Neurorehabilitation Practice Updates: Translating CPG's into Practice

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Speakers

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Session Objectives

By the end of this course, the learner will be able to:

1. Describe the purpose and action statements in the CPGs: Vestibular Hypofunction, Concussion, and Locomotor Training.
2. Differentiate guidelines and research recommendations in the three CPG's.
3. Analyze case examples for each of the three CPGs to further clinical decision making for clinical practice.

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CPG's-Clinical Practice Guidelines

A clinical practice guideline is a statement that uses current best evidence to assist with the diagnosis and management of specific conditions. The goal is to help clinicians know who, what, how, and when to treat. This helps your doctor know when to recommend therapy and allows clinicians to stay consistent with treatment.

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Creation of a CPG

LEVEL OF EVIDENCE	
I	Evidence obtained from high-quality (≥50% critical appraisal score) diagnostic studies, prospective studies, or randomized controlled trials
II	Evidence obtained from lesser-quality (<50% critical appraisal score) diagnostic studies, prospective studies, or randomized controlled trials
III	Case-controlled studies or retrospective studies
IV	Case study or case series
V	Expert opinion
Based on information from the Centre for Evidence Based Medicine. Website: http//www.cebm.net/oxford-centre-evidence-based-medicine-levels-evidence-march-2009/	

GRADES OF RECOMMENDATIONS		
GRADE	RECOMMENDATION	STRENGTH OF RECOMMENDATION
A	Strong Evidence	A preponderance of level I and/or level II studies supports the recommendation. This must include at leas 1 level I study.
B	Moderate Evidence	A single high-quality randomized controlled trial or a preponderance of level II evidence supports the recommendation.
C	Weak Evidence	A single level II study or a preponderance of level III and IV studies supports the recommendation.
D	Expert Opinion	Best practice based on the clinical experience of the guideline development team and guided by the evidence, which may be conflicting. Where higher quality studies disagree with respect to their conclusions, it may be possible to come to agreement on certain aspects of intervention (eg variation in treatment/diagnostic test, population, or setting that may account for conflict).

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Vestibular Rehabilitation for Peripheral Vestibular Hypofunction: An Evidence-Based Clinical Practice Guideline

www.neuropt.org

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CPG-Peripheral Vestibular Hypofunction

- Peripheral vestibular hypofunction
- Vestibular rehabilitation

VESTIBULAR REHABILITATION SPECIAL INTEREST GROUP

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CPG-Peripheral Vestibular Hypofunction

- All things *treatment*
- Decision to treat

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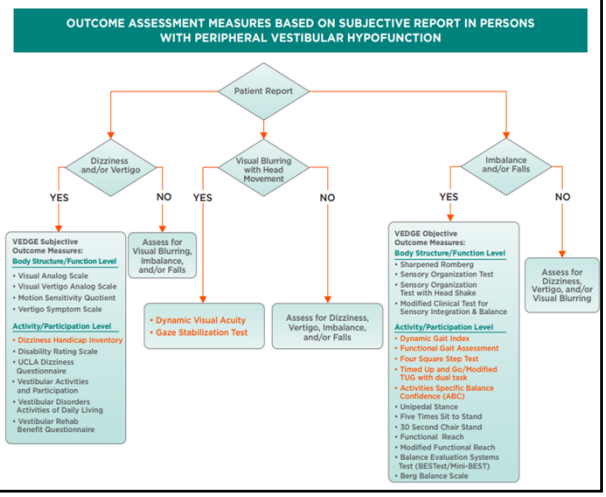
CPG-Peripheral Vestibular Hypofunction

- Outcome assessment measures based on subjective report in persons with peripheral vestibular hypofunction



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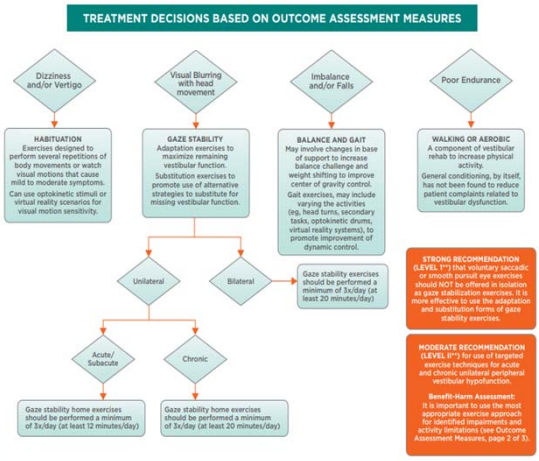
CPG-Peripheral Vestibular Hypofunction

