
interactive metronome
THE COURSE WILL BEGIN SHORTLY

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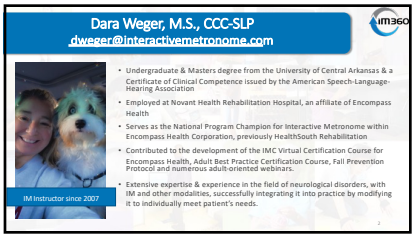
Dara Weger, M.S., CCC-SLP
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IM360
IM Instructor since 2007
• Undergraduate & Masters degree from the University of Central Arkansas & a Certificate of Clinical Competence issued by the American Speech-Language-Hearing Association
• Employed at Novant 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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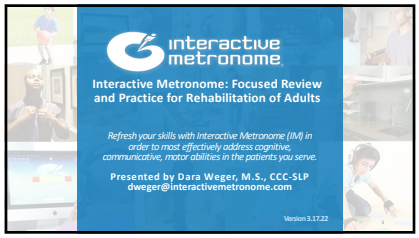
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Interactive Metronome: Focused Review and Practice for Rehabilitation of Adults
Refresh your skills with Interactive Metronome (IM) in order to most effectively address cognitive, communicative, motor abilities in the patients you serve.
Presented by Dara Weger, M.S., CCC-SLP
dweger@interactivemetronome.com
Version 3.17.22

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Virtual Course Agenda
IM360
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 (YIKI) 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.
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4


IM Demo
IM360
VIDEO
Encompass Health Videos
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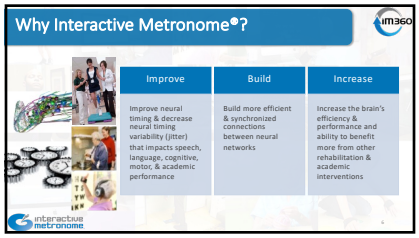
Why Interactive Metronome®?
IM360
Improve
Improve neural timing & decrease neural timing variability (jitter) that impacts speech, language, cognitive, motor, & academic performance
Build
Build more efficient & synchronized connections between neural networks
Increase
Increase the brain's efficiency & performance and ability to benefit more from other rehabilitation & academic interventions
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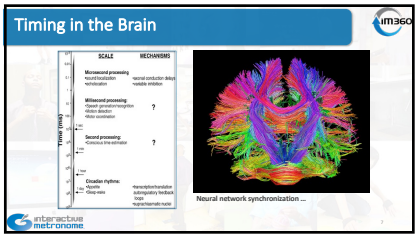
Timing in the Brain
IM360
SCALE
MECHANISMS
Neural network synchronization ...
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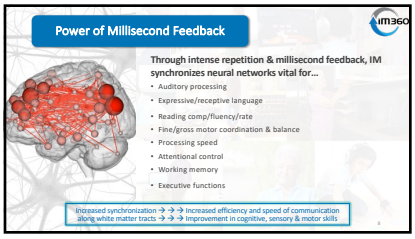
Power of Millisecond Feedback
IM360
Through intense repetition & millisecond feedback, IM synchronizes neural networks vital for...
• Auditory processing
• Expressive/receptive language
• Reading comp/fluency/rate
• Fine/gross motor coordination & balance
• Processing speed
• Attentional control
• Working memory
• Executive functions
Increased synchronization → → → Increased efficiency and speed of communication along white matter tracts → → → Improvement in cognitive, sensory & motor skills

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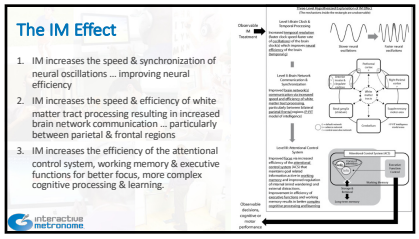
The IM Effect
1. IM increases the speed & synchronization of neural oscillations ... improving neural efficiency
2. IM increases the speed & efficiency of white matter tract processing resulting in increased brain network communication ... particularly between parietal & frontal regions
3. IM increases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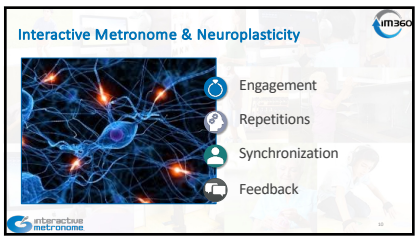

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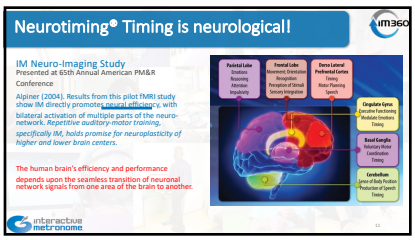

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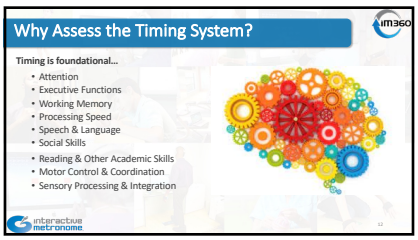

