THE COURSE WILL BEGIN SHORTLY

1

Interactive Metronome: Focused Review and Practice for Rehabilitation of Adults

Refresh your skills with Interactive Metronome (IM) in order to most effectively address cognitive, communicative, motor abilities in the patients you serve.

Presented by Dara Weger, M.S., CCC-SLP
dweger@interactivemetronome.com

Version 3.17.22

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Dara Weger, M.S., CCC-SLP

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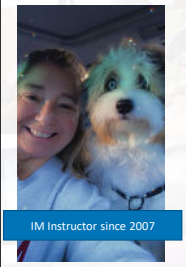

IM Instructor since 2007

- Undergraduate & Masters degree from the University of Central Arkansas & a Certificate of Clinical Competence issued by the American Speech-Language-Hearing Association
- Employed at Novant Health Rehabilitation Hospital, an affiliate of Encompass Health
- Serves as the National Program Champion for Interactive Metronome within Encompass Health Corporation, previously HealthSouth Rehabilitation
- Contributed to the development of the IMC Virtual Certification Course for Encompass Health, Adult Best Practice Certification Course, Fall Prevention Protocol and numerous adult-oriented webinars.
- Extensive expertise & experience in the field of neurological disorders, with IM and other modalities, successfully integrating it into practice by modifying it to individually meet patient's needs.

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Virtual Course Agenda

Pre-course homework (1 Hour Optional)

*Today's course agenda (8 total hours *1.5 hours for breaks= 7 contact hours):*

15 min	Course Begins: Technology Test
15 min	Meet and Greet
1 hour	IM Fundamentals, Candidacy, IM Assessments
15 min	Break
1.75 hours	IM Treatment in this Setting: Phases 1 and 2 (Lab)
30 min	Lunch Break
1.5 hours	IM Treatment in this Setting: Phases 3 and 4 (Lab)
15 min	Break
15 min	Documentation and Billing
1.5 Hours	Case Examples and Fall Risk Reduction (Lab)
30 min	Closing Thoughts, Q&A and Post-Test

Today you are with me (YAY) a total of 8 hours, which includes an hour and 30 minutes of break time.

Your course CEUs will be 7.0 Contact Hours. The 1-hour Pre-Coursework is optional

THANK YOU for investing 9+ hours of your time to learn about IM! We are confident that we can help your patients achieve the outcomes your clinic aims to achieve.

4

IM Demo

VIDEO

Encompass Health Videos

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Why Interactive Metronome®?

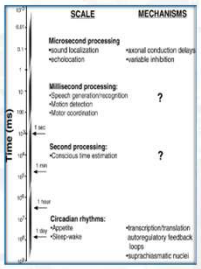
Improve	Build	Increase
Improve neural timing & decrease neural timing variability (jitter) that impacts speech, language, cognitive, motor, & academic performance	Build more efficient & synchronized connections between neural networks	Increase the brain's efficiency & performance and ability to benefit more from other rehabilitation & academic interventions

6

The Science Behind IM

7

Timing in the Brain



Neural network synchronization …

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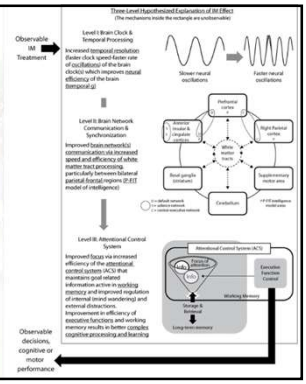
The IM Effect

1. IM increases the speed & synchronization of neural oscillations … improving neural efficiency
2. IM increases the speed & efficiency of white matter tract processing resulting in increased brain network communication … particularly between parietal & frontal regions
3. IM increases the efficiency of the attentional control system, working memory & executive functions for better focus, more complex cognitive processing, language & learning, fine and gross motor coordination, balance.

Increased synchronization → → → Increased efficiency and speed of communication along white matter tracts → → → Improvement in cognitive, sensory & motor skills



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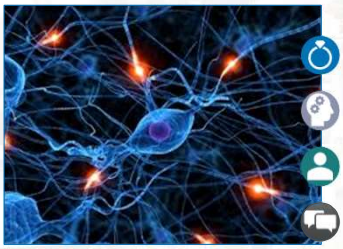
Interactive Metronome & Neuroplasticity



- Engagement
- Repetitions
- Synchronization
- Feedback

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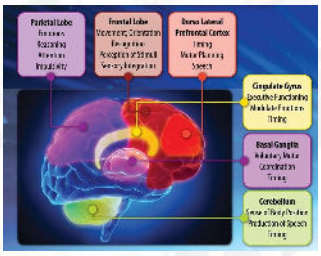
Neurotiming® Timing is neurological!

IM Neuro-Imaging Study

Presented at 65th Annual American PM&R Conference

Alpiner (2004). Results from this pilot fMRI study show IM directly promotes neural efficiency, with bilateral activation of multiple parts of the neuro-network. *Repetitive auditory-motor training, specifically IM, holds promise for neuroplasticity of higher and lower brain centers.*

The human brain's efficiency and performance depends upon the seamless transition of neuronal network signals from one area of the brain to another.



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Who Benefits from IM?

- Stroke & Other Neurological Impairments
- Concussion
- Traumatic Brain Injury
- ADHD
- Craniotomy (brain aneurysm, tumor…)
- Chemo Brain
- Prosthetic Limb
- Multiple Sclerosis
- Parkinson's
- General Debilitation
- Fall Risk Reduction
- Healthy Aging
- Sports Performance/ Enhancement
- Executive Function Disorder
- Auditory Processing Disorder

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CANDIDACY FOR IM TREATMENT
Occupational Therapy

- Fine motor difficulties
- Flexibility
- Positioning for functional skills
- Self-care skills
- Coordination
- Sensory integration/sensory processing disorders
- Visual motor skills
- Visual perceptual skills
- Mobility and transfer needs
- Integration of adaptive equipment (ie walkers, canes, prosthetics etc)

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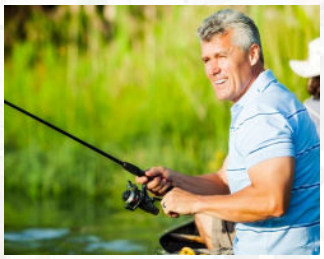
CANDIDACY FOR IM TREATMENT
Physical Therapy

- Balance
- Coordination
- Endurance
- Flexibility
- Gross motor function
- Mobility and motor function
- Ambulation
- Pain
- Posture
- Strength



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CANDIDACY FOR IM TREATMENT
Speech Therapy

- Difficulty focusing attention & concentrating
- Difficulty remembering or learning new information
- Poor judgment (eg. Taking unnecessary risks)
- Difficulty in problem solving
- Difficulty getting tasks started
- Difficulty expressing simple and/or complex ideas
- Difficulty in participating in conversation
- Difficulty comprehending speech (following directions, yes/no questions, etc)
- Difficulty reading, writing, or doing calculations

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How Does Rhythmn Affect Gait and Parkinson's Disease?

Visit our YouTube Channel for More Best Practice Videos: **YouTube.com/IMetronome**

VIDEO

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Seizure Precautions

There are no documented cases of IM contributing to seizures in epileptics, but it is possible if seizures are not medically controlled.

Stress, fatigue, & stimuli that are auditory, visual, vestibular, &/or rhythmical can elicit seizures in individuals with epilepsy.

Avoid known triggers if using IM with an individual who has epilepsy and proceed only with physician's approval.

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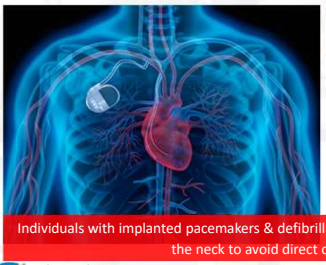
Implanted Pacemaker & Defibrillator Precautions



When worn on the head, **headphones do not pose a health risk** to individuals with implanted pacemakers & defibrillators. All headphones (wired and wireless) contain a magnetic substance called neodymium for the purpose of sound reproduction which may cause electromagnetic interference with these implanted devices **if the headphones are placed within 3 centimeters of the surface of the chest**. Keeping the headphones at least 3 centimeters away from the surface of chest is considered safe, at which point experts say there is *no longer any electromagnetic interference.*

Individuals with implanted pacemakers & defibrillators should avoid draping headphones around the neck to avoid direct contact with the chest.

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IM 10.0 New Software Release!!

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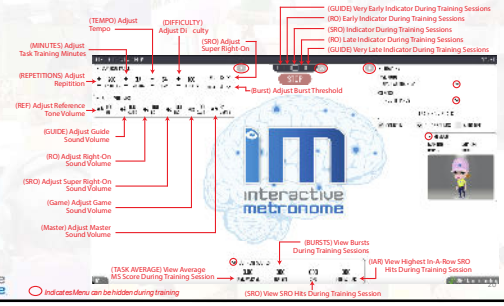
IM 10.0 Software FEATURES

Participate as your instructor guides you through the software...

*View IM Program Features Appendix Page A-10



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Lab 1 - Start a New File

Select:
- FILE
- NEW
- THIS COMPUTER

Enter NEW USER Information

Choose: SAVE in the IMProData File

You will be brought back to the main IM Training Screen.

To confirm you created a file. Verify that your Member Information has populated.

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IM Scoring & Auditory Visual Feedback

Lower millisecond scores are better!

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What do all those numbers mean?

