INCOG 2.0 Guidelines for Cognitive Rehabilitation Following Traumatic Brain Injury: What's New?

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On behalf INCOG 2.0 team

UHN Toronto Rehabilitation Institute
The KITE Research Institute

Ontario Ministry of Health & Long Term Care

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Objectives

By the end of the presentation participants should be able to:

I. Describe the process of development of the INCOG guidelines.

II. Name new updated recommendation topics from the guideline.

III. Discuss how the INCOG clinical algorithms could be used to tailor treatment to individuals with TBI.

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Overview

- Intro to INCOG methods and updates (how we did our work)
- What's new since 2014?
- Review of each of the topics (PTA, Attention, Memory, Executive Functions and Cognitive-Communication)
  a. New evidence
  b. Review of recommendations highlighting rationale for new recs
  c. Review of algorithm highlighting rationale for revised algorithm
- Barriers and Facilitators to implementation
- Questions

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Introduction

- INCOG = International Cognitive Rehabilitation Guidelines after Traumatic Brain injury (TBI)
  - Arose from a workshop that prioritized the topic for Knowledge Translation
  - Initial guidelines published in JHTR in 2014
- Target audience are clinicians working with people who have experienced a Traumatic Brain Injury but may be used by others.
- Population: People with moderate or severe TBI though some studies did include Mild TBI.

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International Expert Panel

AUSTRALIA

- Dr. **Peter Bragge**, PhD
- Professor **Jacinta Douglas**, MSc (Psych), PhD
- Dr. **Adam McKay**, MPsych (Clinical Neuropsychology), PhD
- Professor **Jennie Ponsford**, AO, MA (Clinical Neuropsychology), PhD
- Professor **Leanne Togher**, B.App.Sc (Speech Path), PhD
- Dr. **Jessica Trevena-Peters**, DPsych

CANADA/USA

- Dr. **Mark Bayley**, MD, FRCPC
- Dr. **Robin Green**, PhD, C.Psych
- **Shannon Janzen**, MSc
- **Amber Harnett**, MSc, BSc, BScN, RN (c)
- Dr. **Eliyas Jeffay**, PhD, C.Psych
- Professor **Mary Kennedy**, PhD, CCC-SLP
- **Ailene Kua**, MSc, PMP
- **Lyn Turkstra**, PhD, Reg-CASLPO
- Dr. **Shawn Marshall**, MD, MSc, FRCPC
- **Amanda McIntyre**, PhD (c), RN
- **Eleni Patsakos**, MSc, PhD (candidate)
- Dr. **Robert Teasell**, MD, FRCPC
- Dr. **Diana Velikonja**, PhD, MScCP
- **Penny Welch-West**, M.Cl.Sc, SLP Reg. CASLPO
- Dr. **Catherine Wiseman-Hakes**, PhD, Reg. CASLPO

Physicians, Nurses, Psychologists, SLPs, PTs, OTs, etc.

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Overview
Bayley et al.

INCOG 2.0: What's Changed From 2014 to Now?

INCOG 2.0 Guidelines for Cognitive Rehabilitation Following Traumatic Brain Injury: What's Changed From 2014 to Now?

- Why is Cognitive Rehab still a priority?
  - 160 new papers (40 RCTS)= Fastest Growing evidence
  - Audits by our team show inconsistent uptake
- The ongoing challenges for implementation of INCOG guidelines
- What's new

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Barriers To Implementation

- Barriers related to nature of cognitive rehab
  - Intrinsically complex - assessment of the cognitive strengths/weaknesses of persons with TBI, their priorities, the demands of their environment to provide individualized therapy.
  - Limited training of health professionals.
  - Poorly described interventions in studies.
- Barriers related to adopters
  - Limited awareness.
  - Clinicians need implementation tools.

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Barriers To Implementation

- **Barriers related to the practice environment**
  - Downing et al. and Nowell et al. highlighted the importance of client self-awareness, family involvement, team collaboration, and goal setting as important ingredients for success.
  - Outpatient and community rehabilitation programs, receive limited funding, too brief to fully execute cognitive rehabilitation protocols. Covid has also redirected resources.
- **Barriers related to comorbidities of people with TBI**
  - Mental Health are important challenges.
  - Existing inequity of access for underserved, vulnerable, and racialized populations.