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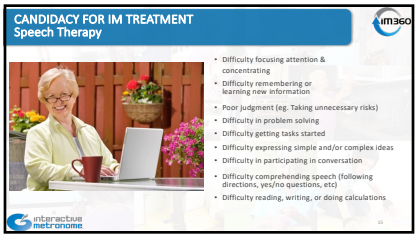

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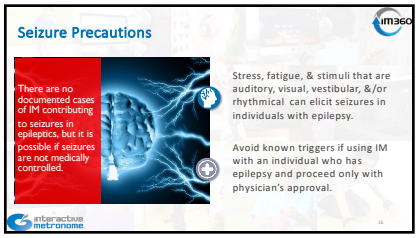

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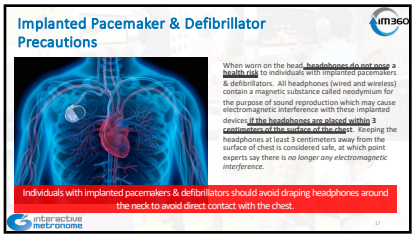

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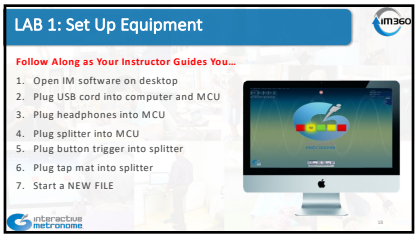

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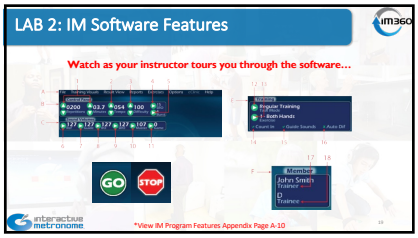

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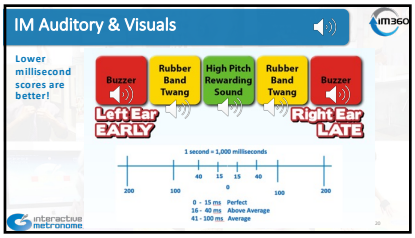

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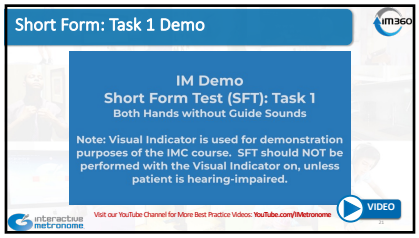

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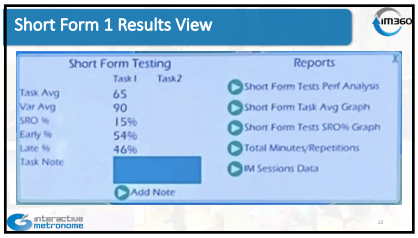

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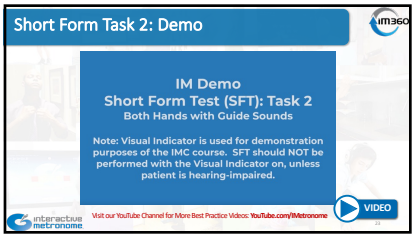

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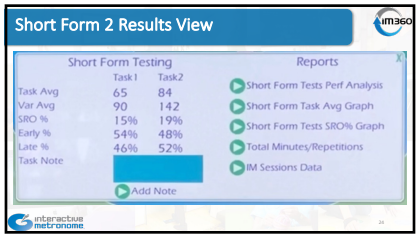

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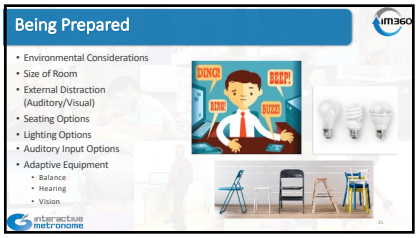

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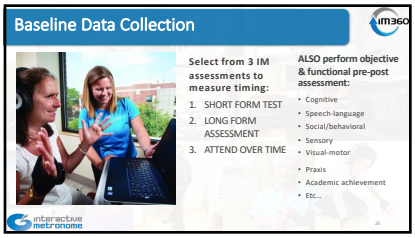

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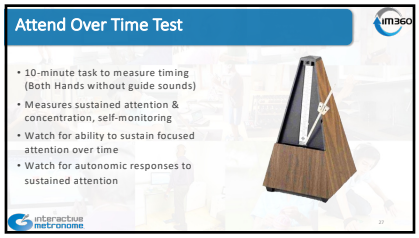

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Determining Which Assessment to Perform

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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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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LAB 3: 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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LAB 4: SFT Reports & Data Interpretation

SELECT

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

You cannot view YOUR Short Form Test Reports today because you only have one set of data for today.