- Millisecond per trigger hits:
  1. 53 ms
  2. 9 ms
  3. 112 ms
  4. 13 ms
  5. 6 ms
  6. 9 ms
  7. 12 ms
  8. 72 ms
  9. 84 ms
  10. 63 ms
- Task Average
  - Total sum of milliseconds
    - 433 ms
  - Divided by total number of repetitions
    - 433 Divided by 10
    - 43.3 MS Task Average
- Highest in a Row
  - Consecutive
  - Perfect (0-15 ms)
  - Highest IAR = 4
- Burst
  - 4 Perfects In a Row Equals one Burst
  - 1 Burst
- SRO Percent
  - Overall percentage of perfection
  - 50% SRO

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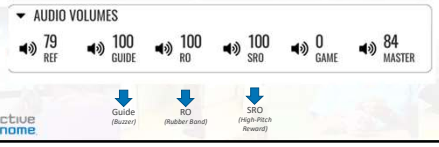
Volume Settings



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Being Prepared

- Environmental Considerations
- Size of Room
- External Distraction (Auditory/Visual)
- Seating Options
- Lighting Options
- Auditory Input Options
- Adaptive Equipment
  - Balance
  - Hearing
  - Vision

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Baseline Data Collection

Select from 3 IM assessments to measure timing:

1. SHORT FORM TEST
2. LONG FORM ASSESSMENT
3. ATTEND OVER TIME

ALSO perform objective & functional pre-post assessment:

- Cognitive
- Speech-language
- Social/behavioral
- Sensory
- Visual-motor
- Praxis
- Academic achievement
- Etc…

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Determining Which Assessment to Perform

Short vs Long Form Assessment Considerations

- What are the physical, cognitive and/or medical circumstances that my patient presents with?
- What are my goals for treatment?
- How well and for how long can my patient attend to a task?
- What discipline will be responsible for performing the Short or Long Form Assessment?

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Benefits of Short vs Long Form Assessment

Long Form Assessment

- Long Form Assessment includes the Short form Assessment.
- Long Form Assessment requires the patient to exhibit more sustained attention.
- Long Form Assessment allows for a more in depth look at motor planning and timing as it relates to upper and lower extremities, right vs. left sided task, balance and bilateral integration.

Short Form Assessment

- Short Form Assessment gives a quick, cursory view of the patient's basic motor and timing skills.
- Short Form Assessment may be more appropriate for low-level patient's or those patients that need bedside assessments.
- Short Form Assessment requires 5-10 minutes to perform.

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How Often Should I Perform the Short and Long Form Assessments

- Time considerations
- Goal writing and updating plan of care
- Treatment planning
- Change in status

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IM Assessment Modifications

- Skip IM assessment & go directly to total hands-on IM
- Seated or assist for balance
- Skip certain tasks if unable to complete
- Rest breaks
- Complete over more than one session
- Speakers
- Placement/type of headphones
- Alternative triggers/switches
- Decrease volume
- Visual mode (only if hearing loss)

RECORD MODIFICATIONS FOR LATER COMPARISON

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Observations About Timing

Way too early or too fast → Impulsive? Driven by impaired sensory processing

Way too late or too slow → Slow processing? Impaired motor coordination?

Randomly (or dissociated from the beat altogether) → Cognitive impairment?

In straight, linear fashion rather than circular, rhythmical with hands → Dyspraxia?

Opposite from the beat → Didn't understand directions? Cognitive impairment?

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IM Assessment
Behavioral Observations

- **Follows instructions?** Needs simplification? modeling?
- **Easily distracted?** Needs minimally distracting environment for treatment initially?
- **Poor balance?** Needs to be seated for IM exercises initially to help focus on timing rather than maintaining balance?
- **Sensory processing concerns?** Accommodations needed?
- **Lacks coordination? Linear movement with hands?** Needs to work with just ref tone at just right tempo and high reps to resolve before feedback is introduced?
- **Motivated?** Needs positive reinforcement/reward for effort?

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LAB 2: Complete SFT

HOW TO ADMINISTER

- As a screening or brief assessment
- As a warm-up or quick assessment at start or end of IM training sessions
- Do not allow patient to practice before
- Do not allow patient to look at computer screen
- Upon completion, compare Task Average (MS) to Indicator Table for patient's age
- If repeat SFT, also compare to previous SFT scores

LAB

- Select Short Form Test
- Complete it
- Write down your scores
- Compare your scores to Indicator Table (see Appendix)

Appendix Reading for Later…

IM is Measuring and Changing Something Real and Important

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Patient Instructions for SFT

SF Task 1 (Both Hands):

- You are going to hear a metronome beat through these headphones ***(show headphones)…***
- You will have a trigger strapped to the palm of your hand ***(place glove & trigger on dominant hand)…***
- As soon as you hear the metronome beat, start clapping your hands together like this right on the beat ***(say "bing" and model clapping right on the beat)…***
- Keep clapping on every beat until you no longer hear the beat.

SF Task 2 (Both Hands with Guide Sounds)

- This time, you will hear the same metronome beat and some other sounds that are called Guide Sounds. They tell you whether you are getting closer to the beat or whether you are way off the beat…
- Focus on the metronome beat and clap right on the beat like you did last time…
- Keep clapping until you no longer hear the beat.

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SFT Reports & Data Interpretation

- SELECT
- Reports
- *For these reports to populate, you must have data from at least 2 Short Form Test administrations on 2 separate dates.*
- Short Form Test Reports
  - Short Form Test Performance Analysis
  - Short Form Test Task Average Graph
- Compares MS Task Average scores to show improvement in synchronization over time
- If score for SF Task 1 is better than SF Task 2, why would that have happened?
- What if score on SF Task 2 is better than SF Task 1? What might that indicate?

You cannot view YOUR Short Form Test Graph or comparison reports today because you only have one set of data.

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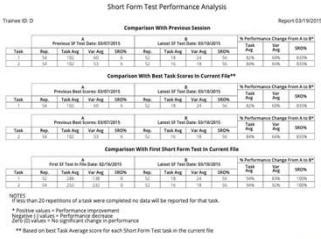
SFT Comparison Report Example

A-18
SAMPLE SFT PERFORMANCE ANALYSIS REPORT



Short Form Test Performance Analysis

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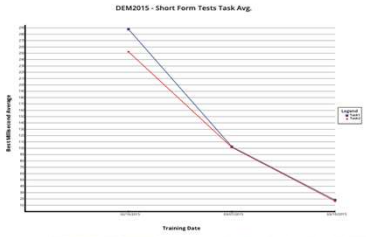
SFT Task Average Graph Example

SAMPLE SFT TASK AVERAGE GRAPH



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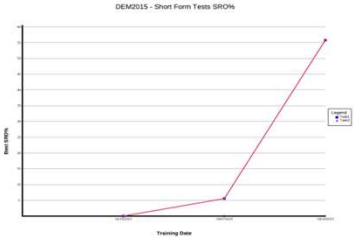
SFT SRO% Graph Example

A-19
SAMPLE SHORT FORM TEST SRO% GRAPH



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LAB 3: Complete LFA

HOW TO ADMINISTER

- Before IM training starts, at interim re-assessment, and at discharge
- Do not allow patient to practice before
- Do not allow patient to look at computer screen
- Upon completion, compare Task Average (MS) to Indicator Table for patient's age
- If repeat LFA, also compare to previous LFA scores

LAB

- Select Long Form Assessment
- Complete it
- You do not need to write down your scores

Compare your scores to Indicator Table (see Appendix)

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Patient Instructions for LFA

- As with SFT, explain that the person will hear a steady metronome beat through the headphones
- Prior to each LFA task, explain & model the correct movement
- Tasks 1-13 are WITHOUT guide sounds. Task 14 is the only one WITH guide sounds. Instructions for this task are the same as SFT Task 2.

DO NOT ALLOW YOUR PATIENT TO LOOK AT THE COMPUTER SCREEN!

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Pull Up Your LFA Report

- SELECT:
  - Reports
  - Long Form Assessment
  - LFA Calculations
- Compare Task Average score for LFA Task 1 (without guide sounds) to Task 14 (with guide sounds)
- Were lower extremity tasks harder than upper extremity tasks?
- How did the right-side tasks compare to left-side tasks?
- What does it mean if scores with dominant hand are worse than non-dominant hand?

You cannot view your Attend Over Time report today because you did not complete it – but feel free to add it to your labs today if you'd like!

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LFA Calculations Report Interpretation

- **Compare MS scores to Indicator Table** *(lower scores are better)*
- **Compare Early to Late %**
  - Balanced (close to 50-50) may indicate good rhythm
  - Predominantly Late may indicate slow cognitive processing or coordination issue
  - Predominantly Early is somewhat typical – check DATA LIST view to see if hits are EARLY or VERY EARLY. Predominantly **very early** hits may indicate impulsivity.