- Treatment Decisions Based on Outcome Measure Assessment Measures



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CPG-Peripheral Vestibular Hypofunction

- Other ANPT resources
  - CPG Resource Toolbox

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Summary of Action Statements

- A. Action Statement 1: EFFECTIVENESS OF VESTIBULAR REHABILITATION IN PERSONS WITH ACUTE AND SUBACUTE UNILATERAL VESTIBULAR HYPOFUNCTION
- A. Action Statement 2: EFFECTIVENESS OF VESTIBULAR REHABILITATION IN PERSONS WITH CHRONIC UNILATERAL VESTIBULAR HYPOFUNCTION.
- A. Action Statement 3: EFFECTIVENESS OF VESTIBULAR REHABILITATION IN PERSONS WITH BILATERAL VESTIBULAR HYPOFUNCTION

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SUMMARY OF ACTION STATEMENTS

Therapeutic Intervention for Persons With Peripheral Vestibular Hypofunction

A. Action Statement 1: EFFECTIVENESS OF VESTIBULAR REHABILITATION IN PERSONS WITH ACUTE AND SUBACUTE UNILATERAL VESTIBULAR HYPOFUNCTION. Clinicians should offer vestibular rehabilitation to patients with acute or subacute unilateral vestibular hypofunction. (Evidence quality: 1; recommendation strength: strong)

A. Action Statement 2: EFFECTIVENESS OF VESTIBULAR REHABILITATION IN PERSONS WITH CHRONIC UNILATERAL VESTIBULAR HYPOFUNCTION. Clinicians should offer unilateral vestibular rehabilitation to patients with chronic unilateral vestibular hypofunction. (Evidence quality: 1; recommendation strength: strong)

A. Action Statement 3: EFFECTIVENESS OF VESTIBULAR REHABILITATION IN PERSONS WITH BILATERAL VESTIBULAR HYPOFUNCTION. Clinicians should offer vestibular rehabilitation to patients with bilateral vestibular hypofunction. (Evidence quality: 1; recommendation strength: strong)

A. Action Statement 4: EFFECTIVENESS OF SACCADIC OR SMOOTH-PURSUIT EXERCISES IN PERSONS WITH PERIPHERAL VESTIBULAR HYPOFUNCTION (UNILATERAL OR BILATERAL). Clinicians should offer saccadic or smooth-pursuit exercises in isolation (i.e., without head movement) as specific exercises for gaze stability to patients with unilateral or bilateral vestibular hypofunction. (Evidence quality: 1; recommendation strength: strong)

B. Action Statement 5: EFFECTIVENESS OF DIFFERENT TYPES OF EXERCISES IN PERSONS WITH ACUTE OR CHRONIC UNILATERAL VESTIBULAR HYPOFUNCTION. Clinicians may provide targeted exercise techniques to accomplish specific goals appropriate to address identified impairments and functional limitations. (Evidence quality: II; recommendation strength: moderate)

B. Action Statement 6: EFFECTIVENESS OF SUPERVISED VESTIBULAR REHABILITATION. Clinicians may offer supervised vestibular rehabilitation to patients with unilateral or bilateral peripheral vestibular hypofunction. (Evidence quality: I-III; recommendation strength: moderate)

B. Action Statement 7: OPTIMAL EXERCISE DOSE OF TREATMENT IN PEOPLE WITH PERIPHERAL VESTIBULAR HYPOFUNCTION (UNILATERAL OR BILATERAL). Clinicians may provide a home exercise program of gaze stability exercises consisting of a minimum of 3 times per day for a total of at least 12 minutes per day for patients with acute/subacute vestibular hypofunction and at least 20 minutes per day for patients with chronic vestibular hypofunction. (Evidence quality: V; recommendation strength: expert opinion)

B. Action Statement 8: DECISION RULES FOR STOPPING VESTIBULAR REHABILITATION IN PERSONS WITH PERIPHERAL VESTIBULAR HYPOFUNCTION (UNILATERAL AND BILATERAL). Clinicians may stop vestibular rehabilitation for resolution of symptoms, or plateau in progress as reasons for stopping rehabilitation. (Evidence quality: V; recommendation strength: expert opinion)