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*View Sample SFT Reports Appendix Page A-21 – A-22

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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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LAB 5: 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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LAB 6: Pull Up Your LFA Report

SELECT
- Reports
- Long Form Assessment
- LFA Calculations

NOTE:
- AOT score is reported at the bottom of the LFA Calculations Report

You cannot view YOUR AOT report today because you did not complete it

*View Sample LFA Reports Appendix Page A-23 – A-25; Sample AOT Reports Appendix Page A-26

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LAB 7: Data List View

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

SELECT
- Result View
- Data List View
- Select date
- Look at your LFA data % very early and % very late (most of the hits should fall in early, SRO and late)

*View Sample Data Report Appendix Page A-27

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TIME FOR A BREAK

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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 3x/week with minimum of 30 minutes of active IM treatment per session **(i.e., within 45 min session, 30 min is on the machine actively training).** Approximately 1400-1600 reps per session (adapt as appropriate according to age & tolerance).
- Duration varies depending upon baseline timing skills & other factors. Determine an interval for re-assessment and communicate that to patients, & caregivers (rather than telling them a predetermined number of IM treatment sessions).

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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 m ust 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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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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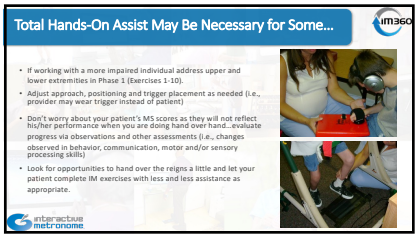

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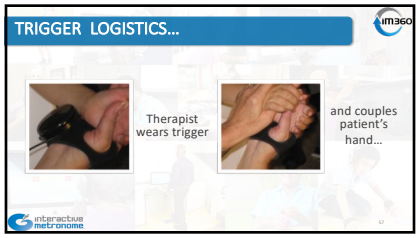

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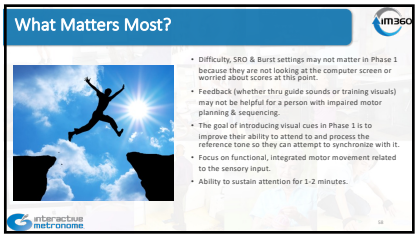

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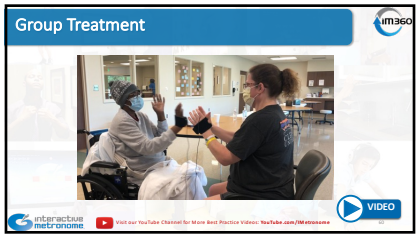

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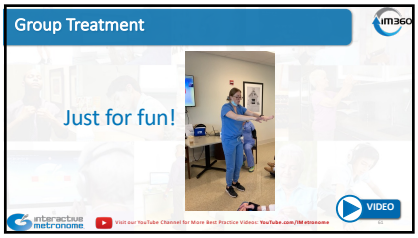

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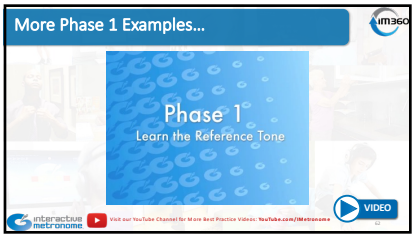

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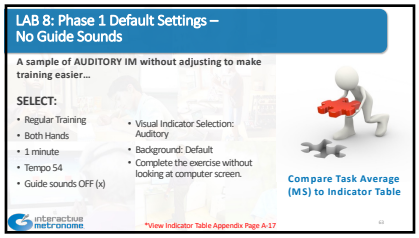

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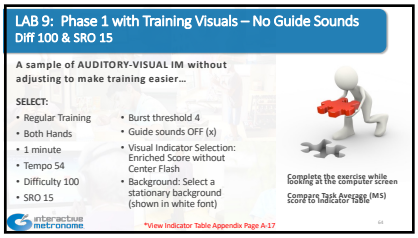

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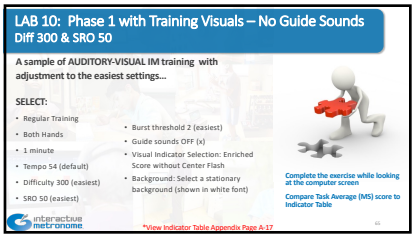

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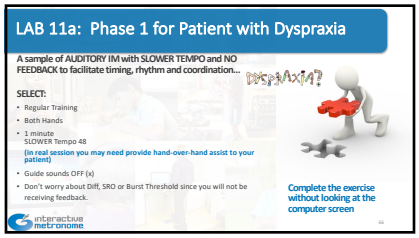

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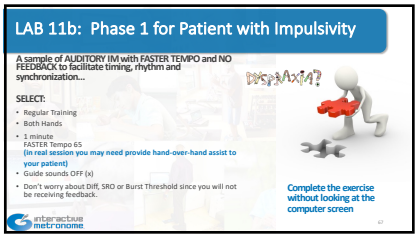

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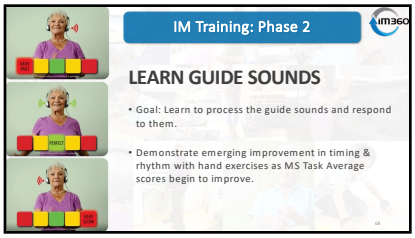

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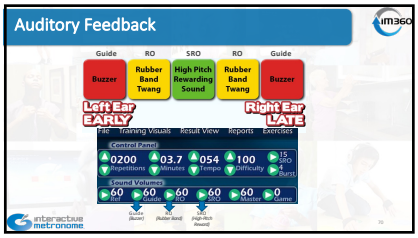

