Weakness Right	49%	YES	ABNORMAL	
Directional Preponderance				
	5%			
		Warm Deg./Sec.	Cold Deg./Sec.	Total
25% Right	Right	8	8	16
75% Left	Left	22	25	47
				63

Gans Sensory Organization Performance Test © (GSOP)

GSOP results indicate patterns of postural stability.

Test Results	Postural Stability	Performed	Finding
N = Normal	N	YES	ABNORMAL
S = Sway	N		
F = Fall	N		
R = Right	N		
L = Left	N		

cVemp					Performed	Finding
	Present	Reduced Amplitude	Delayed	Absent	Reduced Threshold	
Right						YES NORMAL
Left						

Rotary					Performed	Finding
	High Gain	Reduced Gain	Prolonged Time Constant	Short Time Constant		
Right Ear		X		X	YES	ABNORMAL
Left Ear						

Overall Impression : ABNORMAL

- Findings are remarkable for depressed labyrinthine reactivity in the right ear. This is evidenced by a unilaterally weak VOR response to bilateral bithermal caloric air irrigations. The corresponding pattern of gain in response to bidirectional rotational chair testing along with the pattern of postural stability in the Gans SOP, and a direction fixed left beating nystagmus observed throughout VNG testing which enhanced dynamically and suppressed with vision suggest that the patient remains uncompensated for the aforementioned vestibulopathy.
- The patient may therefore benefit from a course of vestibular rehabilitation therapy (VRT) if not medically contraindicated. Ideal VRT protocols would include gaze stabilization, adaptation, substitution, and habituation, all with the use of divided attention and executive function tasks. Given the frequency region of impairment identified by rotary chair and dynamic visual acuity testing, protocols should emphasize mid and high frequency (.5-3Hz) stimulation when initiating VOR rehabilitation intervention. This therapy can be completed with an AIB certified physical therapist, preferably in close proximity to the patient's home.

Luay Shayya, M.D.

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Patient Acquisition



Internal: Current Database



External: New Referral Sources



Other: Patient outreach, social media, dizzy.com

Patient Acquisition: Patient Database

Partner Logo

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icy sidewalks...



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experts before you fall!
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for people over age 65?

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90 Million Americans
suffer from dizziness or
vertigo every year!

Do You?



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Patient Acquisition: Educating Referral Sources

Vestibular Toxicity: Causes, Evaluation Protocols, Intervention, and Management

Richard E. Gans, Ph.D.¹ and Grant Rauterkus, Research Associate¹

ABSTRACT

The loss of vestibular function, typically bilateral, due to chemical solvents and pharmacological agents is not rare and has been investigated and reported for many years. The successful treatment of bacterial infections and sepsis with IV antibiotics and cancer-fighting drugs like cisplatin makes the decision to use these life-saving drugs less of a debate, despite their potential deleterious effect on balance and equilibrium. The purpose of this article is to provide the reader with an overview of the more common substances found in industry and medicine which may decrease or permanently alter peripheral and/or central vestibular function. A review of the literature and intervention protocols will be discussed as well as the role of the audiologist in the retraining therapy.

Osteopenia and osteoporosis in idiopathic benign positional vertigo

S.-H. Jeong, MD
S.H. Choi, MD
J.-Y. Kim, MD

ABSTRACT

Idiopathic benign positional vertigo (BPV) are mostly associated with osteoporosis with idiopathic BPV. We investigated the prevalence of anterior-posterior lumbar vertebral osteoporosis in patients with a confirmed diagnosis of idiopathic BPV without a history of previous episodes of vertigo.

Vertebral T scores were measured. The prevalence of osteoporosis was higher in patients with idiopathic BPV than in the control group. The prevalence of osteoporosis was higher in patients with idiopathic BPV than in the control group.