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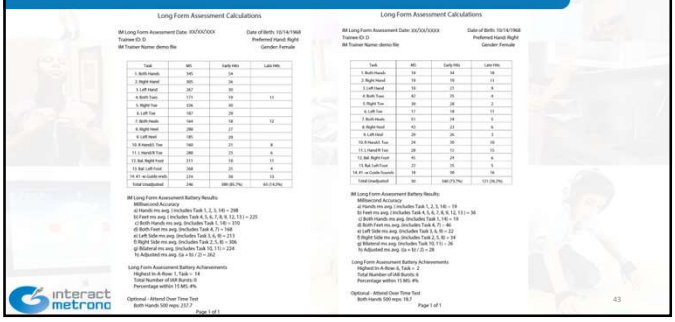
LFA Calculations Report Examples



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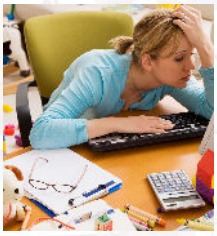
THIRD ASSESSMENT OPTION

ATTEND OVER TIME TEST



- Useful for Assessing a client's ability to self-monitor & sustain attention/concentration over longer periods of time without prompts or cues.
- Can complete test immediately following the LFA on the same day
- AOT is a 9.3-minute assessment with one task (Both Hands without Guide Sounds)
  - Does your patient lose focus during this time?
  - Does he recognize he is off track and self-correct?
- AOT scores are reported at the bottom of the LFA Report

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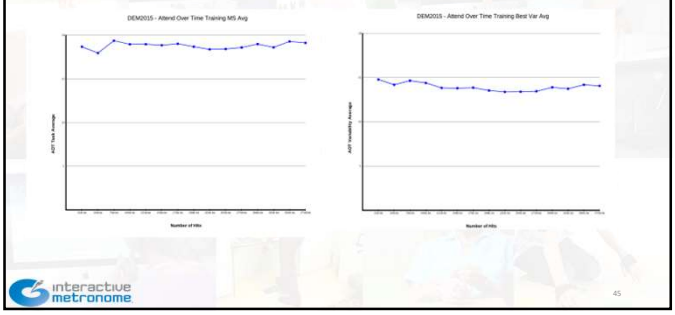
AOT Task Average and Best Var Ave Examples



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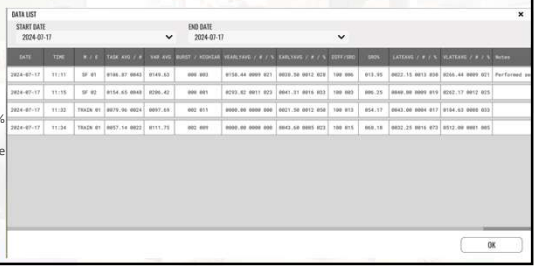
Data List View

Data List View is useful to look at **% VERY EARLY** and **% VERY LATE** as this may indicate impulsivity or processing delay

SELECT

- View
- Data List View
- Select date
- Look at your % very early and % very late *this correlates to the 'guide' buzzer sound



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Quick Review of IM Settings and Definitions

REF: Reference Tone (Cowbell)

GUIDE: Buzzer sound when you're way too early or way too late

RO: Rubber Band Twang that tells you when you're within the set difficulty range of training

SRO: Reward tone that tells you if you are within the set SRO range.

IAR: Highest number of consecutive SRO hits during a task

BURST: A setting to help motivate your patients to get SRO hits! Several bursts can be earned during each task. The more bursts achieved, the more neural synchronization is taking place!

DIFFICULTY: The setting that determines when your patient hears the "Guide" sound

TEMPO: Beats per minute or speed of the metronome (default is 54 bpm)

*View IM Settings & Definitions Appendix Page A-9

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Frequency, Intensity & Duration

- Repetition is required in order to make lasting, functional changes in the brain.
- Performing a little IM here and there or for a short period of time will not lead to functional neurological change.
- Aim for 2-3x/week with an average of 30 minutes of active IM treatment per session. This can be broken into smaller time intervals with more frequency. This can also include group time.
- Interdisciplinary functional group activities in an inpatient setting can add a layer of treatment needed to exceed previously expected outcomes. Recognizing the average short length of stay requires therapist to maximize treatment time to increase opportunities for repetition and task practice.

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IM Treatment Overview

Phases 1-2	Learn IM Ref Tone & Auditory/Visual Guides with Hand Exercises
Phases 3-4	Use Auditory/Visual Guides to Improve Timing & Rhythm with Hands first, then with Foot & Bilateral Exercises

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IM Treatment: Phase 1

LEARN REFERENCE TONE

- Goal: Understand concept of clapping & tapping on the beat. Ok to be hitting too early or too late. But should not be opposite or random.
- Scores may not improve much until feedback for timing is introduced in Phase 2.

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IM Treatment: Phase 1

- Reference tone ONLY
- Guide sounds turned OFF
- Hand exercises only **(Both Hands, Right Hand, Left Hand)**
- 1-3 minutes per exercise; repeat same exercises over length of session to facilitate mastery
- Encourage rhythmical, circular hand movement

30 min of IM treatment per session
(approx. 1400-1600 reps)
per session as tolerate

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Using IM Data to Find the "Just Right" Setting

- Early vs late hits: Is the patient anticipating or responding?
- Tempo: Does the patient respond in a more accurate way if the speed of the reference tone is fast? slow?
- Volume: Does the patient seem to be able to tolerate the level of volume?
- Visual vs. auditory: Does the patient appear to need to tune out visual distractors?

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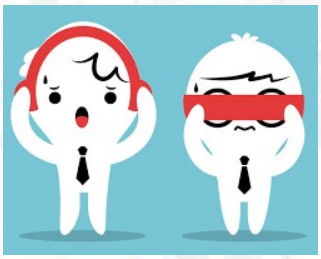
Using IM Data to Find the "Just Right" Setting

- Auditory vs. Visual
  - Does a visual cue facilitate attention or does it serve to distract the patient?
  - Are they having difficulty tuning out external/environmental distractions?
  - Are they processing information in a timely manner?
  - Did they need to close their eyes during baseline data collection?



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Using IM Data to Find the "Just Right" Setting

- Tempo Changes
  - Are they attempting to match the beat
  - Are they ahead of the beat
  - Are they behind the beat
  - Are they dissociative

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Using IM Data to Find the "Just Right" Setting

- Volume settings
  - Are they having a difficult time identifying the reference tone due to hearing deficits?
  - Do they wear hearing aids?
  - Are they hypersensitive to the sound?

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Tips to Improve Timing

- Some individuals will demonstrate impaired motor planning & sequencing.
  - Linear rather than circular movements with both hands, right hand, and left hand on LFA even though instructed to use circular movements
  - Trouble sequencing both toes, both heels, and/or bilateral tasks on LFA
- To help this person in Phase 1:
  - Avoid verbal cues. Do not look at computer screen.
  - Decrease tempo (48-52 bpm) to find just right pace
  - High repetitions at just right tempo (5-10 min per ex as tolerated)
  - Hand over hand assist (your timing must be good)
  - Simultaneous visual model (you clap too while he watches and copies you)

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Tips to Improve Timing

- Use of the Training Visuals* may be necessary for some individuals in Phase 1 if they …
  - Have trouble paying attention to the ref tone
  - Are impulsive
  - Are hitting opposite of beat instead of on it
  - Are hitting randomly, very fast, or very slow – totally out of sync with the ref tone
  - Have severe unilateral hearing impairment and can't hear ref tone and guide sounds in one ear

*TRAINING VISUALS ARE CONTRAINDICATED WHEN MOTOR PLANNING & SEQUENCING IS IMPAIRED AS FEEDBACK FOR MOVEMENT IS NOT HELPFUL AND CAN INTERFERE WITH PERFORMANCE.

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Tips to Improve Timing

- If using Training Visuals* in Phase 1, you may need to adjust Difficulty & SRO settings (because you are introducing feedback for timing)
  - Adjust Difficulty setting to make easier
    - Default is 100ms
    - Increase to give more room for error (up to 300 ms)
  - Adjust SRO setting to make easier
    - Default is 15ms
    - Increase to give more room to achieve SRO (green) hits (up to 60ms)

*THE GOAL OF INTRODUCING VISUAL CUES IN PHASE 1 IS TO IMPROVE ABILITY TO ATTEND TO & PROCESS THE REF TONE SO THEY LEARN THE CONCEPT OF TRYING TO SYNCHRONIZE WITH IT.

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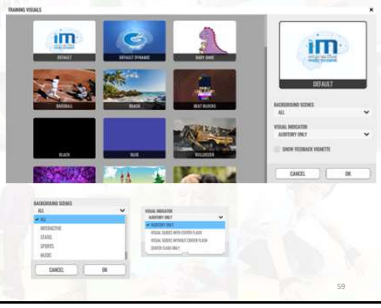
Training Visual Settings

- **TRAINING VISUALS:** access the Visual Guides at the bottom of the training box
- **BACKGROUND SCENES:** sets the screen type:
  - Static (one picture)
  - Interactive (Games)
- **VISUAL INDICATOR:** sets the feedback – choose between four types of feedback:
  - Auditory Only
  - Visual Guides With Center Flash
  - Visual Guides Without Center Flash
  - Center Flash Only



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INSTRUCTOR DEMONSTRATION: Visual Training Options

60

60

Helping the Person with Hemiplegia

- Learn ref tone with intact hand first – then progress to affected hand with tempo adjustment and self-assist or hands-on assist from provider
- Work on bringing affected hand to midline when clapping during Both Hands exercise
- Gravity-assisted movement

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Left Hemiparesis

VIDEO

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Use of adaptive equipment for hemiparesis

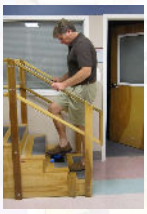
VIDEO

63

POSITIONING...

Balance Ball

Stairs



Wheelchair

Gait Belt

64

TRIGGER LOGISTICS...

Therapist wears trigger

and couples patient's hand...

65

What Matters Most?

- Difficulty, SRO & Burst settings may not matter in Phase 1 because they are not looking at the computer screen or worried about scores at this point.
- Feedback (whether thru guide sounds or training visuals) may not be helpful for a person with impaired motor planning & sequencing.
- The goal of introducing visual cues in Phase 1 is to improve their ability to attend to and process the reference tone so they can attempt to synchronize with it.
- Focus on functional, integrated motor movement related to the sensory input.
- Ability to sustain attention for 1-2 minutes.

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Phase 1 Examples …

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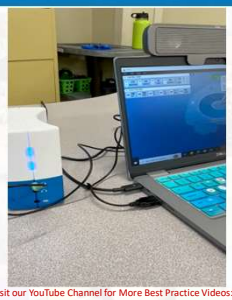
Total Hands-On Assist May Be Necessary for Some…

- If working with a more impaired individual address upper and lower extremities in Phase 1 (Exercises 1-10).
- Adjust approach, positioning and trigger placement as needed (i.e., provider may wear trigger instead of patient)
- Don't worry about your patient's MS scores as they will not reflect his/her performance when you are doing hand over hand…evaluate progress via observations and other assessments (i.e., changes observed in behavior, communication, motor and/or sensory processing skills)
- Look for opportunities to hand over the reigns a little and let your patient complete IM exercises with less and less assistance as appropriate.