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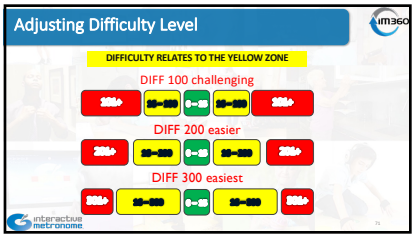

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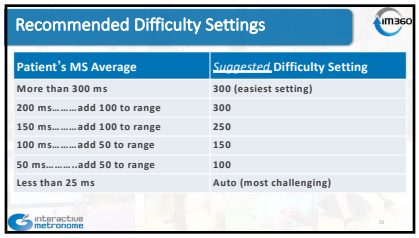
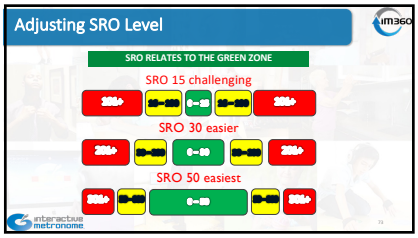


Patient's MS Average	*Suggested* Difficulty Setting
More than 300 ms	300 (easiest setting)
200 ms……add 100 to range	300
150 ms……add 100 to range	250
100 ms……add 50 to range	150
50 ms……add 50 to range	100
Less than 25 ms	Auto (most challenging)

72



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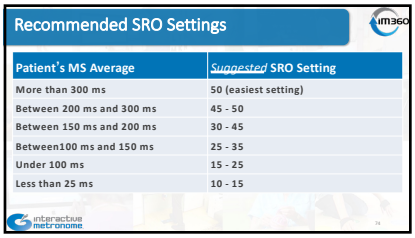

Patient's MS Average	*Suggested* SRO Setting
More than 300 ms	50 (easiest setting)
Between 200 ms and 300 ms	45 - 50
Between 150 ms and 200 ms	30 - 45
Between100 ms and 150 ms	25 - 35
Under 100 ms	15 - 25
Less than 25 ms	10 - 15

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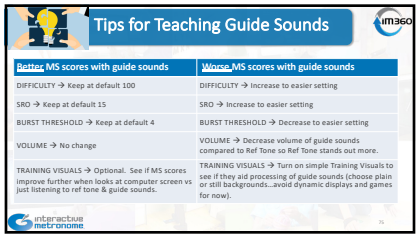
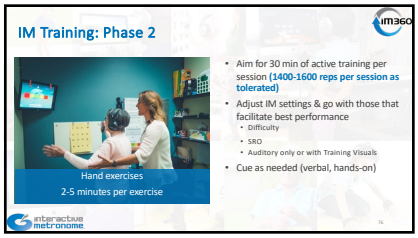


Better MS scores with guide sounds	Worse MS scores with guide sounds
DIFFICULTY → Keep at default 100	DIFFICULTY → Increase to easier setting
SRO → Keep at default 15	SRO → Increase to easier setting
BURST THRESHOLD → Keep at default 4	BURST THRESHOLD → Decrease to easier setting
VOLUME → No change	VOLUME → 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).

75



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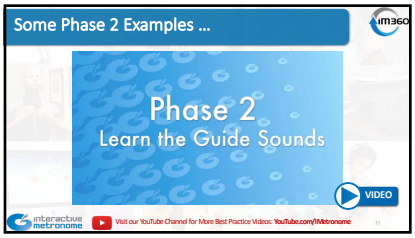

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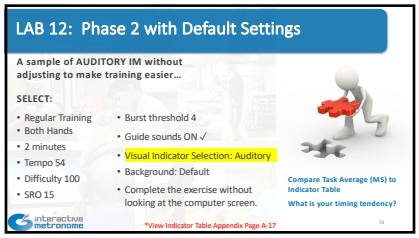

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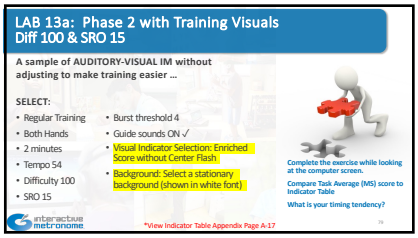

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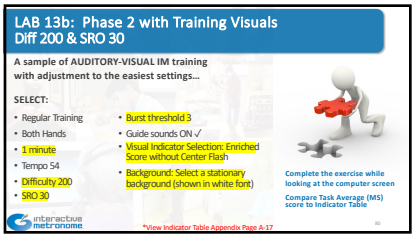