C. Action Statement 9: FACTORS THAT MODIFY REHABILITATION OUTCOMES. Clinicians may evaluate factors that could modify rehabilitation outcomes. (Evidence quality: I-III; recommendation strength: weak to strong)

A. Action Statement 10: THE HARM/BENEFIT RATIO FOR VESTIBULAR REHABILITATION IN TERMS OF QUALITY OF LIFE/PSYCHOLOGICAL STRESS. Clinicians should offer vestibular rehabilitation for persons with peripheral vestibular hypofunction. (Evidence quality: I-III; recommendation strength: strong)

These guidelines were issued in 2016 on the basis of the scientific literature published between January 1985 and February 2015. These guidelines will be considered for review in 2020, or sooner if new evidence becomes available. Any updates to the guidelines in the interim period will be posted on the Neurology Section of the APTA website: www.neurept.org.

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- D. Action Statement 7: OPTIMAL EXERCISE DOSE OF TREATMENT IN PEOPLE WITH PERIPHERAL VESTIBULAR HYPOFUNCTION (UNILATERAL AND BILATERAL).

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CPG-Peripheral Vestibular Hypofunction

- Clinical Case Example-Application
  - Case description
    - Britt is a 54-year-old male
    - Referred to OP PT with a diagnosis of "vestibulopathy;" evaluate and treat
    - Lives in a 2-story home with his family
    - Works as a Manager for a mechanical engineering corporation
    - 5 months ago, woke up not feeling well and work up with vertigo that progressed throughout the day; + nausea and vomiting and went to urgent care because of the increased concern and was told to rest and take Meclizine.
    - Vertigo symptoms decreased over the following 2 days. Returned to work @ his at home office
    - He continues to describe vertigo symptoms especially late in the day and when doing increased activities that involved ADL's and IADL's that involved quick head and neck movements.
    - Followed-up with PCP because he felt like his balance was "off" during his attempt to golf
    - PCP referred for PT-vestibular rehabilitation

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CPG-Peripheral Vestibular Hypofunction

- Clinical Case Example-Application
  - Examination
    - Dizziness Handicap Inventory score = 48
    - Dynamic Gait Index = 18 (fall risk)
    - Activities-Specific Balance Confidence questionnaire = 50%
    - mCTSIB = abnormal with eyes closed standing on foal
    - Visual Analog Scale (head movement) = 0-10 (best-worst dizziness rating) = 3-4/10
    - Dynamic Visual Acuity Test = normal results
  - ***Based on the CPG, <u>would</u> Britt benefit from vestibular rehabilitation?***

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CPG-Peripheral Vestibular Hypofunction

- Clinical Case Example-Application
  - ***Using the CPG, Britt's symptoms could be classified into <u>what</u>* phase *of vestibular hypofunction?***
  - ***Using the CPG, <u>how often</u> does the evidence support intervention?***

General guide for those without significant comorbidities Number of sessions based on 1x/week	
Acute and Subacute unilateral	2-3
Chronic unilateral	4-6
Acute or Chronic bilateral	8-12

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CPG-Peripheral Vestibular Hypofunction

- Clinical Case Example-Application
  - ***Using the CPG, what are the recommendations for intervention?***
  - ***Britt's has complaints with increased screen time and especially when attempting to play even 9 holes of golf? Which exercise is the most appropriate?***
  - ***As the PT you encourage specific exercises when Britt walks/runs on the treadmill in his home. You would like him to walk/run with head turns while focusing on an object in his home gym. This activity has Britt working on which vestibular rehabilitation goals?***

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CPG-Peripheral Vestibular Hypofunction

- Clinical Case Example-Application
  - ***Overall, what is a consideration with this case that may have a negative impact on Britt's recovery?***
  - ***Considering a utilization of resources, when should PT be concluded?***

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Physical Therapy Evaluation and Treatment After Concussion/Mild Traumatic Brain Injury Clinical Practice Guideline

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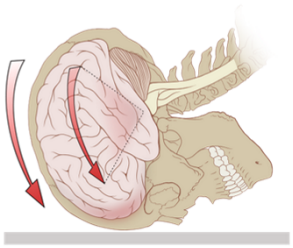
CPG – Concussion