The aim of this study

J Neurol (2013) 260:832–838
DOI 10.1007/s00415-012-6712-2

ORIGINAL COMMUNICATION

Decreased serum vitamin D in idiopathic benign paroxysmal positional vertigo

Seong-Hae Jeong · Ji-Soo Kim · Jong Wook Shin · Sungbo Kim · Hajeong Lee · Ae Young Lee · Jae-Moon Kim · Hyunjin Jo · Junghan Song · Yuna Ghim

Received: 9 August 2012/Revised: 3 October 2012/Accepted: 5 October 2012/Published online: 25 October 2012
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Abstract Previous studies have demonstrated an association of osteopenia/osteoporosis with idiopathic benign paroxysmal positional vertigo (BPPV). The aim of this study was to investigate the prevalence of osteopenia/osteoporosis in patients with idiopathic BPPV. We investigated the prevalence of anterior-posterior lumbar vertebral osteoporosis in patients with a confirmed diagnosis of idiopathic BPPV without a history of previous episodes of vertigo.

Front Office Staff Education and Management



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Coding & Scheduling

TEST	CODE	TIME TO ADMINISTER	REIMBURSEMENT *(2022 MMA)
Rotary Chair	92546	3-5 minutes (Step Rotation)	\$118.00
VNG	92540/92547	15 minutes	\$107.00
Calorics	92537/92538	12-20 minutes (mono/bithermal)	\$20.00 mono \$40.00 bithermal
ABR (neurodiagnostic)	92653	10 minutes	\$84.00
EcOG	92584	10 minutes	\$110.00
VEMP	92517/92518/92519	15 minutes	\$103 (C&O)
CDP	92548/92549	10-20 minutes	\$48-60
Gans SOP	97750	4 minutes	Variable
Visual Acuity (DVA or CDVAT)	No current code	3 minutes	None
Audiology	92557/92550/92588	15 minutes	\$90

Billing & Coding

2022 Medicare Fee Schedule

CPT Code	Medicare Maximum Allowable (MMA)
92540	\$107.07
92538	\$22.09
92537	\$39.74
92546	\$117.82
92547	\$9.75
92653	\$83.45
92584	\$110.15
92517	\$66.20
92518	\$62.42
92519	\$102.86

Financials

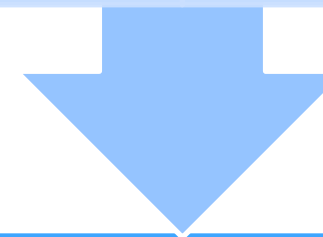
DIAGNOSTICS

Avg. ENT uses ICD-10 80 x per month - dizziness e.g. R42

If only 60 patients are tested each month =

720 patients per year

= \$414,000



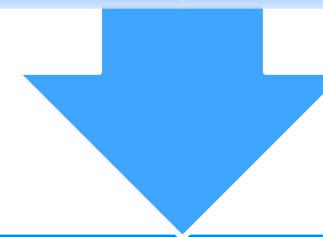
HEARING AIDS

30% of 720 = 216

30% of 216 = 65

65 x \$2,500 avg profit

= \$162,500



Annual *Gross Revenue per Physician*

Diagnostics = \$428,400

HA Profit = \$162,500

= \$ 576,500

Revenue

Revenue projections can be calculated based on Medicare rates and number of patients tested

# Patients p/month	Dx Annual Revenue*	HA Annual Revenue**	GROSS ANNUAL REVENUE
12	\$82,800	\$32,400	\$115,200
40	\$276,000	\$108,000	\$384,000
60	\$414,000	\$162,500	\$576,500
80	\$552,000	\$216,000	\$768,000