68

68

More Phase 1 Examples …



VIDEO

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More Phase 1 Examples …

VIDEO

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Group Initiative

- IM Group Kit
  - Inclusions - Large gloves (6), MCU with 100 IM hours, Mini USB, Wireless Button Trigger (6), External Speakers

VIDEO

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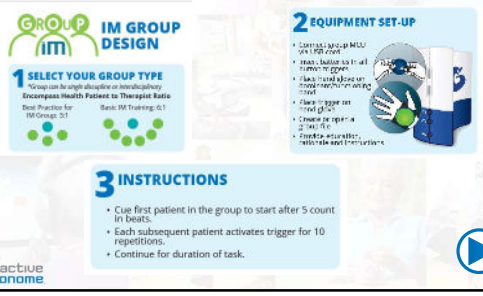
Group Initiative



VIDEO

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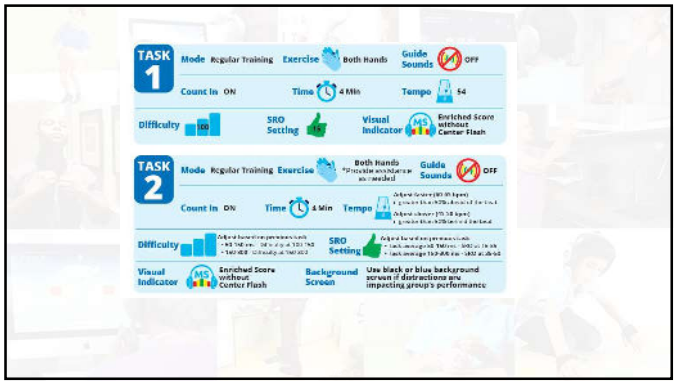

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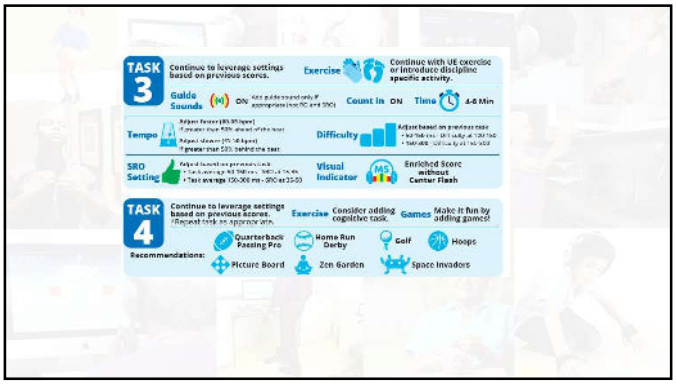

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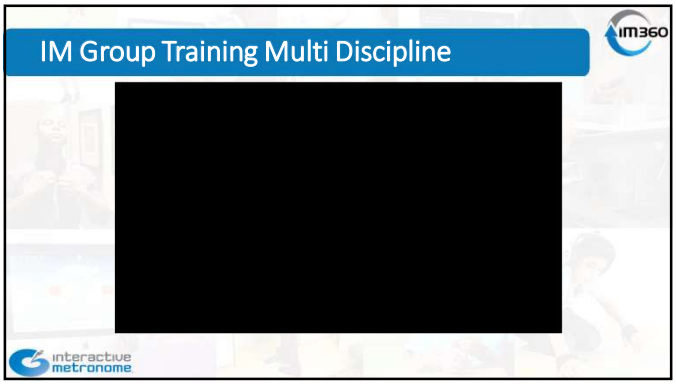

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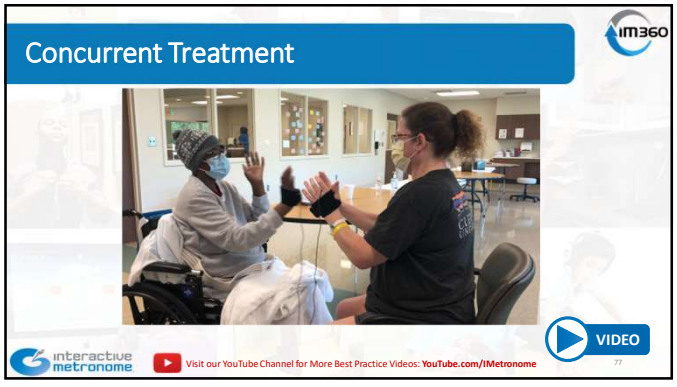

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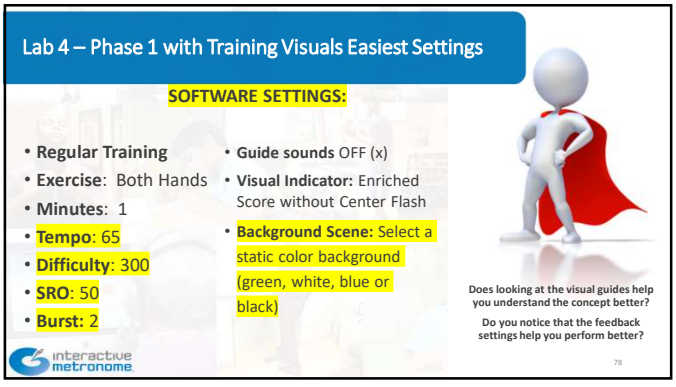

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Lab 5 - Phase 1 with Training Visuals Slow Tempo

SOFTWARE SETTINGS:

- **Regular Training**
- **Exercise:** Right Hand
- **Minutes:** 1.5
- **Tempo:** 45
- **Difficulty:** 300
- **SRO:** 50
- **Burst:** 2 (easiest)
- **Guide sounds:** OFF (x)
- **Visual Indicator:** Enriched Score without Center Flash
- **Background Scene:** Select a static background (Kittens, Beach, Baseball etc.)

Is the slower tempo easier or harder for you?

Do the Visual guides help or hurt your performance"

79

79

Lab 6 - Phase 1 with Training Visuals Fast Tempo

SOFTWARE SETTINGS:

- **Regular Training**
- **Exercise:** Left Hand
- **Minutes:** 1.5
- **Tempo:** 70
- **Difficulty:** 200
- **SRO:** 35
- **Burst:** 5
- **Guide sounds** OFF (x)
- **Visual Indicator:** Enriched Score with Center Flash – OR – Center Flash only
- **Background Scene:** Select a static background (Kittens, Beach, Baseball etc.)

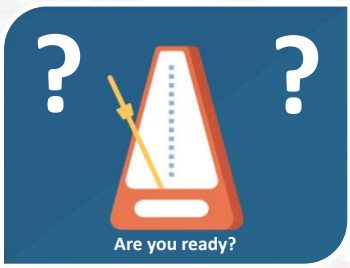
Is the faster tempo easier or harder for you?

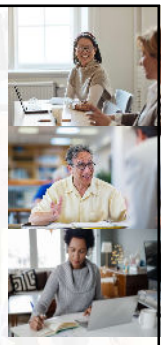
Do the Visual Guides help or hurt your performance?

80

80

POP QUIZ!





81

81

1. Performing a Long Form Assessment is appropriate for every patient.

a. Sure, why not? All patients are the same in the eyes of the IRF-PAI

b. Absolutely not! That's crazy!

82

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2. IM is useful for:

a. Improving neural timing

b. Building efficient connections between neural networks

c. Increasing the brain's efficiency

d. Filling that treatment hour so I can move on to the next victim!

e. Everything but d.

83

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3. Which of the modifications are allowed when collecting baseline data?

a. Balance Assistance

b. Blindfolding and spinning the patient 5 times before beginning.

c. Skipping tasks

d. a and c

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4. IM games can be helpful when:

a. learning the feedback/auditory guide sounds
b. Increasing time on task
c. Motivating patient
d. Enhancing training
e. All of the above

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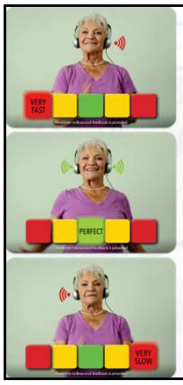

IM Training: Phase 2

LEARN GUIDE SOUNDS

- Goal: Learn to process the guide sounds and respond to them.
- Demonstrate emerging improvement in timing & rhythm with hand exercises as MS Task Average scores begin to improve.
- Adjust IM settings & go with those that facilitate best performance
  - Difficulty
  - SRO
  - Auditory only or with Training Visuals
- Cue as needed (verbal, hands-on)

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Explanation of Guide Sounds

A buzzer in the LEFT ear means you are WAY too early.
A buzzer in the RIGHT ear means you are WAY too late.

A rubber band bong sound in the LEFT ear means you close to the beat but are a LITTLE too early.
A rubber band bong sound in the RIGHT ear means you are close to the beat but are LITTLE too late.

A high pitch reward tone in BOTH EARS occurs when you are right exactly on the beat.

Your goal is to hear the high pitch reward tone in both ears as much as possible.