- For our purposes, concussion is synonymous with a mild traumatic brain injury
- Symptoms related to concussion often vary, leading to misdiagnosis or improper care
- Various mechanisms result in a concussion
- Examination and symptom monitoring are key



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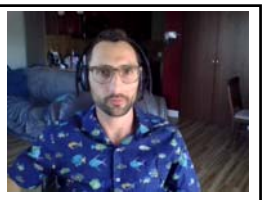
CPG – Concussion



- Numerous factors may impact recovery from a concussive event
  - Pre-injury
  - Injury-related
  - Post-injury
- Exacerbation of symptoms is common

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CPG – Concussion

- Priority 1: screen for emergent conditions or treatment

Sidebar 1
Indicators for immediate emergency medical evaluation
- Declining level or loss of consciousness, cognition, or orientation (Glasgow Coma Scale score of less than 13)
- New onset of pupillary asymmetry, seizures, repeated vomiting, or other focal neurologic signs
- Severe or rapidly worsening headache or neurologic deficits
- Signs/symptoms indicating undiagnosed skull fracture
- Serious cervical spine fracture, dysfunction, or pathology (eg, vertebrobasilar artery insufficiency, cervical ligamentous instability, signs of central cord compression)

- Assess for related musculoskeletal impairments and conditions

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CPG – Concussion

- What happened?
- How did it happen?
- Treatment or medication to this point?
- Initial symptoms, changes in symptoms, current symptoms?

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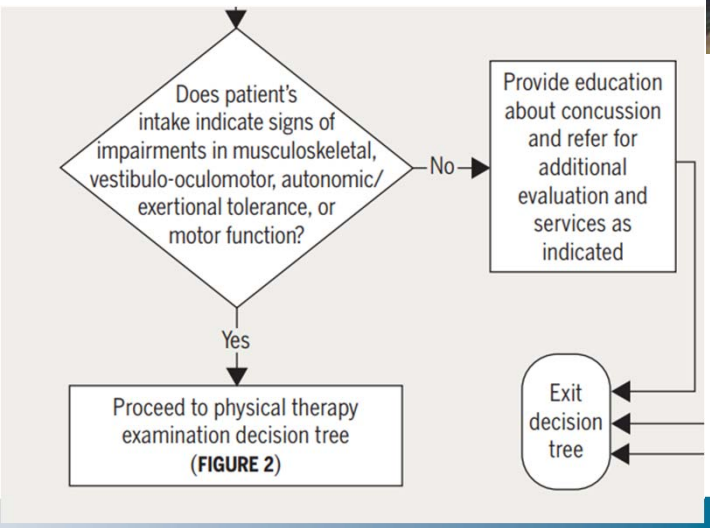
CPG – Concussion



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CPG – Concussion

- Recommended Examination
  - Neurological
    - Cranial nerve exam
    - Sensory processing
    - Cognition
    - Motor control and coordination
    - Vestibular
  - Cardiovascular
  - Musculoskeletal

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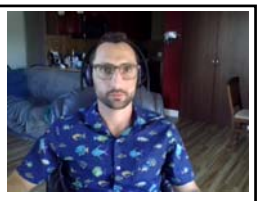
CPG – Concussion – Case Discussion



- 16 y/o male high school football player who plays as a wide receiver and safety
- Reports that he hit helmet-to-helmet with another player in a game, but does not remember much more of that game and was removed from play
- He has had frequent headaches and a sensation of fogginess since the incident
- Followed up with his PCP and was held from any return to play after performing below baseline on his ImPACT test in his reaction time and processing speed
- It has been 3 weeks and he has not made it past phase 1 of his return to play protocol with persistent symptoms at rest
- He is now referred to you for evaluation and treatment as appropriate

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CPG – Concussion – Case Discussion

- 16 y/o male high school football player who plays as a wide receiver and safety
- Reports that he hit **helmet-to-helmet** with another player in a game, but **does not remember much more of that game and was removed from play**
- He has had frequent **headaches** and a sensation of **fogginess** since the incident
- Followed up with his PCP and was held from any return to play after performing **below baseline on his ImPACT test in his reaction time and processing speed**
- It has been 3 weeks and he **has not made it past phase 1** of his return to play protocol with **persistent symptoms at rest**
- He is now referred to you for evaluation and treatment as appropriate