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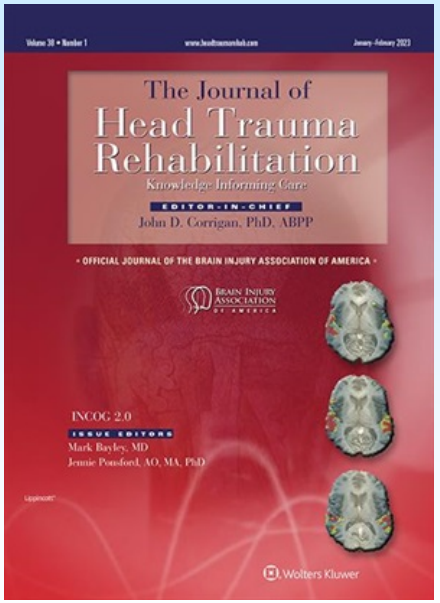
INCOG 2.0 series

INCOG 2.0 Guidelines for Cognitive Rehabilitation Following Traumatic Brain Injury: What's Changed From 2014 to Now?	INCOG 2.0 Guidelines for Cognitive Rehabilitation Following Traumatic Brain Injury Part III: Executive Functions
INCOG 2.0 Guidelines for Cognitive Rehabilitation Following Traumatic Brain Injury: Methods, Overview and Principles	INCOG 2.0 Guidelines for Cognitive Rehabilitation Following Traumatic Brain Injury Part IV: Cognitive-Communication and Social Cognition Disorders
INCOG 2.0 Guidelines for Cognitive Rehabilitation Following Traumatic Brain Injury Part I: Post Traumatic Amnesia	INCOG 2.0 Guidelines for Cognitive Rehabilitation Following Traumatic Brain Injury Part V: Memory
INCOG 2.0 Guidelines for Cognitive Rehabilitation Following Traumatic Brain Injury Part II: Attention and Information Processing Speed	The Future of INCOG (is Now)



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What's New – Overall

- Updated Recommendations
- Updated Algorithm
- Updated Audit Tools to monitor implementation
- Updated Cognitive-Communications section with new section on Social Cognition
- New section on Principles of Telerehabilitation and updated sections in specific topics

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Methods and Overview
Bayley et al.

INCOG 2.0 Guidelines for Cognitive Rehabilitation Following Traumatic Brain Injury: Methods, Overview, and Principles

- Methodology
- Scope and Purpose
- Target Users/ Populations

INCOG 2.0: Methods, Overview, and Principles

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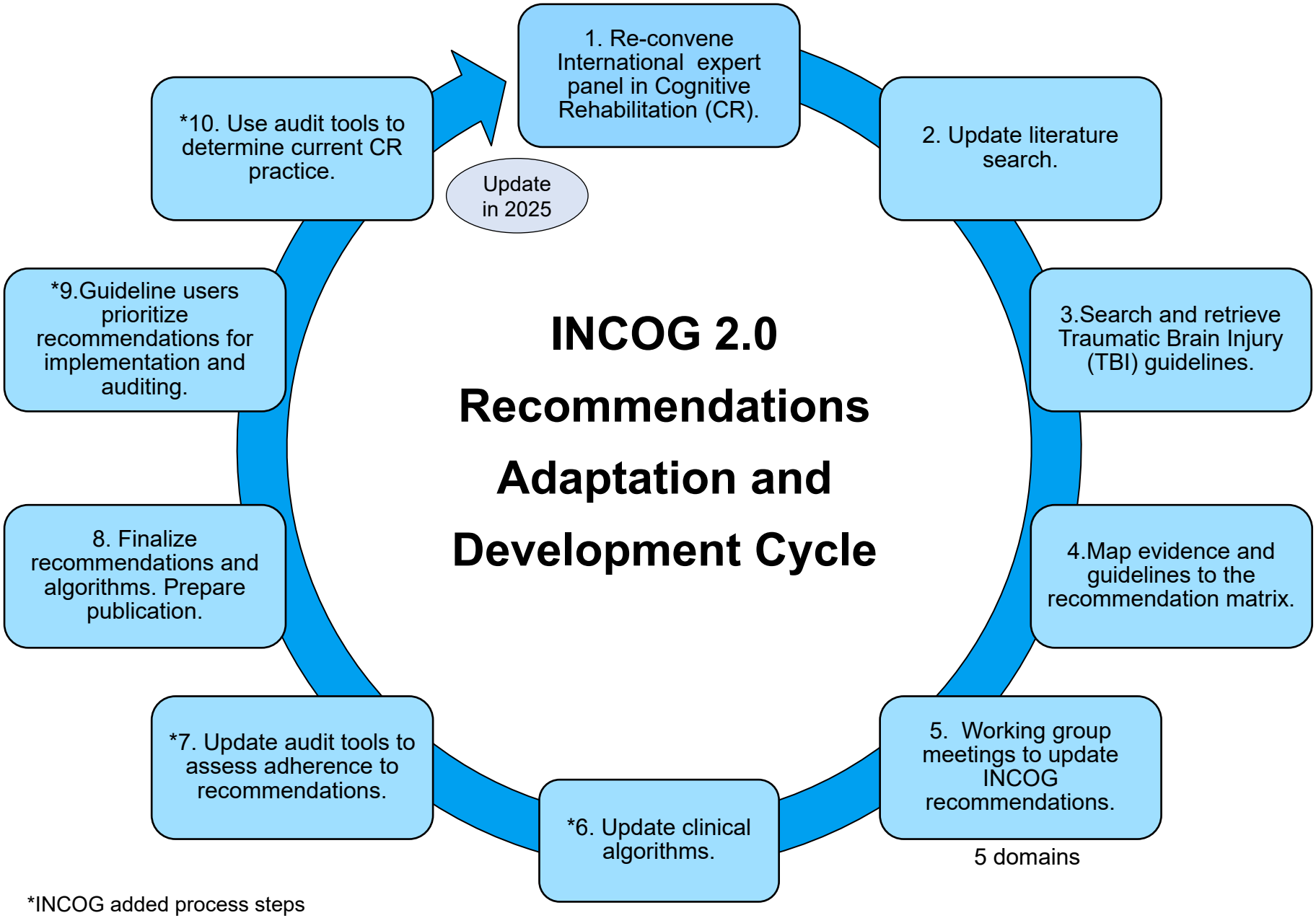