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81

Phase 3 - Develop Basic Timing

- Repeat hand exercises 1-3 until Task Avg scores improve AND person can make circular, rhythmical movements with hands with clapping/tapping (indicating good motor planning & sequencing)
- Increase time per exercise as tolerated to 3-5 minutes (162-270 repetitions)
- Guide sounds ON
- Keep adjusting Difficulty, SRO, Burst Threshold and level of feedback to be more challenging as tolerated in order to nudge performance toward more SRO hits, higher IAR, and progressively lower MS Task Avg scores
  - More SRO hits and bursts are indications of greater neural synchronization
  - Aim for MS Task Avg in 20's or lower for high functioning patients

interactive metronome 82

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Introduce Games

- Use your judgment to determine when to introduce games
- Games facilitate
  - Higher IAR
  - More bursts
  - ... and better MS scores
- Games are engaging and encourage completion of more reps leading to better outcomes.
- Games can be used as a reward for effort during IM sessions
- All IM games have POSITIVE reinforcement
- A few have NEGATIVE reinforcement (consequence for very early or late hits) – see Appendix for more info

*View Games Appendix Page A-14

interactive metronome 83

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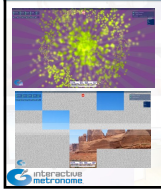
IM Games



- Use your best judgment – don't introduce games too early.
- Trial & error approach to finding the right fit
- Monitor for sensory overload
- Games can facilitate visual tracking
- Use the games as a reward or motivator
- Have your patient target "greens" – adjust SRO range to as much as 60 MS to make "greens" easier to achieve.
- Continually adjust settings to nudge your patient toward lower scores.

interactive metronome 84

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Counteract Timing Tendency

- 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.

Accelerate your patient's outcomes!

interactive metronome 85

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Lab 14: Phase 3 Games with Positive Reinforcement

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

SELECT:
- Regular Training
- Both Hands
- 2 minutes
- Tempo 54
- SELECT Difficulty
- SELECT SRO
- Burst Threshold
- Guide sounds ON ✓
- Visual Indicator Selection: Enriched Score without Center Flash
- Select a game with positive reinforcement – see Appendix for options

*View Indicator Table Appendix Page A-17

interactive metronome 86

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Lab 15: Phase 3 Games with Negative Reinforcement

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

SELECT:
- Regular Training
- Both Hands
- 2 minutes
- Tempo 54
- SELECT Difficulty
- SELECT SRO
- Burst Threshold
- Guide sounds ON ✓
- Visual Indicator Selection: Enriched Score without Center Flash
- Select a game with negative reinforcement – see Appendix for options

*View Indicator Table Appendix Page A-17

interactive metronome 87

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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.

interactive metronome 88

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Speech & Language

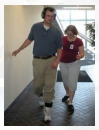
- Continue to work on upper extremity exercises for progressively more complex & longer task
  - Increase sustained attention by increasing time on task
  - More complex IM settings as improvement is demonstrated
    - Difficulty setting
    - SRO setting 55 (default)
    - Feedback Setting
  - Introduce 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

interactive metronome 89

89

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

interactive metronome 90

90

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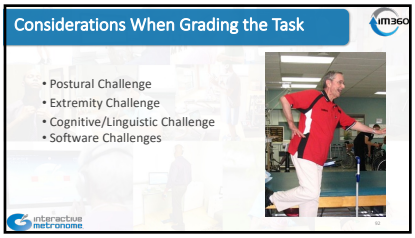

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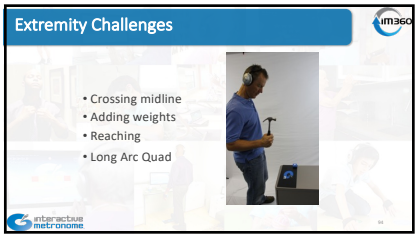

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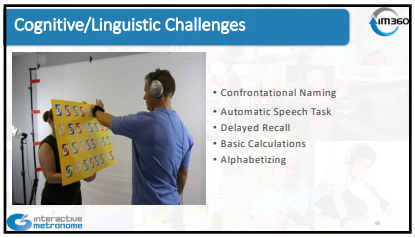

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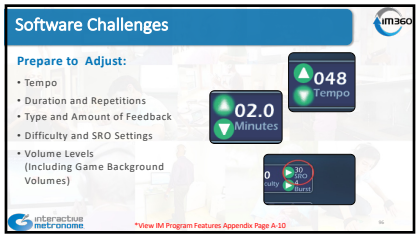

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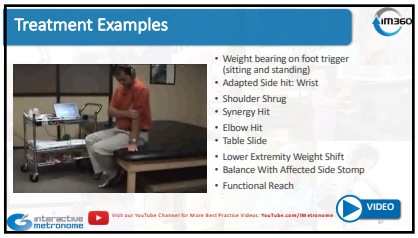

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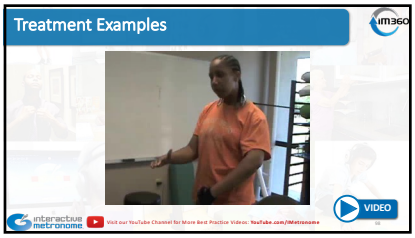

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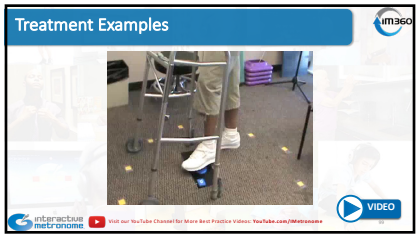