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Adjusting Difficulty Level

DIFFICULTY RELATES TO THE YELLOW ZONE

DIFF 100 challenging

101+	16 – 100	0 – 15	16 – 100	101+

DIFF 200 easier

201+	16 – 200	0 – 15	16 – 200	201+

DIFF 300 easiest

301+	16 – 300	0 – 15	16 – 300	301+

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Recommended Difficulty Settings

Patient's MS Average	*Suggested* Difficulty Setting
More than 300 ms	300 (easiest setting)
200 ms.....add 100 to range	300
150 ms.....add 100 to range	250
100 ms.....add 50 to range	150
50 ms.....add 50 to range	100
Less than 25 ms	Auto (most challenging)

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Adjusting SRO Level

SRO RELATES TO THE GREEN ZONE

SRO 15 challenging

101+	16 – 100	0 – 15	16 – 100	101+

SRO 30 easier

201+	30 – 200	0 – 30	30 – 200	201+

SRO 50 easiest

301+	50 – 300	0 – 50	50 – 300	301+

90

Recommended SRO Settings

Patient's MS Average	*Suggested* SRO Setting
More than 300 ms	50 (easiest setting)
Between 200 ms and 300 ms	45 - 50
Between 150 ms and 200 ms	30 - 45
Between100 ms and 150 ms	25 - 35
Under 100 ms	15 - 25
Less than 25 ms	10 - 15

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Tips for Teaching Guide Sounds

Better MS scores with guide sounds	Worse MS scores with guide sounds
DIFFICULTY → Keep at default 100	DIFFICULTY → Increase to easier setting
SRO → Keep at default 15	SRO → Increase to easier setting
BURST THRESHOLD → Keep at default 4	BURST THRESHOLD → Decrease to easier setting
VOLUME → No change	VOLUME → Decrease volume of guide sounds compared to Ref Tone so Ref Tone stands out more.
TRAINING VISUALS → Optional. See if MS scores improve further when looks at computer screen vs just listening to ref tone & guide sounds.	TRAINING VISUALS → Turn on simple Training Visuals to see if they aid processing of guide sounds (choose plain or still backgrounds…avoid dynamic displays and games for now).

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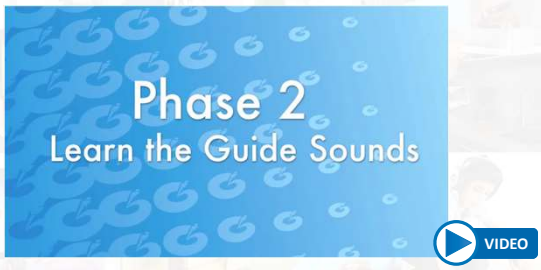
Some Phase 2 Examples …



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Lab 7 - Phase 2 with Default Settings

A sample of AUDITORY IM without adjusting to make training easier…

SELECT:

- Regular Training
- Both Hands
- 2 minutes
- Tempo 54
- Difficulty 100
- SRO 15
- Burst threshold 4
- Guide sounds ON ✓
- Visual Indicator Selection: Auditory
- Background: Default
- Complete the exercise without looking at the computer screen.

Compare Task Average (MS) to Indicator Table

What is your timing tendency?

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Lab 8 - Phase 2 with Training Visuals
Diff 100 & SRO 15

A sample of AUDITORY-VISUAL IM without adjusting to make training easier …

Guide Sound Settings
Ref: 100
Guide: 90
RO: 0
SRO 0

SELECT:

- Regular Training
- Both Hands
- 2 minutes
- Tempo 54
- Difficulty 100
- SRO 15
- Burst threshold 4
- Guide sounds ON ✓
- Visual Indicator Selection: Enriched Score without Center Flash
- Background: Select a stationary background (shown in white font)

Complete the exercise while looking at the computer screen.

Compare Task Average (MS) score to Indicator Table

What is your timing tendency?

95

Lab 9 - Phase 2 with Training Visuals
Diff 200 & SRO 30

A sample of AUDITORY-VISUAL IM training with adjustment to the easiest settings…

Guide Sound Settings
Ref: 100
Guide: 100
RO: 90
SRO: 0

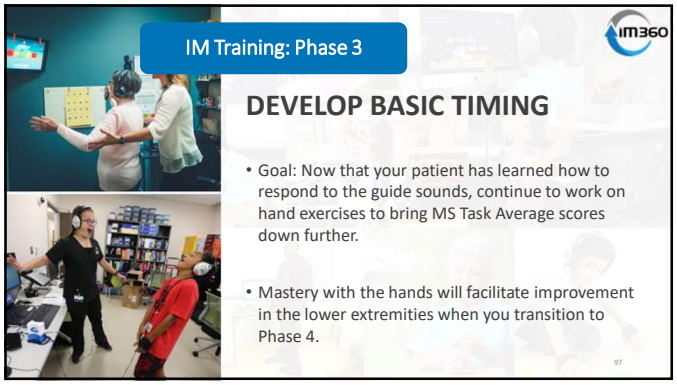
SELECT:

- Regular Training
- Both Hands
- 1 minute
- Tempo 54
- Difficulty 200
- SRO 30
- Burst threshold 3
- Guide sounds ON ✓
- Visual Indicator Selection: Enriched Score without Center Flash
- Background: Select a stationary background (shown in white font)

Complete the exercise while looking at the computer screen

Compare Task Average (MS) score to Indicator Table

96



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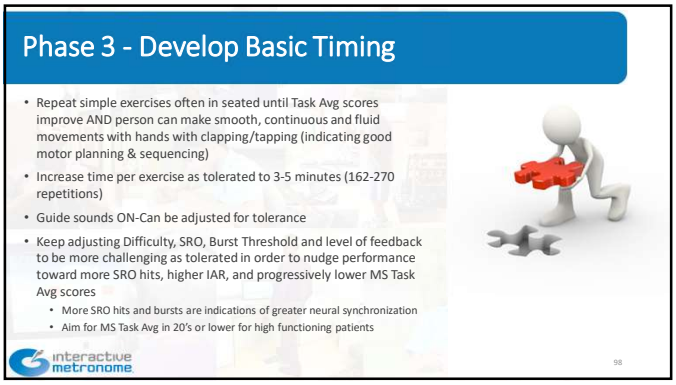

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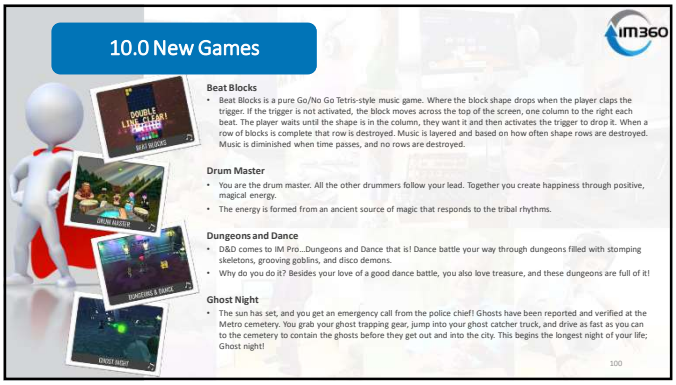

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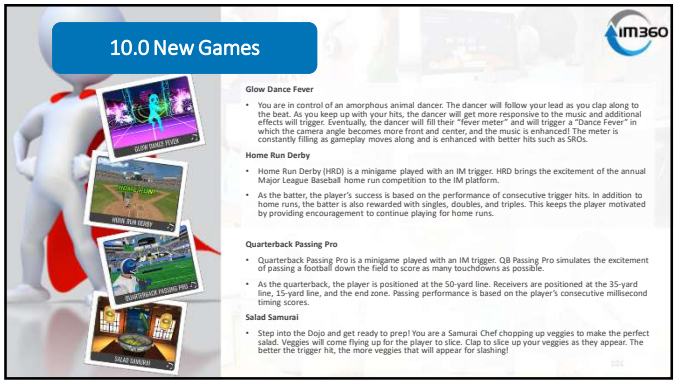

101

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Counteract Timing Tendency

If your patient is able to do this it will accelerate outcomes …

- If hitting too fast (or ahead of the beat) …purposely maintain a slightly slower pace.
- If hitting too slowly (or after the beat) … purposely maintain a slightly faster pace.

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Phase 3 – The Interesting Thing about Neuroplasticity!

104

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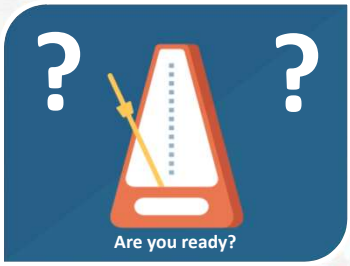
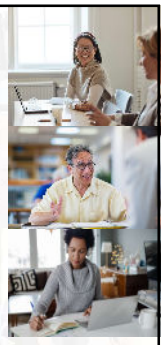
POP QUIZ!





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5. Introducing customized task helps providers target discipline specific skills.

a. True – Why wouldn't we want to target the task that are important to the patient
b. False – I prefer "cookbook" therapy! So much easier!

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6. Traditional Speech, PT, and OT services should not be provided while IM training is being administered.

a. True
b. False

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7. When determining the appropriateness of IM training for low-functioning adults with severe neurological impairments, the following parameters should be taken into consideration:

a. Stamina
b. Scheduling
c. Portability
d. Physical Limitations
e. All of the above

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Lab 10 - Phase 3 Select Your Own Settings

Based on your performance thus far, select your own software settings to facilitate even better scores …

- **Regular Training**
- **SELECT** Exercise
- **Minutes:** 2
- **SELECT** Tempo
- **SELECT** Difficulty
- **SELECT** Burst
- **SELECT** SRO
- **SELECT** Background Scene or Game
- **SELECT** Visual Indicator
- **Guide Sounds:** ON ✓

What is your performance using Games vs. Static background?

Do the Games help you stay engaged?

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Lab 11 - Phase 3 Games with Positive Reinforcement

SOFTWARE SETTINGS:

- **Regular Training**
- **Exercise:** Right Hand
- **Minutes:** 2
- **Tempo:** 60
- **Difficulty:** 200
- **SRO:** 50
- **Burst:** 4
- **SELECT** Game with Positive Reinforcement
- **SELECT** Visual Guides Without Center Flash
- **Guide sounds** ON ✓

What happens when you set feedback to the easiest settings while playing the games?

Does it help or hurt you to have visual feedback while playing the games?