*INCOG added process steps

Levels of Evidence

A	Recommendation supported by at least one meta-analysis, systematic review or randomized controlled trial of appropriate size with relevant control group.
B	Recommendation supported by cohort studies that at minimum have a comparison group (includes small randomized controlled trials).
C	Recommendation supported primarily by expert opinion based on their experience though uncontrolled case studies or series may also be included here.

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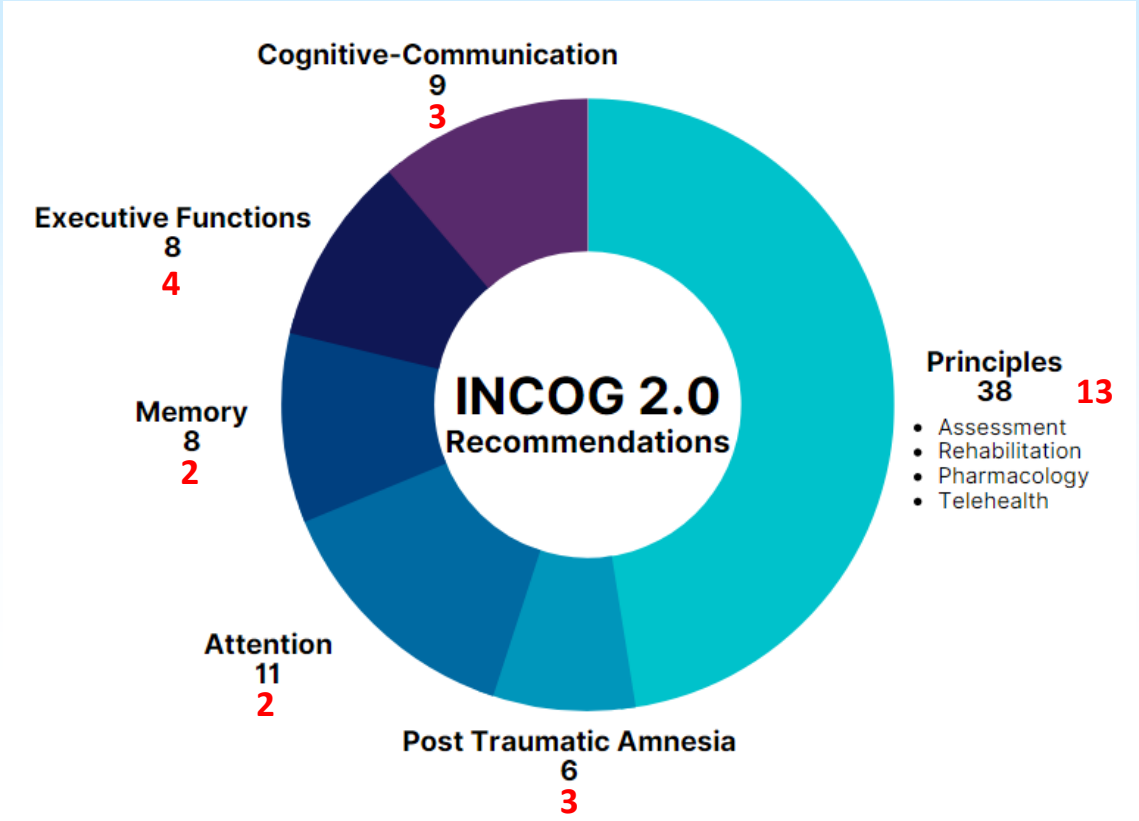
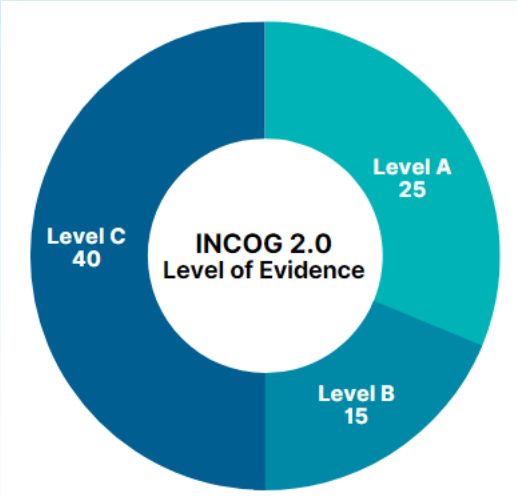
INCOG 2.0 Recommendations Breakdown