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CPG – Concussion – Case Discussion

- Paperwork
  - Post-Concussion Symptom Scale
  - Health History
    - Concussion-specific
    - Medications
    - Imaging

Concussion-Specific History
ADHD
Dyslexia
Autism
Sleep Disorders
Learning Disabilities
Migraines
Depression
Substance Abuse
History of Concussion

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CPG – Concussion – Case Discussion

- Standard & Cervical Exam
  - Neuro Screen/Exam
  - AROM
  - MMT
  - Upper cervical instability testing
  - Segmental cervical mobility
  - Deep neck flexor endurance
  - Joint position error sense
- Additional Exam
  - Vestibular and ocular exam
  - Balance Error Scoring System (B.E.S.S.)
  - Exertion testing
  - Dynamic visual acuity
  - Head impulse

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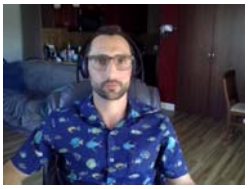
CPG – Concussion – Exertional Testing



- Buffalo Concussion Treadmill Test
  - Assesses tolerance to activity
  - Provides guidance on ranges to perform exercise
  - Establishes progress toward recovery

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CPG – Concussion – Exertional Testing

- Buffalo Concussion Treadmill Test - Materials
  - Heart rate monitor
  - RPE scale
  - VAS
  - Treadmill with an incline
  - Form to document treadmill settings, HR, etc.

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CPG – Concussion – Exertional Testing

Buffalo Concussion Treadmill Test Assessment Form

Patient: _____ Date: _____ Starting Speed: _____mph

Min	HR	RPE	VAS scale	Symptom reports	Observations
REST		NA			
0					
1					
2					
3					
4					

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CPG – Concussion – Exertional Testing

Early Test Termination
Increase in VAS by 3 points from baseline
RPE > 17
Patient reaches 90% of age-predicted HR max
Examiner notes patient difficulties or symptom exacerbation
Patient requests to terminate test

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CLINICAL PRACTICE GUIDELINE
PHYSICAL THERAPY EVALUTION AND TREATMENT
AFTER CONCUSSION/MILD TRAUMATIC BRAIN INJURY

ACADEMY OF NEUROLOGIC PHYSICAL THERAPY

SCREENING AND DIAGNOSIS

DIAGNOSIS

Physical therapist **must screen** all individuals and document the presence of absence of symptoms, impairments, and functional

DIFFERENTIAL DIAGNOSIS

Physical therapist **must evaluate** for potential signs and symptoms of an undiagnosed concussion. Evaluation should include

CLINICAL PRACTICE GUIDELINE
PHYSICAL THERAPY EVALUTION AND TREATMENT
AFTER CONCUSSION/MILD TRAUMATIC BRAIN INJURY

ACADEMY OF NEUROLOGIC PHYSICAL THERAPY

INTERVENTIONS

COMMUNICATION AND EDUCATION

Physical therapists **must educate** patients and their families/caregivers about the various symptoms, impairments, and functional limitations that are associated with concussion, and stress

VESTIBULO-OCULOMOTOR

Physical therapists **should use** canalith repositioning interventions.

- **Level of Evidence: A**

CLINICAL PRACTICE GUIDELINE
PHYSICAL THERAPY EVALUTION AND TREATMENT
AFTER CONCUSSION/MILD TRAUMATIC BRAIN INJURY

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EXAMINATION

SYSTEMS TO BE EXAMINED

Physical therapists **must determine and document** a need for

IMPAIRMENTS: CERVICAL MUSCULOSKELETAL

Physical therapists **should examine** the cervical and thoracic spines

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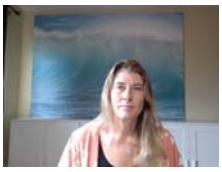

Clinical Practice Guideline to Improve Locomotor Function Following Chronic Stroke, Incomplete Spinal Cord Injury, and Brain Injury

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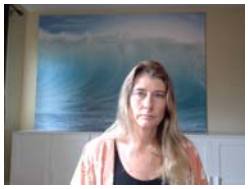
Locomotor Clinical Practice Guideline (CPG)