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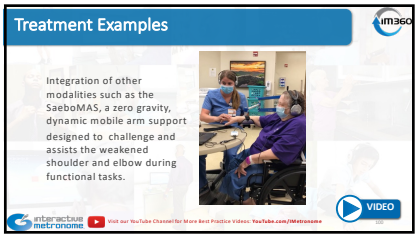

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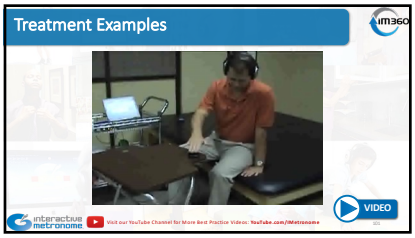

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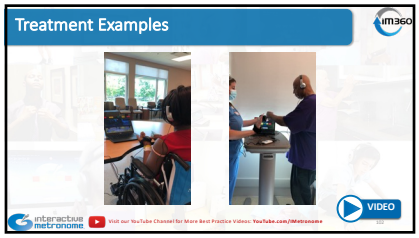

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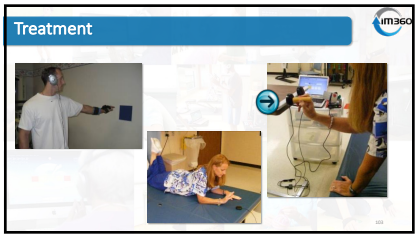

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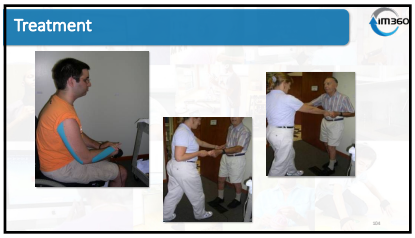

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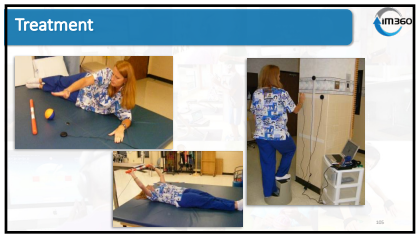

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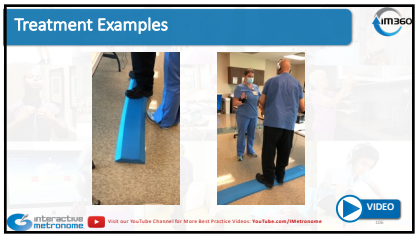

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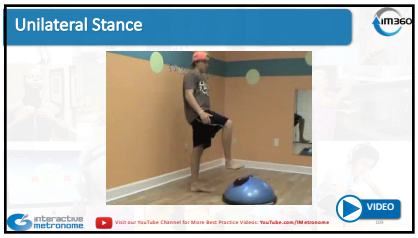

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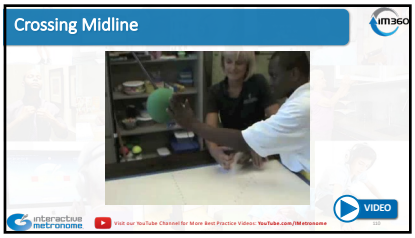

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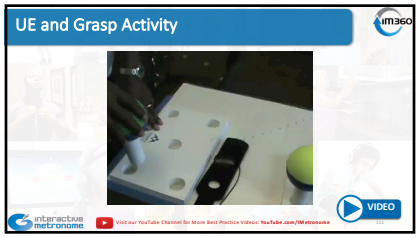

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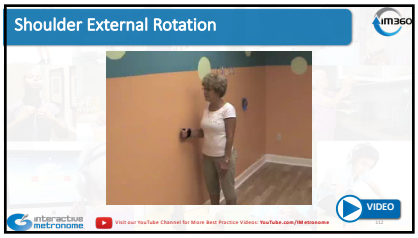

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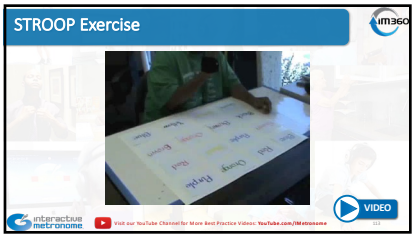

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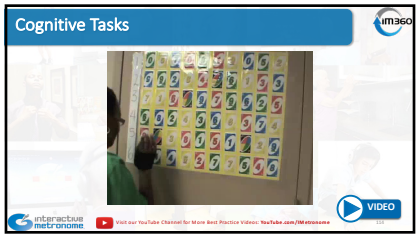

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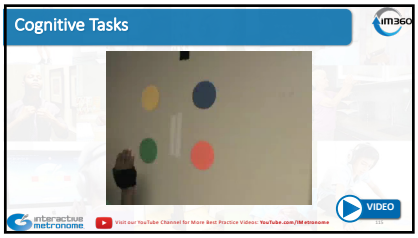

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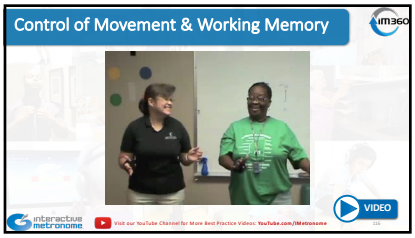