INCOG 2.0 Recommendations = 80 **New = 27**





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Principles of Cognitive Rehab

- 10 recommendations for assessments- not specific tools.
- Intervention principles- focus on individual and meaningful goals.
- Principle#2: Cog rehabilitation should incorporate:
  - Restorative treatments focussed on real world activities
  - Training in compensatory strategies
  - Caregiver training
  - Education about cognitive consequences of TBI
  - Functional adaption, and
  - Environmental manipulations.
- Principle#4: Groups for Social skills, Emotional self-regulation, Goal attainment, Problem solving, Communication, Attention, Memory
- NEW Principle#6: consider non-pharmacological interventions over pharmacological

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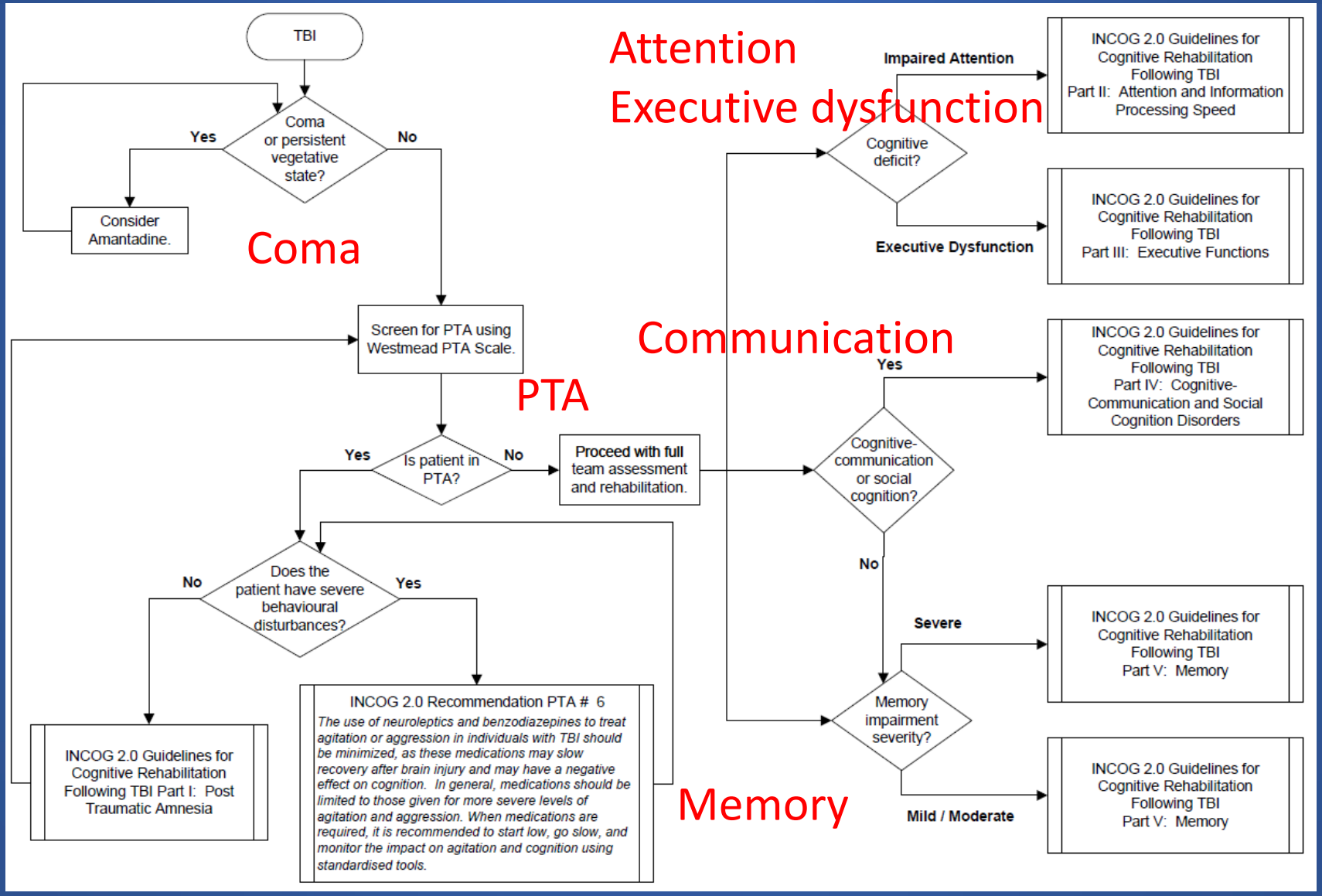
Principles Algorithm