- Evaluate available evidence of the efficacy of various physical interventions to improve walking function of patients with a history of acute onset stroke, motor incomplete SCI, or TBI of > 6 months duration
- Core CPG Group Members
  - T. George Hornby PT, PhD
  - Darcy Reisman PT, PhD
  - Patty Scheets PT, DPT, NCS
  - Irene Ward PT, DPT, NCS
- CPG Coordinators
  - David Haddad, PT
  - Allison Miller PT, NCS
- Funding and Support: APTA Practice Committee, ANPT Board of Directors
- Librarians
  - Marita Delmonaco, MS
  - Linda O'Dwyer MS, MSLS
- Appraisal team
  - Nora Fritz PT, PhD, NCS
  - Kelly Hawkins PT, PhD, NCS
  - Christopher Henderson PT, PhD, NCS
  - Kathryn Hendron PT, PhD, NCS
  - Carey Holleran PT, DHS, NCS
  - James Lynskey PT, PhD
  - Amber Walter PT, NCS

https://journals.lww.com/jnpt/Abstract/publishahead/Clinical_Practice_Guideline_to_Improve_Locomotor.99754.aspx

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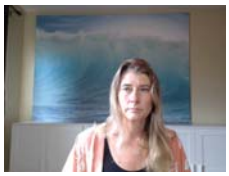
Inclusion Criteria



- Evaluate available evidence of the efficacy of various physical interventions to improve walking function of patients with a history of acute onset stroke, motor incomplete SCI, or TBI of > 6 months duration
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Target Outcomes
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- Timed distance (6-minute walk test, 2-minute walk test, 12-minute walk test)

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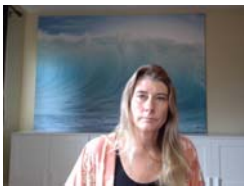

INTENSITY MATTERS

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Clinical Practice Guideline to Improve Locomotor Function

Following Chronic Stroke, Incomplete Spinal Cord Injury, and Brain Injury

Clinicians should perform:

- Walking training at moderate to high aerobic intensities (up to 85% HR max)
- Walking training with virtual reality

Clinicians may consider:

- Strength training at ≥70% 1 repetition max
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Clinicians should not perform:

- Static or dynamic balance activities including pre-gait
- Body-weight support treadmill training with emphasis on kinematics
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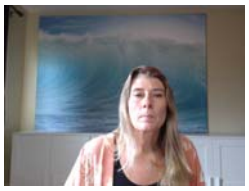
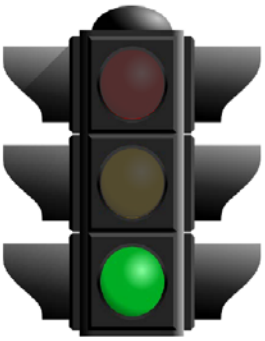


Action Statements



Clinicians should perform:

- Walking training at moderate to high aerobic intensities (up to 85% HR max)
- Walking training coupled with virtual reality

To improve walking speed and distance in individuals greater than 6 months following acute-onset CNS injury as compared with alternative interventions.

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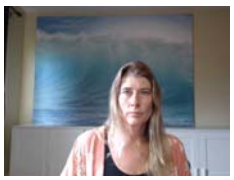

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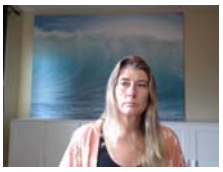

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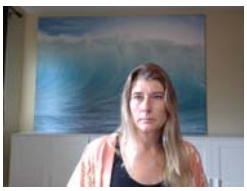

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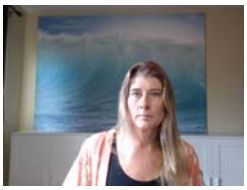

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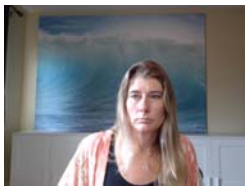

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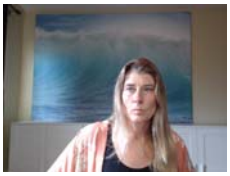
Clinical Practice Guideline to
Improve Locomotor Function
Following Chronic Stroke, Incomplete Spinal Cord Injury, and Brain Injury