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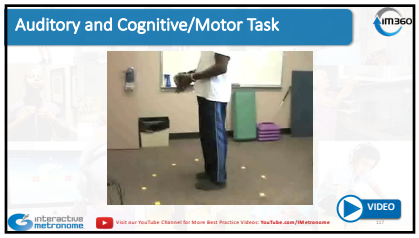

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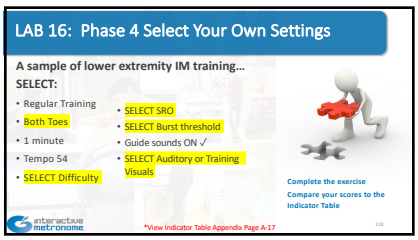

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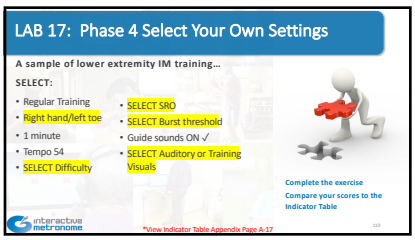

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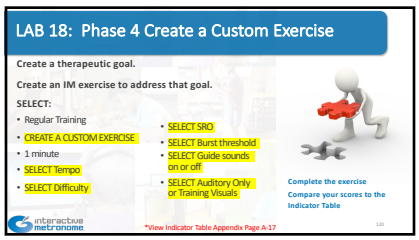

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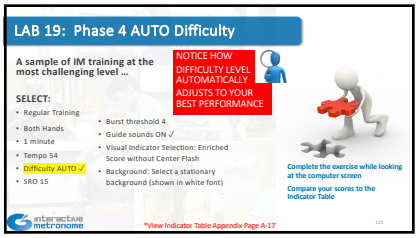

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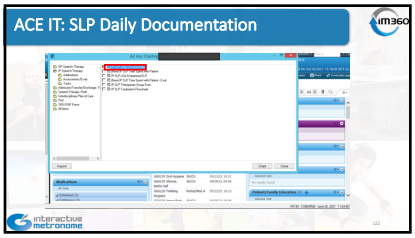

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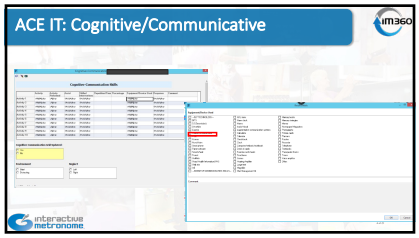

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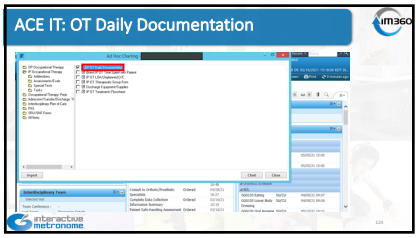

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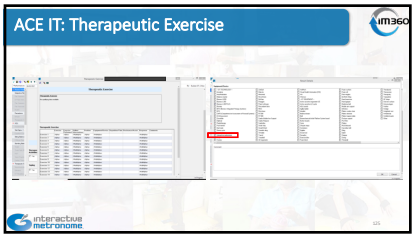

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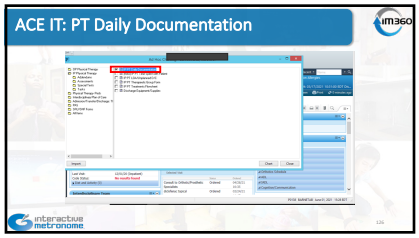

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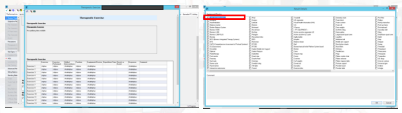
ACE IT: Therapeutic Exercise



127

Julie: Severe Concussion

VIDEO

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128

Diana: TBI

- 23 yr old college senior majoring in business admin
- Olympic level synchronized swimmer & coach
- Severe TBI: Fell from golf cart at fundraiser for friend who survived plane crash

129

Life After TBI…

Diana was unable to return to college and struggled with…

- Attention & concentration
- Cognitive speed
- Cognitive fatigue
- Significant sensory overload (Easily overwhelmed with noise, lights, visual stimuli…)
- Memory
- Language (expressive & receptive aphasia)
- Executive functions
  - Impulsive
  - Disinhibited
  - Socially inappropriate
  - Problem-solving
  - Organization
  - Time management
  - Etc.…
- Balance

130

Recovery of Function

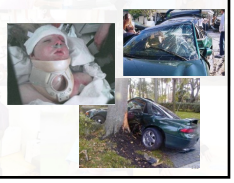
It took 24 sessions of IM, 45 min each, over a period of 2 months for Diana to regain cognitive & motor skills, successfully returning to…

- College part-time with goal of transitioning to full time
- Social life
- Synchronized swimming
- Coaching
- Driving

131

Kelly: Severe TBI

- Severe TBI
- Moderate Impairments:
  - Cognitive speed
  - Attention
  - Perseveration
  - Executive functions
  - Memory
  - Language processing
  - Visual processing