Newer Recommendations

- 10 Recommendations for Medication Management.
- NEW 5 Recommendations for Tele-Assessment:
  - Suitability, informed consent, equipment availability
  - Preference for videoconference over telephone
  - Use of tools validated for videoconference (preferred)
- NEW 7 Recommendations for Tele-Rehab interventions:
  - Timely and equitable care
  - Ideal characteristics of person are: goals are well aligned, has history of following instructions well, has reasonable ability to self monitor and is self-aware and Family support is available.
  - Video conference preferred to visually monitor
  - Hybrid may be necessary.
  - Use groups where there is evidence for in-person.

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Posttraumatic Amnesia (PTA)
Ponsford et al.

INCOG 2.0 Guidelines for Cognitive Rehabilitation Following Traumatic Brain Injury, Part I: Posttraumatic Amnesia

- New Evidence
- Algorithm

INCOG 2.0: Part I: Posttraumatic Amnesia

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Recommendation re Assessment and Management in PTA

- PTA#1: Post-traumatic amnesia (PTA) assessment of a person with TBI should be performed daily using the Westmead Post-Traumatic Amnesia Scale until resolution of PTA (Updated from INCOG 2014,53 PTA 1, p. 310).
  Level B. Spiteri et al., 2021

- PTA#2: Provide a safe, quiet and consistent environment with flexible sleeping opportunities (Updated from INCOG 2014)

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Therapy Recommendations in PTA

- NEW PTA#3: Physical therapists should make efforts to provide therapy to patients in PTA, while flexibly adapting session length, intensity and location based on the degree of agitation, cognitive impairment, and fatigue of the person with TBI (INCOG 2022).
  Level B. Spiteri et al. 2021 a,b

- NEW PTA#4: Swallowing and communication should be monitored by speech language pathologists (SLPs); treating team should use short and simple communication, minimizing repeated orientation and memory questioning (INCOG 2022).
  Level C. Steel et al 2016, 2017; Nielsen et al.,2020 ; Hart et al.,2020

- NEW PTA#5: Individuals with TBI in PTA should receive activities of daily living (ADL) training that is standardized and follows procedural, and errorless learning principles (INCOG 2022).
  Level A. Trevena Peters et al.,2017, 2018, 2019 (RCT); Mortimer et al., 2019

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Medication for Agitation in PTA

- PTA#6: Avoid use of neuroleptics and benzodiazepines
- Manage agitation environmentally as much as possible
- If necessary, start low, go slow and monitor impact on cognition

Level C: Hicks et al., 2018 (Review); Phyland et al.2022 (RCT); McKay et al., 2020