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Lab 12 - Phase 3 Games with Negative Reinforcement

SOFTWARE SETTINGS:

- **Regular Training**
- **Exercise:** Left Hand
- **Minutes**: 2
- **SELECT** Tempo
- **Difficulty** 100
- **SRO** 15
- **Burst:** 3
- **SELECT** Game with Negative Reinforcement
- **SELECT** Visual Guides With Center Flash or Center Flash Only
- **Guide sounds** ON ✓

What happens when you set feedback to the default settings while playing the games?

Does it help or hurt you to have Center Flash visual feedback while playing the games?

111

111

Lab 13 - Phase 3 Create a Custom Exercise

Think of a therapeutic goal. Create a Custom IM exercise to address that goal.

SOFTWARE SETTINGS:

- **Regular Training**
- **CREATE A CUSTOM EXERCISE**
- **Minutes:** 2
- **SELECT** Tempo
- **SELECT** Difficulty
- **SELECT** SRO
- **SELECT** Burst
- **SELECT** Guide sounds ON or OFF
- **SELECT** Auditory Only or Training Visuals

Some custom goal ideas: Crossing midline, sitting on a therapy ball, standing on a dynamic surface, completing a 3-step sequence, prone or supine positioning…

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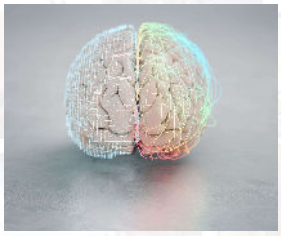
Transition to Address More Advanced Skills Phase 4 – Generalize Timing Skills



There are shared neural pathways for motor & auditory processing skills. It is vital to improve the efficacy of those shared pathways through timed, rhythmical motor output in both the upper and lower extremities, bilaterally and cognitively. Due to short length of stay and severity of the case mix index, it is necessary to utilize all processes in order to net overall neurological change.

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Speech & Language

- Continue to work on upper extremity exercises for progressively more complex & longer task
  - Increase sustained attention by increasing time on task
  - More complex IM settings as improvement is demonstrated
    - Difficulty setting
    - SRO setting 15 (default)
    - Feedback Setting
  - Introduce custom exercises after timing has improved with hands
- Begin working on exercises 4-12 to improve timing in lower extremities & bilaterally
  - Impaired timing = neural jitter (noise in the brain)
  - Timing in whole body critical for communicative-cognitive-social/emotional-sensory-motor skills

- Visual Attention
- Impulse Control
- Working Memory
- Bilateral Integration
- Sequencing
- Naming
- Word Finding
- Automatic Speech Task
- Verbal Fluency

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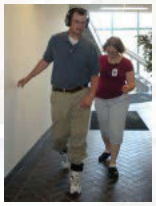
Occupational and Physical Therapy



- Hand strengthening
- Balance while carrying an object
- Postural stability
- Shoulder girdle stability
- Reaching
- Shoulder range of motion
- Trunk rotation
- Overhead reach
- Weighted upper extremity for increased proprioception

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Physical Therapy Activities

- Lateral weight shifting
- Dorsiflexion
- Plantar Flexion
- Pre-gait
- Stair climbing
- Motor Planning
- Weight shifting
- Weight bearing
- Balance
- Quad Strengthening
- Mid-range control
- Balance displacement

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Considerations When Grading the Task

- Postural Challenge
- Extremity Challenge
- Cognitive/Linguistic Challenge
- Software Challenges

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Postural Challenges

- Seating surfaces
  - Transition to Plinth
  - Balance ball
  - Peanut ball
- Adding balance challenges
  - Balance disc
  - Foam
  - Bosu
  - Base of support changes

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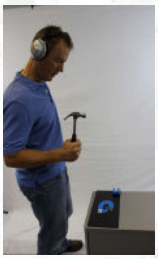
Extremity Challenges

- Crossing midline
- Adding weights
- Reaching
- Long Arc Quad



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Cognitive/Linguistic Challenges

- Confrontational Naming
- Automatic Speech Task
- Delayed Recall
- Basic Calculations
- Alphabetizing

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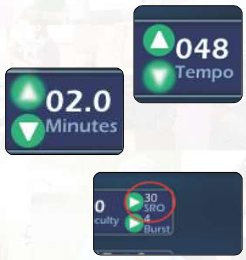
Software Challenges

Prepare to Adjust:

- Tempo
- Duration and Repetitions
- Type and Amount of Feedback
- Difficulty and SRO Settings
- Volume Levels (Including Game Background Volumes)



*View IM Program Features Appendix Page A-10

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Treatment

- Weight bearing on foot trigger (sitting and standing)
- Adapted Side hit: Wrist
- Shoulder Shrug
- Synergy Hit
- Elbow Hit
- Table Slide
- Lower Extremity Weight Shift
- Balance With Affected Side Stomp
- Functional Reach

VIDEO

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Use of Adaptive Equipment

VIDEO

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Treatment Ideas for Parkinson's

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Balance & Gait

The only true way to practice walking is to walk…

The smooth transition between phases of the gait cycle is an integrated activity that is difficult to learn through practice of individual parts.

- **Goals for gait training with IM in-motion trigger:**
  - improve biomechanics
  - alter gait speed
  - increase stride length…

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Treatment with In-Motion Trigger

IM for Gait Training with In-Motion Triggers

VIDEO

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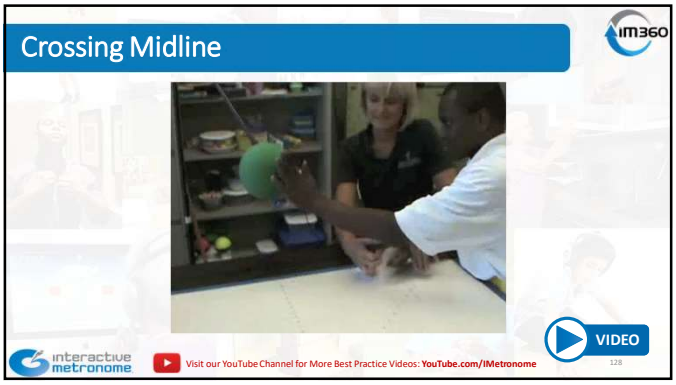

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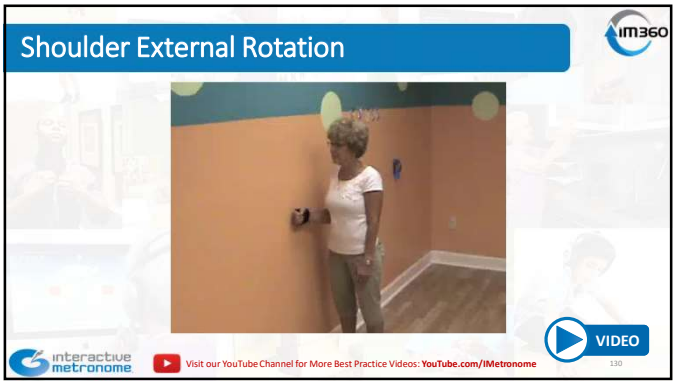

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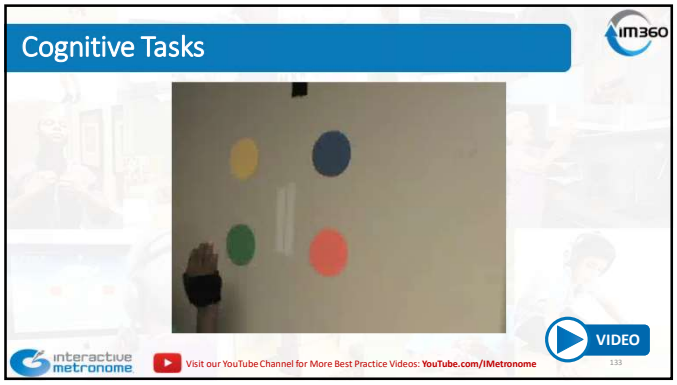

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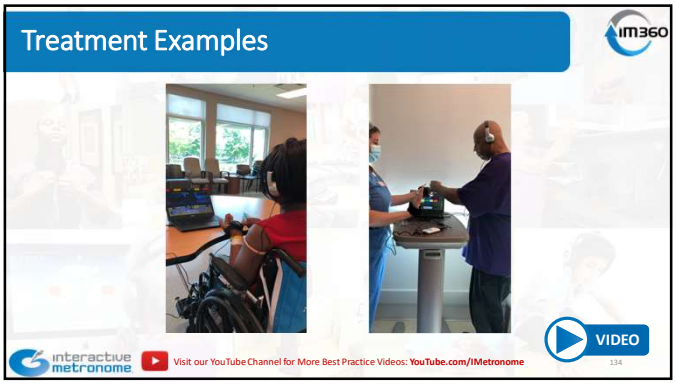

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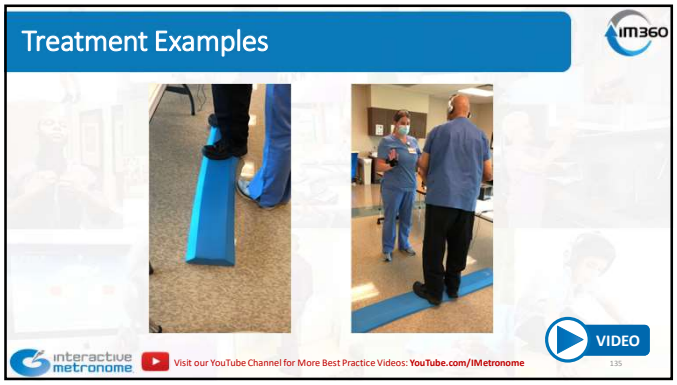