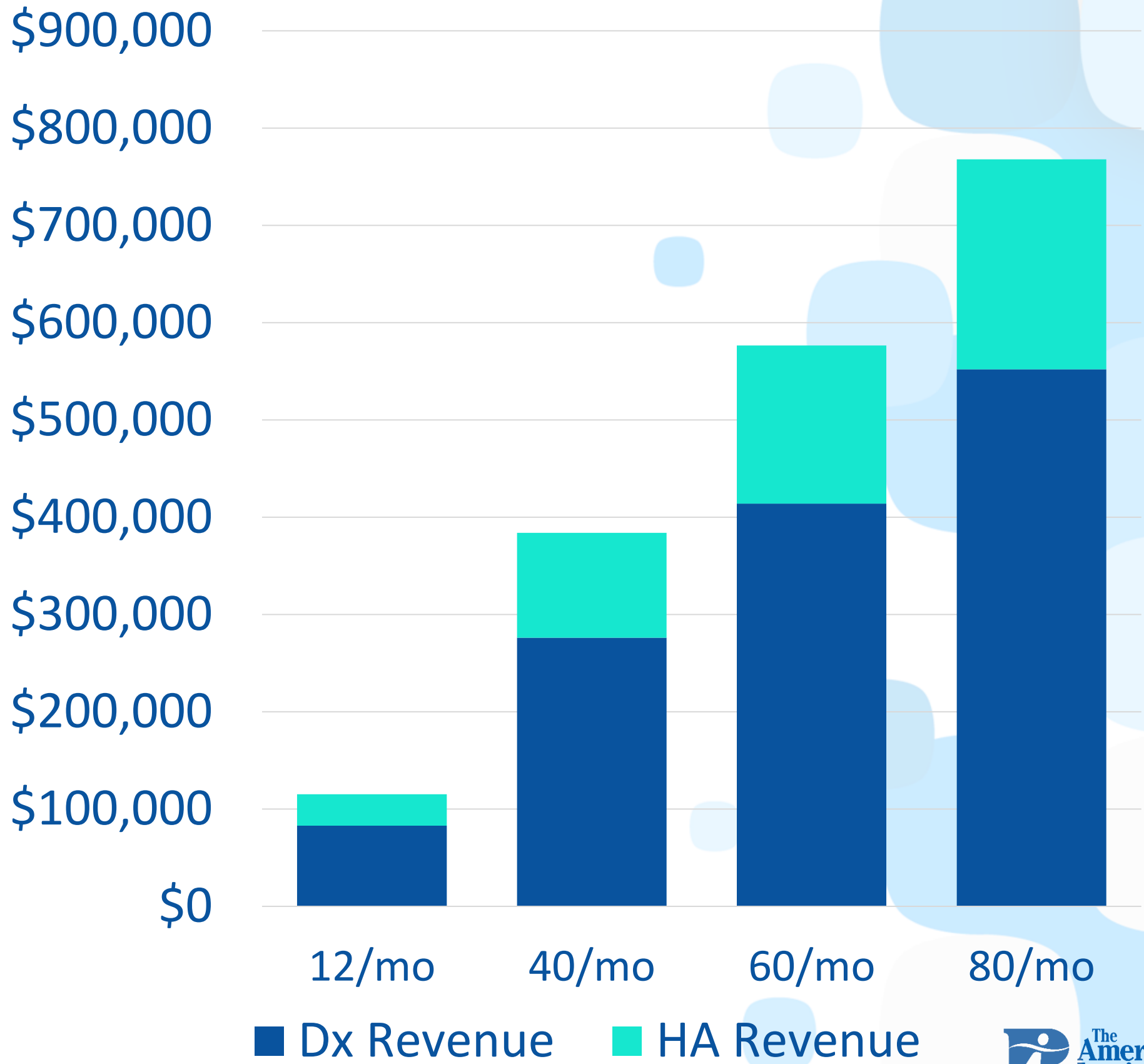
Assumptions:

*Dx Revenue = \$575 per patient

**HA Revenue = 09% (30% of 30%) of total patients @ \$2,500 profit

What is Possible?

Revenue for Dx & HA by Patients Per Month, Annualized



Implementation & Execution



Benefits of Neurodiagnostic Services

✓ Diversify portfolio of services and expand offerings to customer base of patients and referral sources

✓ Elevate your practice and brand within the scope of the medical community

✓ Insulate your practice from competition and add revenue sources which will produce regardless of HA market volatility

✓ Do well by doing good! Produce excellent outcomes helping an underserved population while also generating significant revenue

Thank You



Center of Specialty Care

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