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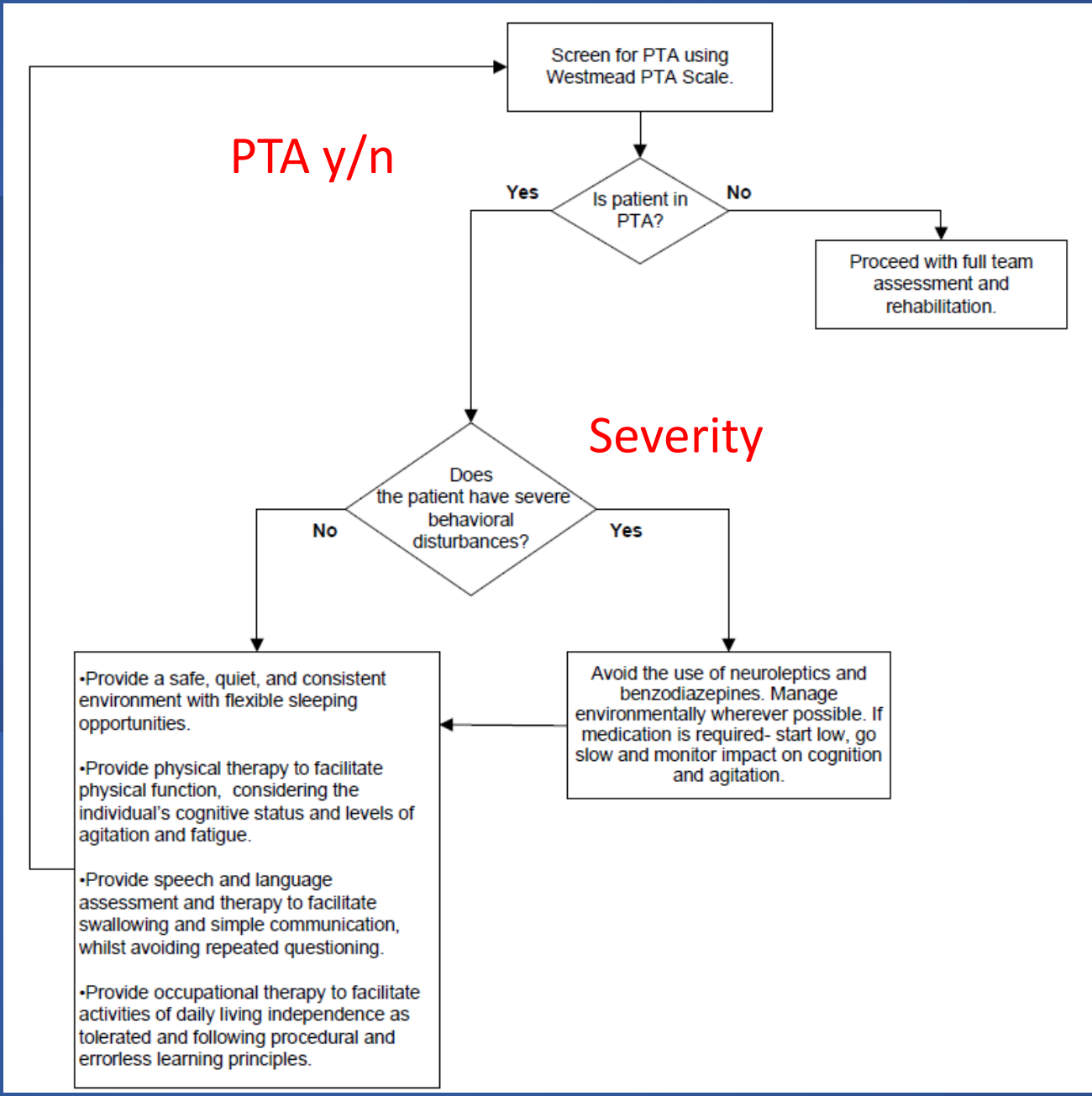
Posttraumatic Amnesia Algorithm



Attention and Information Processing Speed

Ponsford et al.