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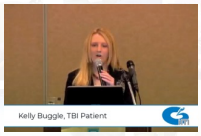
Kelly Recovers



- Few ST sessions for strategy-training early on in recovery
- 18 sessions of IM
- Completed HS diploma
- Off to college
- Driving
- Straight-A student

VIDEO

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133

John: CVA

- **47 yr old father of 4 teenagers & primary source of family income suffered a right hemisphere stroke**
- **Very anxious to return to independence & work**
- Impairments in…
  - Self-care
  - Activities of daily living
  - Balance
  - Mobility
  - Left upper extremity function (significant tremor & spasticity)
  - Cognitive abilities

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Return to Independence

As John's timing improved with each IM session, so did his cognitive & motor skills. After 19 sessions, he…

- regained independence with self-care, activities of daily living and management of medications & checkbook
- demonstrated significant improvement in balance & coordination to vacuum, grocery shop etc.
- successfully passed a driver's evaluation & resumed driving
- returned to work full time and his normal routine

135

Stroke: Terry

VIDEO

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136

Richard: Parkinson's

- 81 yr old ALF resident
- Fallen 5 times over the past year
- complains of difficulty initiating mobility with impact on transfers, walking, ADLs, & leisure activities like bowling and golf.
- Indep w extra time: supine-to-sit
- SB assist w cues for safety & weight shift: sit-to-stand
- Ambulates 400 feet with short, shuffling steps – lacks heel strike on L foot – unable to clear obstacles
- Requires assistive device for safety but refuses use

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Richard: Parkinson's

TREATMENT:
- 12 IM sessions (700-800 reps each) using In Motion Trigger

RESULTS:
- Fewer freezing episodes
- Returned to bowling, golfing, & group exercise classes
- Ambulates on all surfaces with modified independence
- No assistive device

VIDEO

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Amputee: Fredrick

VIDEO

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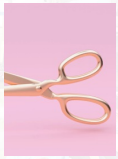
Is IM the Right Fit for Inpatient Rehabilitation Facilities?

- 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 for inpatients. Consider alternative exercises over consecutive sessions as initial baseline protocols.

142

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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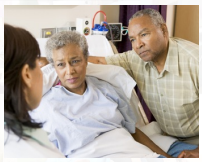
Scheduling/Therapy Needs

- 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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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 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.

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

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The Truth about Falls

- 20-30% of people who fall suffer moderate to severe injuries such as lacerations, hip fractures, and head traumas.
- These injuries can make it hard to get around or live independently, and increase the risk of early death.
- Falls are the most common cause of traumatic brain injuries (TBI).
- About one-half of fatal falls among older adults are caused by TBI.
- Most fractures among older adults are caused by falls.

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

154

The Truth about Falls

- The most common fractures are of the spine, hip, forearm, leg, ankle, pelvis, upper arm, and hand.
- Many people who fall, even if they are not injured, develop a fear of falling.
- This fear may cause them to limit their activities, which leads to reduced mobility and loss of physical fitness, and in turn increases their actual risk of falling.
- In 2013, about 25,500 older adults died from unintentional fall injuries.
- People age 75 and older who fall are four to five times more likely than those age 65 to 74 to be admitted to a long-term care facility for a year or longer.
- Over 95% of hip fractures are caused by falls.

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

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The Cost Related to Falls

- In 2013, the direct medical costs of falls, adjusted for inflation, were $34 billion.
- Direct medical costs of falls is expected to more than double by 2020, estimated at $67.7 billion!
- Medicare costs per fall averaged between $13,797 and $20,450 (in 2012 dollars).
- 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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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)

158

Dual Tasking

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

- 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.

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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)

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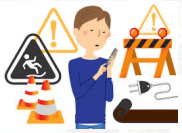
How can IM Impact Dual Tasking with Falls?



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.*

161

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".

162

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 under time.	16%
Four Step Square Test • Implicates improvements in balance, speed, 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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Balance Strategies by Population

Young, Healthy	Older, Healthy	Older, Cognitively Impaired

"Posture First"
• Postural stability actually improves during a dual-task setting vs. balance only. (Rech, 2011)
• As complexity of the tasks increase performance decreases in cognitive task.
	"Posture First"
	• Greater decline in Cognitive Performance
	• Decline in Visual Spatial
		"Loss of Posture First"
		• Equal decline in:
		  • Balance
		  • Cognition
		(Woolcott, 2002)

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Gait Strategies by Population

Young, Healthy	Older, Healthy	Older, Cognitively Impaired
Automatic activity Speed Stride Length Double Supp. Phase when paired with cognitive task. Cognitive task performance is accurate ~~Balance is compromised (Melzer, 2004)~~	Automatic activity Speed Stride Length Double Supp. Phase when paired with cognitive task. Cog performance by 20% Obstacle avoidance (Al-Yahya et al. 2011)	Automatic activity Speed Stride length Double Supp. Phase when paired with cognitive task. Cognitive performance inaccurate ~~Loss of Posture First (Woolcott, 2002)~~

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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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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

172

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

173

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

174

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

a. True
b. False

175

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

a. True
b. False

176

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

177

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

a. True
b. False

178

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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