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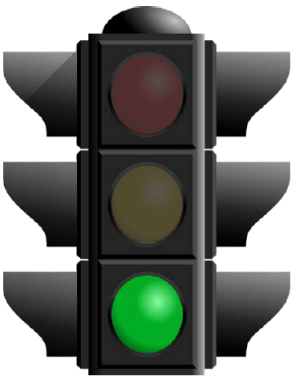

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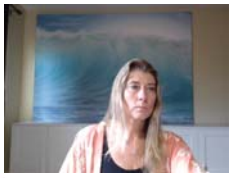
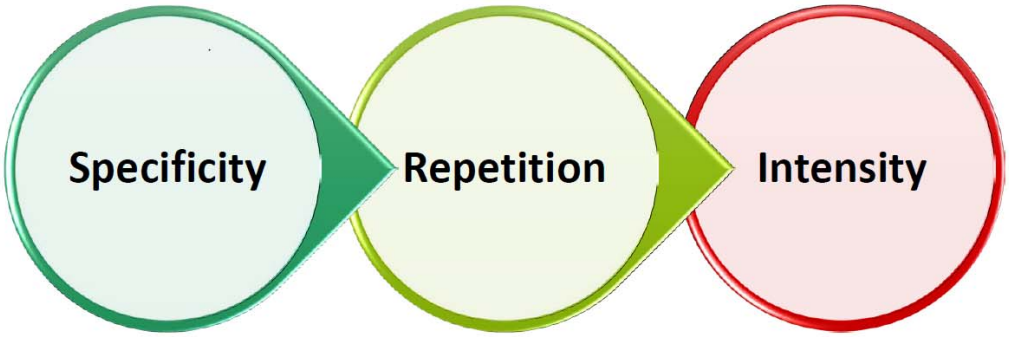


Active Ingredients: Principles of Exercise Physiology



WALK **A LOT** **HARD**

70-80% HRR OR 85% HR MAX

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CONTINUOUSLY MONITOR

Intensity

How to Take Your Pulse

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Locomotor Training: Clinician Tools & Resources

These are tools and resources to help clinicians implement high intensity gait training with patients as well as provide educational materials for patients, physicians, and other stakeholders

Tools

Heart Rate Reserve Calculator

Heart Rate Max Calculator

Heart Rate Intensity Guide

Continuous Heart Rate Monitoring Device Choices

Borg Rating Scale

Resources

APTA The Pulse: *Don't Be Afraid to Sweat*

American Stroke Association: Contributions of Stepping Intensity and Variability to Mobility in Individuals Poststroke: A Randomized Clinical Trial

PTinMotion: New APTA-Supported CPG Looks at Best Ways to Improve Walking Speed, Distance for Individuals After Stroke, Brain Injury and Incomplete SCI

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	Input Cells		
Individual Input	Resting HR	Age	Beta blockers (y/n)
	60	67	n

	HRR Range			
Heart Rate Reserve Calculation (HRR)	**60%**	**70%**	**80%**	**HR MAX (Cohnen-Solal et al)**
	121	131	141	161

INTENSITY MATTERS

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	Input Cells		
Individual Input	Resting HR	Age	Beta block
	60	67	n

	HR Max Range		
Heart Rate Maximum Calculation (HR Max)	**65%**	**75%**	**85**
	105	121	13

http://www.neuropt.org/practice-resources/locomotor/resourses

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INTENSITY MATTERS

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Improve Locomotor Function

following chronic stroke, incomplete spinal cord injury and brain injury

A key element of locomotor training is cardiovascular intensity

Remember **Intensity Matters!**

To increase awareness and translation of research into practice, the Academy of Neurologic Physical Therapy has selected a high impact area of evidence to promote in an "Intensity Matters" campaign. This is focused on promoting walking training at high cardiovascular intensities to maximize locomotor outcomes for individuals with neurologic diagnoses.

The recommended target HR range is 75-85% of HR max (or 70-80% HRR)

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Age	65%	75%	85%	HR Max
20	126	146	165	194
25	124	143	162	191
30	121	140	159	187
35	119	138	156	184
40	117	135	153	180
45	115	132	150	177
50	112	130	147	173
55	110	127	144	170
60	108	125	141	166
65	106	122	138	163
70	103	119	135	159
75	101	117	132	156
80	99	114	129	152
85	97	111		
90	94	109		

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INTENSITY MATTERS

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What if the patient is on Beta Blockers?