INCOG 2.0: Part II: Attention and Information Processing Speed

INCOG 2.0 Guidelines for Cognitive Rehabilitation Following Traumatic Brain Injury, Part II: Attention and Information Processing Speed

- New Evidence
- Algorithm

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Attention Recommendations

- Att#2: Metacognitive strategy training using functional everyday activities should be considered for individuals with TBI, especially those with mild-moderate attention deficits (Updated from INCOG 2014,28 Attention 1, p.324-325).
  Level A Time Pressure Management RCT ; Cicerone et al.,2019 ; Roitsch et al.2018; Virk et al., 2015; (reviews), Dymowski et al., 2016 (case studies)

- Att#3: Computer-based de-contextualized attentional tasks for individuals with TBI are **NOT recommended**. Everyday task specific training should be considered but cannot be expected to generalize beyond trained or similar tasks (Updated from INCOG 2014,28 Attention 6, p.326-327).
  Level B Bogdanova et al., 2016; Cicerone et al., 2019 (reviews), Dundon et al., 2015; Straudi et al., 2017 (RCTs)

- Att# 4,5,6 No change to recommendations relating to the use of dual-tasking, alterations to the environment, or evidence **against** recommendation of periodic random alerting or mindfulness-based therapy

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rTMS and tDCS

- NEW Att#8: The use of repetitive transcranial magnetic stimulation (rTMS) and transcranial direct current stimulation (tDCS) to ameliorate attention following TBI is **not recommended** outside of the context of a research trial protocol (INCOG 2022).

  Level B: Ahorsu et al., 2021; Nousia et al., 2022 (reviews); Lee & Kim, 2018; Neville et al., 2019; Rushby et al.;2021 Sacco et al., 2016; Ulam et al., 2015 (RCTs); Boissonault et al., 2021

Pharmacological Recommendations

- Att#9: Methylphenidate (initiated at a dose of approximately 0.10mg/kg and increased gradually to a target of 0.25–0.30 mg/kg bid) **is recommended** in adults with TBI to enhance speed of information processing (Updated from INCOG 2014,28 Attention 9, p.328).
  Level A; Barnett & Reid, 2020; Chien et al., 2019, Huang et al., 2016 (reviews) Dorer et al., 2018; Dymowski et al.;2016; Jenkins et al., 2019; Johansson et al., 2015; Manktelow et al., 2017; Moreno-Lopez et al.,2017 ; Zhang & Wang, 2019 (RCTs)

- Att#10: While amantadine may enhance arousal in patients in a minimally conscious state, it should **not** be used to enhance attentional functions following emergence from coma (Updated from INCOG 2014,28 Attention 10, p.328).
  Level A Hammond et al., 2018 (RCT)

- NEW Att#11: The traditional Chinese medicine MLC901 (NeuroAiD IITM) may enhance complex attention in individuals with mild-moderate TBI (INCOG 2022).
  Level A Theadom et al. , 2018 (RCT)