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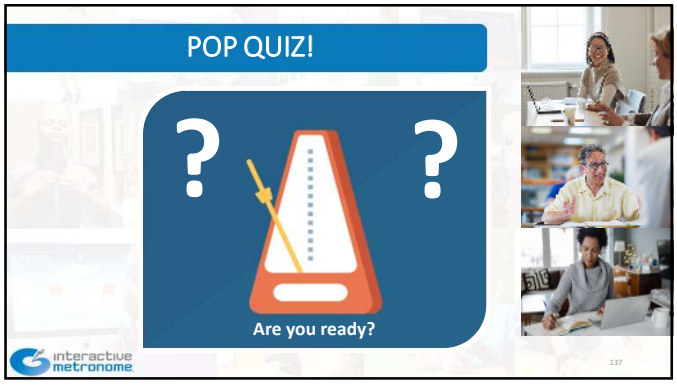

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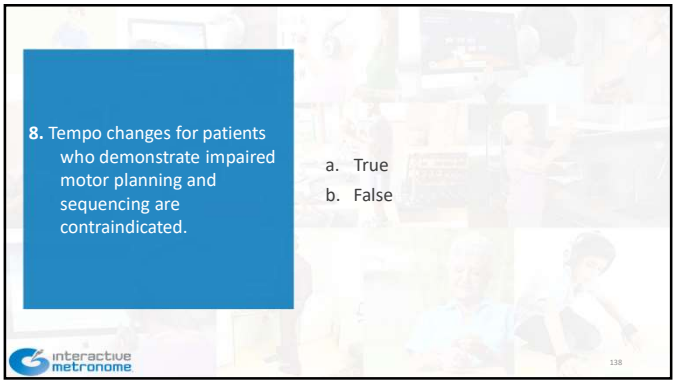

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9. If a patient does better when given the guide sounds/feedback:

a. Adjust the difficulty and SRO to be easier
b. Adjust the difficulty and SRO to be more challenging
c. Increase the number of repetitions
d. Turn them off! They don't appear to be helping.
d. Both B and C

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10. Patient success can be improved by:

a. Adjusting computer settings
b. Ignoring patient's physical and/or cognitive limitations
c. Providing environmental modifications
d. Both A and C

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Lab 14 - Phase 4 Lower Extremity

SOFTWARE SETTINGS:

- **Regular Training**
- **Exercise:** Both Toes
- **Minutes:** 1.5
- **Tempo:** 50
- **Difficulty:** 200
- **SRO:** 50
- **Burst:** 2
- **Visual Indicator** – Auditory Only
- **Guide sounds** ON ✓

What happens when you slow the tempo down while completing Lower Extremity Exercises?

Do you think the Visual Feedback Cues might help or hurt your performance?

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Lab 15 - Phase 4 Games with Music

Rhythm IM training…

SOFTWARE SETTINGS:

- **Regular Training**
- **Exercise:** Both Hands
- **Minutes:** 1.5
- **Tempo:** 54
- **Difficulty:** 100
- **SRO:** 30
- **Burst:** 2
- **Visual Indicator:** Auditory Only
- **Game:** Rhythm Master
- **Game volume** ON ✓
- **Guide sounds** ON ✓

Does the music help or hurt your performance? Can you find the rhythm in the background music?

Do you think the Visual Feedback Cues might help or hurt your performance?

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Lab 16 - Phase 4 AUTO Difficulty

This Lab demonstrates IM training at the most challenging level

AUTO Difficulty is found in the upper right 'Training' box

SOFTWARE SETTINGS:

- **Regular Training**
- Both Hands
- **Minutes:** 1.5
- **Tempo:** 54
- **Difficulty:** AUTO ✓
- **SRO** 15
- **Burst:** 4
- **Guide Sounds** ON ✓
- **Visual Indicator:** Enriched Score without Center Flash
- **Background:** Select a stationary background

NOTICE HOW DIFFICULTY LEVEL AUTOMATICALLY ADJUSTS TO YOUR BEST PERFORMANCE

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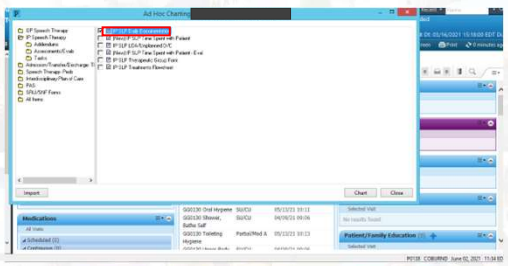
ACE IT: SLP Daily Documentation



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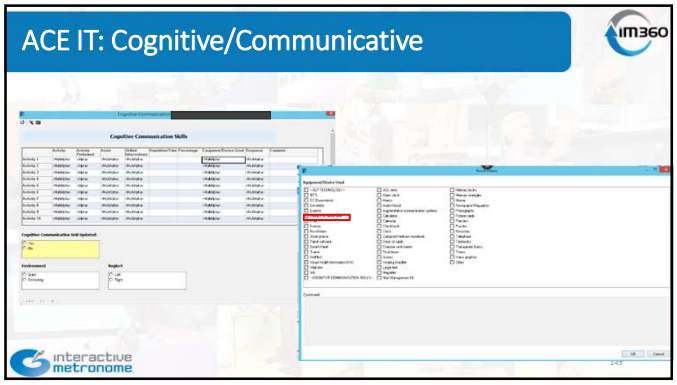

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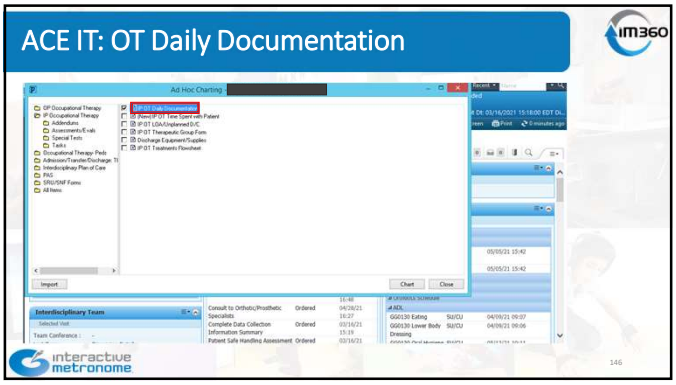

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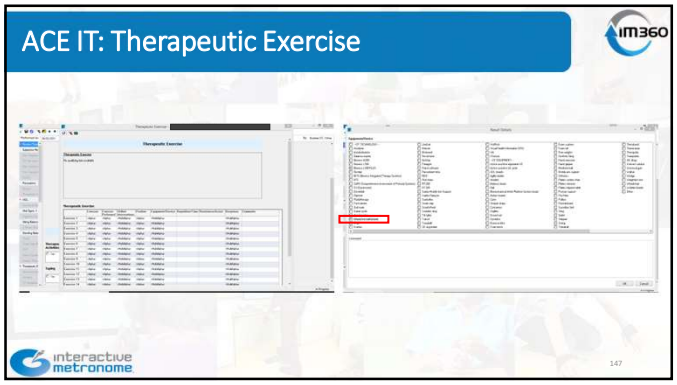

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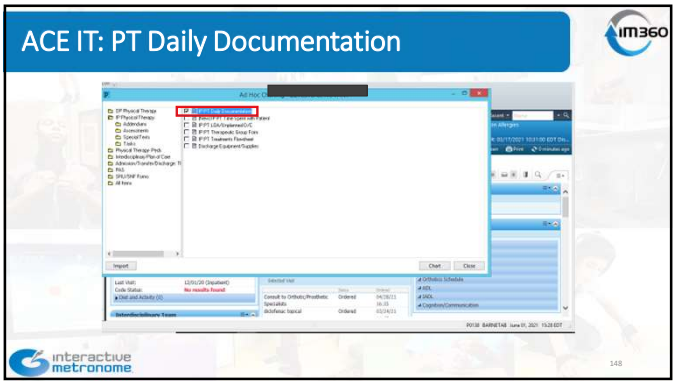

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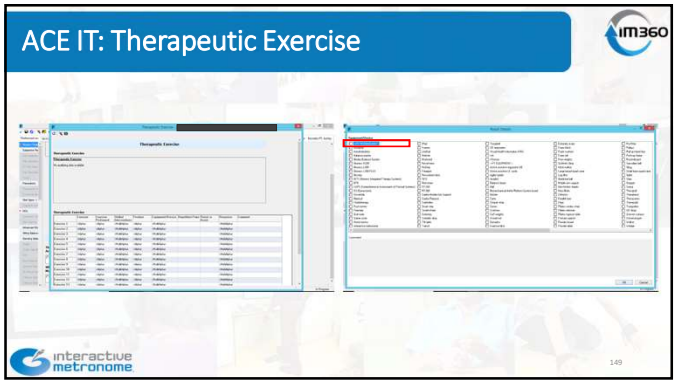

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IM Educational Offerings

- IM Certification
- IM Refresher Course
  **Created specifically for EH*
- IM-Home Certification
- Educational Webinar Library
- Specialization Courses
  - Pediatric Therapy
  - Adult Rehabilitation
  - Fall Risk Reduction

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Is IM the Right Fit for Inpatient Rehabilitation Facilities?

- Constantly reevaluate how your patient is progressing; how are they tolerating the treatment and modify the plan accordingly.
- IM is a treatment tool. It should be used with clinical judgment and experience just as you would with any other treatment tool.
- IM is not a package, not a program, and not a one-size-fits-all program.

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Factors that Impact IM Treatment

- Stamina
- Scheduling and therapy needs
- Positioning/physical limitations
- Outcome expectations
- Patient/family education limitations
- Severity of cognitive deficits
- Portability

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Stamina

- **Duration vs. Repetitions**
  Some patients may comprehend concrete ideas such as time on task vs. repetition of activity.
- **Guide Sounds vs. Reference Tone**
  Levels can be modified for patient's tolerance and performance. Lower level patients may have difficulty tolerating more than one variable at a time.
- **Determining best assessment to obtain baseline**
  Long Form assessment may not be the most appropriate fo inpatients. Consider alternative exercises over consecutive sessions as initial baseline protocols.