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Rating of perceived exertion: Borg scales continued...

HEART online

Rating of Perceived Exertion (RPE) Category Scale

6

7 Very, very light

8

9 Very light

10

11 Fairly light

12

13 Somewhat hard

14

15 Hard

16

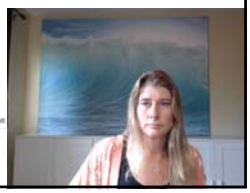
17 Very hard

18

19 Very, very hard

20

Borg G. Borg's Perceived Exertion and Pain Scales. Champaign, IL: Human Kinetics, 1998.



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Locomotor CPG Clinical Case Application

- Ellen is a 66-year-old female
- Referred to OP PT, 8 months after a R CVA with L hemiparesis
- Lives in a 1-story home with her husband. She has two adult children out of the house.
- Worked an elementary school principal, currently on medical leave of absence.
- Patient currently ambulates in her home with a quad cane with supervision assistance.
- Patient limited to short community ambulation with minimal assistance for environmental challenges using quad cane.
- Outcome Measures:
  - 10-m walk test- 0.7 m/s (limited community speed)
  - 6-minute walk test- 300ft (91m)
- ***Based on the Locomotor CPG, <u>what type</u> of intervention would be most appropriate to improve Ellen's ability to walk?***

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Locomotor CPG Clinical Case Application

- ***Does the Locomotor CPG inform us on Ellen's plan of care?***

Inclusion Criteria
- Stroke, motor incomplete SCI, or TBI
- >6 months duration
- Individuals who could walk

Target Outcomes
- Walking speed (10-m walk test)
- Timed distance (6-minute walk test, 2-minute walk test, 12-minute walk test)

- ***Based on the Locomotor CPG, <u>what type</u> of intervention would be most appropriate to improve Ellen's ability to walk?***

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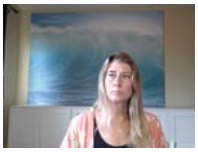

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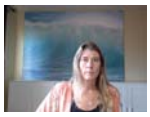

Locomotor CPG Clinical Case Application

- ***What tools or resources might be needed to implement the recommended interventions for Ellen?***

The recommended target HR range is 75-85% of HR max (or 70-80% HRR)

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30	121	140	159	187
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85	97	111	126	149
90	94	109	123	145

Visit www.neuropt.org/practice-resources/Locomotor

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Ellen's Resting HR = 60bpm

She is not on Beta Blockers.

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Individual Input	Input Cells		
	Resting HR	Age	Beta blockers (y/n)
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Heart Rate Reserve Calculation (HRR)	HRR Range			HR MAX (Cohnen-Solal et al)
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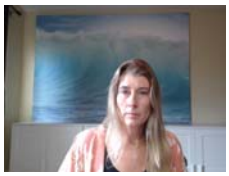

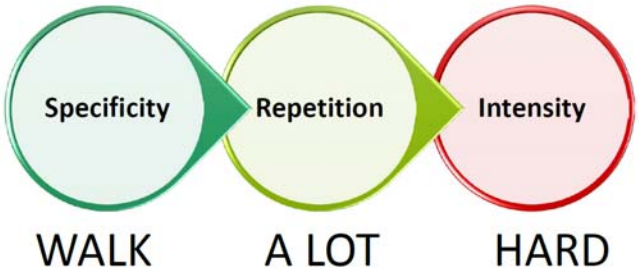

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ANPT Locomotor Training Knowledge Translation Task Force

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Carey Holleran (Co-Chair)
Washington University in St. Louis

Lisa Goodwin (Co-Chair)
University of Vermont Medical Center

Meredith Banhos
TIRR Memorial Hermann

Maghan Bretz
St. Vincent Evansville

Estelle Gallo
Rusk Rehabilitation

Allison Miller
University of Delaware

Sue Peters
University of British Columbia

Lauren Szot
Texas Women's University

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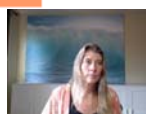

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- AOPT Clinical Practice Guidelines: https://www.orthopt.org/content/practice/clinical-practice-guidelines
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  - Locomotor Training Knowledge Translation Task Force

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