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Signs of Fatigue

- Decreased attention to task
- Decreased millisecond score
- Increased patient complaints
- Changes in respiratory patterns
- Changes in physical behaviors

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Scheduling/Therapy Needs

- Interdisciplinary use of IM may be appropriate in patient treatment plans in order to address skill/discipline specific needs.
  - Frequently, you will see carry-over to other disciplines and goals-objectives.
- The *team* should decide based on their initial evaluations how IM fits into the patient's overall therapy program

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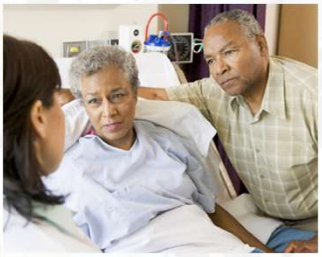
Scheduling/Therapy Needs

- Some patients may benefit from co-treatment.
  - Co-treating may decrease fatigue and over-stimulation and can improve outcomes.
- IM is multi-system taxing so it is important to determine what time of the day a patient's tolerance will be at it's highest.
  - Schedule when the patient is most alert and cognitively engaged.



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Positioning/Physical Limitations

- Recognize patient's limitations
- Utilize body parts that they most easily access
- Modify access to the triggers
- Use speakers
- Provide rest breaks
- Incorporate adaptive equipment (ie. walkers, parallel bars, splints, gate belt etc.)

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Positioning/Physical Limitations

- Mix IM with traditional treatments
- Intermix modalities (ie. NMES, TENS, heat, ultrasound etc.)
- Recognize current medications and the patient's reaction to those
- Respond to autonomic changes (ie. blood pressure, respirations, heart rate etc.)

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Positioning/Physical Limitations

- Do not exclude patients from using this treatment because they cannot perform all 14 exercises the first or even second time.
- Neuroplasticity theories teach us that generalization can occur regardless of length, type, and/or difficulty of exercise.
- Rote practice is the KEY!!! Do what they can and do it A LOT!!!

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Patient/Family Education Requirements

- At a minimum, the patient and/or their families need to understand IM basics and be able to relate it to their overall rehabilitation plan.
- Do not expect even the lowest patient to follow you into "no man's land" without adequate education.
- Constant reinforcement of progress as related to IM principles is crucial in positive outcomes.
- Provide frequent reinforcement of progress related not only to IM but also to their functional outcomes and gains.

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Severity of Cognitive Deficits

- Modifications of IM for low-level patients may not only be governed by physical but cognitive deficits as well.
  - Start at the level the patient can best tolerate.
  - Some patients may be able to only tolerate the minimum of stimulation.
  - Task analysis may be necessary to determine the patients starting level.

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Portability

- IM for low-functioning patients must be easily accessible and available for patient and clinician success.
  - Consider ways to make the equipment accessible at bedside as well as stationary for higher level balance, gait, and mobility gains.
  - Organization of equipment, cords, ear phones, and MCU may be the most challenging barrier to overcome.

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The Truth about Falls

- One out of three older adults (those aged 65 or older) falls each year but less than half talk to their healthcare providers about it.
- Among older adults, falls are the leading cause of both fatal and nonfatal injuries.
- In 2013, 2.5 million nonfatal falls among older adults were treated in emergency departments and more than 734,000 of these patients were hospitalized.
- Falls that result in an injury adds 6.3 days on the average to the hospital stay

www.cdc.gov/homeandrecreationalsafety/falls/adultfalls.html

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Centers for Medicare & Medicaid Services (CMS)

CMS
CENTERS FOR MEDICARE & MEDICAID SERVICES

- Have identified falls as an event that should never occur
- Have identified falls and injury as an Hospital Acquired Condition (HAC), which means limited reimbursement

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The Cycle of Falls

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Examples of targeted solutions provided by The Falls with Injury Project

*** The Preventing Falls with Injury Project**

- Currently only environmental factors and awareness are addressed to reduce falls
  - Schedule Trips to the bathroom
  - Reminding patients to always ask for help walking
  - Engaging patient and their families in the fall safety program and the time of admission
  - Adopting a culture of fall safety
  - Bringing caregivers to the bedside more often (ie. hourly rounding)

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Why Assess Dual Tasking

Impaired ability to maintain normal gait while performing other cognitive tasks, may predispose individuals to postural instability while walking and to falls by reducing obstacle avoidance and ability to recover from a postural perturbation independent of neuromuscular function

(Chen, et. al, 1996; Brown, et. al., 1999; Faulkner, et. al., 2007)

- Balance and walking were once considered automatic activities that required minimal executive attention.
- Dual tasking research suggests balance and walking are not separate processes from executive attention.
- How walking is affected in a dual-task setting is an indicator of attentional resources or capacity for cognitive loading while walking.

(Faulkner, et. al., 2007; Beaucher, et. al., 2005; Chen, et. al., 1996)

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How can IM Impact Dual Tasking with Falls?

Interventions need to address physical fitness, motor planning and sequencing, and automaticity of movement to exercise and strengthen the underlying mechanisms of:

- Balance
- Weight Shifting
- *Attention & Divided Attention*
- *Visual & Auditory Distraction*
- *Cognition*
- Coordination
- Strength

**Cognitive abilities must be addressed to get to the root of the issue and make permanent gains.*

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Why IM?

The Joint Commission

- Upon evaluation, the *Joint Commission*, acknowledges the *IM Fall Reduction Program* as a best practice and a program of "High Interest".

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Marked improvements in patients 60+ The Effectiveness of the IM with Healthy Aging Adults

Dr. Leonard Trujillo, OTR/L, Eastern Carolina University
Initial findings presented at the 2015 AOTA Conference & 2015 ISNR

- N= 9, Health Aging adults (60 – 80 yrs)
- Treatment
  - 12 sessions of IM treatment over two months
  - 6-week break period
  - 6 remaining sessions
  - Total of 18 sessions
- 30 – 45 minutes per session, never exceeding 275 reps per task
- All participants only performed upper extremity exercises and were seated during treatment for safety precautions

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Results

Assessment	Overall Improvement
Modified IM Long Form (seated, all upper extremity exercises)	77%
Short Form	31%
Math Fluency (WJII)	23%
Reading Fluency (WJII)	12%
Decision Speed (WJII)	5%
Visual Matching (WJII)	4%
The d2 Test of Attention • Implicates improvements in the ability to stay focused and attend to more difficult tasks and task over time.	16%
Four Step Square Test • Implicates improvements in balance, sped, and confidence in independent ambulation and other daily tasks. This includes ability to dress and bath with confidence.	88%*
The 9 Hole Peg Test • Implicates improvements in fine motor, dexterity, sense of accuracy and confidence in independence in other daily tasks. This includes ability to dress, eat and perform fine motor tasks with confidence.	3%

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Movement Requires

1. Directed attention
2. Changes in muscle length over time; (motor control and timing are intimately related)
3. Muscle activations require timing on the order of tens of milliseconds
4. Pathologies that disrupt motor timing and sequencing lead to inaccurate movements. Ultimately the cause of falling!

(Mauk & Buonamano, 2004)

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Importance of Incorporating IM with Your Fall Prevention Program

- The old concept that gait and balance are automatic activities that do not require cognitive resources is a fallacy.
- IM requires a patient to focus on auditory stimuli and make a motor response to hit the trigger on the beat.
- Must decide if need to slow down, speed up, or remain consistent.
- Can use auditory or visual feedback to guide performance.
- Computer can measure performance in milliseconds, so act at same speed as muscular contractions.
- Helps patients identify their own timing tendency and learn how to counteract own tendencies.

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How do I Know When to Quit?

YouTube

IM360 VIDEO

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Other IM Continuing Educational Opportunities

- Advanced Adult Motor Skills
- Advanced Adult Cognitive Skills
- Fall Risk Reduction Coaching Program
- Over 100 OnDemand webinars
  - Lunch & Learn Webinar Series
  - Brain Injury/Stroke; Speech/Language, Motor (Ortho/Neuro), etc.

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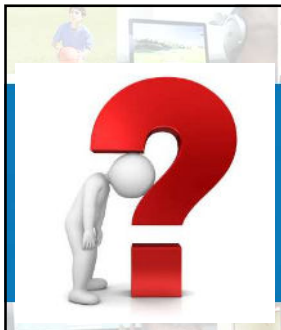

Test Time!
We know you're tired, so it is OPEN BOOK.

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1. Performing a Long Form Assessment is appropriate for every patient.

a. True
b. False

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2. IM is useful for:

a. Improving neural timing
b. Building efficient connections between neural networks
c. Increasing the brain's efficiency
d. All of the above

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3. Which of the modifications are allowed when collecting baseline data?

a. Balance Assistance
b. Hand over hand assistance
c. Skipping tasks
d. a and c

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4. IM games can be helpful when:

a. learning the feedback/auditory guide sounds
b. Increasing time on task
c. Motivating patient
d. Enhancing training
e. All of the above

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5. Introducing customized task helps providers target discipline specific skills.

a. True
b. False

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6. Traditional Speech, PT, and OT services should not be provided while IM training is being administered.

a. True
b. False

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7. When determining the appropriateness of IM training for low-functioning adults with severe neurological impairments, the following parameters should be taken into consideration:

a. Stamina
b. Scheduling
c. Portability
d. Physical Limitations
e. All of the above

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8. Tempo changes for patients who demonstrate impaired motor planning and sequencing are contraindicated.

a. True
b. False

185

9. If a patient does better when given the guide sounds/feedback:

a. Adjust the difficulty and SRO to be easier
b. Adjust the difficulty and SRO to be more challenging
c. Increase the number of repetitions
d. Decrease the number of repetitions
d. Both B and C

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10. Patient success can be improved by:

a. Adjusting computer settings
b. Ignoring patient's physical and/or cognitive limitations
c. Providing environmental modifications
d. Both A and C

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Contact Us

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then press desired option

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IM-Home	2	Education	3
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