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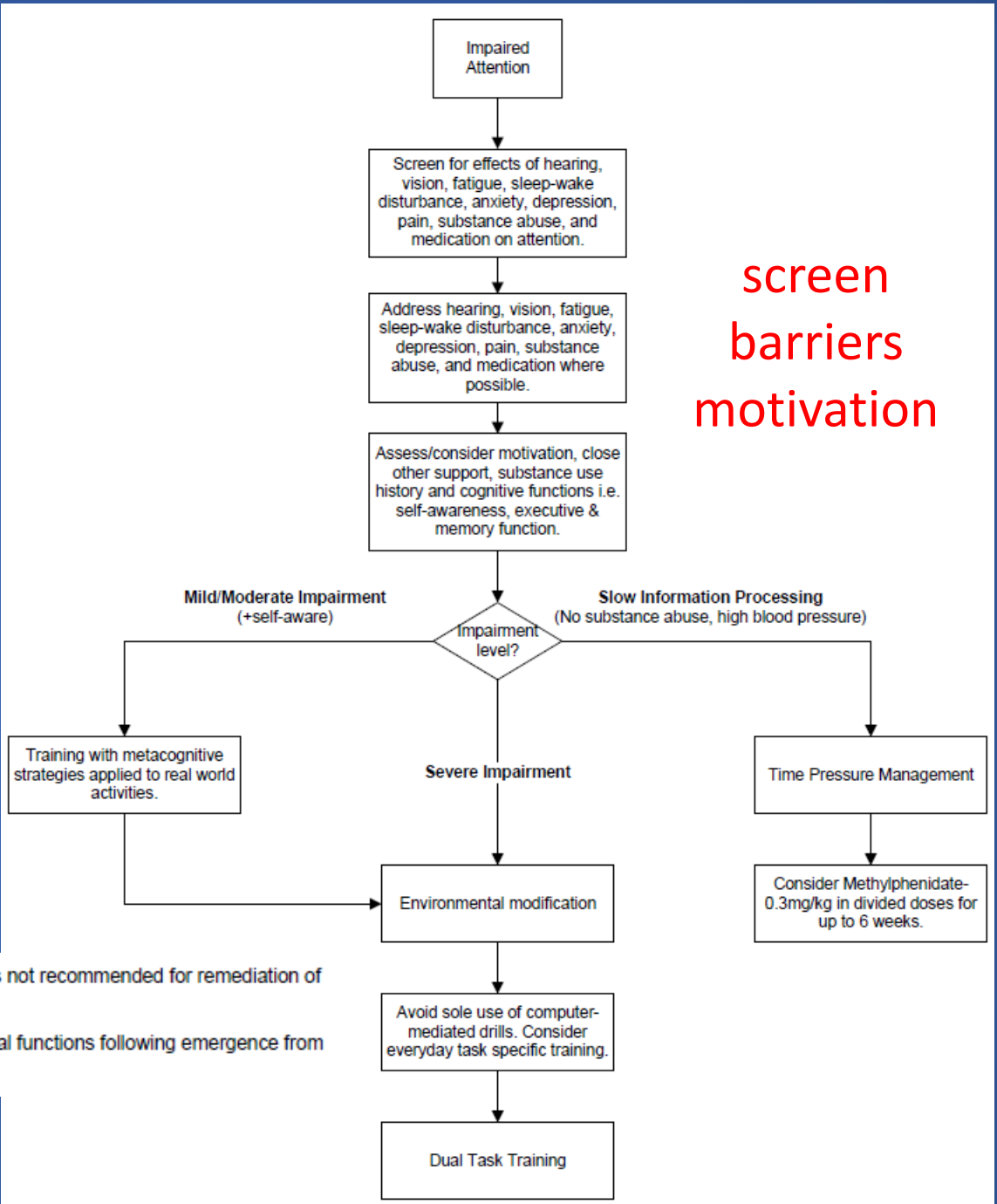
Attention And Information Processing Speed Algorithm



screen
barriers
motivation

Attention #6: Training in mindfulness-based meditation techniques is not recommended for remediation of attention deficits.

Attention # 10: Amantadine should not be used to enhance attentional functions following emergence from coma.

Executive Functions
Jeffay et al.

INCOG 2.0: Part III: Executive Functions

INCOG 2.0 Guidelines for Cognitive Rehabilitation Following Traumatic Brain Injury, Part III: Executive Functions

- New Evidence
- Algorithm

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Recommendations

- Executive interventions are unlikely to be effective without some degree of self-awareness and motivation, so much assess these first.
- EXEC#1: Self-Monitoring and Feedback to Enhance Self-Awareness
  - 1a. Strategies that encourage self-monitoring of performance and involve feedback should be used with individuals with TBI who have impaired self-awareness.
  - 1b. Consider self-awareness training such as video feedback to improve the ability to recognize and correct errors during task performance. (Updated from INCOG 2014, EXEC 3, p. 343).
    Level A. Must be domain specific.

Recommendations

- EXEC#2: Metacognitive strategy instruction (MSI) recommended for problems with planning, problem-solving and organization (e.g., GMT, Goal Plan Do Check). Train step-by-step procedures for:
  - Goal setting & selection
  - Creating general/specific plans
  - Selecting & using strategies
  - Self-assessing (i.e., self-monitoring)
  - Adjust goal and/or plan

Focus on everyday problems and relevant functional outcomes

Level A. 4 new studies Elbogen et al., 2019, Tomas et al., 2016; Siponkoski et al., 2020; Cantor et al.,2014

- EXEC#3: Strategies to improve capacity to analyze and synthesize information for impaired reasoning skills (unchanged from INCOG 2014).
- EXEC#4: Group-based problem solving/planning interventions should be considered

  Now Level A Cantor et al., 2014

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Recommendations

- NEW EXEC#5: consider a structured music therapy program that includes (1) rhythmical training, (2) structured cognitive-motor training, and (3) assisted music playing that is individualized to the person's interests and progression through the program (Adapted from ONF-INESS 2015). May increase fronto-parietal connectivity.
  Level A. Siponkoski et al. (2020) , 2 RCTs 1 meta-analysis

- NEW EXEC#6: Clinicians consider the use of virtual reality programs, in addition to in-person visits to provide timely and equitable access to care for executive dysfunction (INCOG 2022). (Game-based, task-oriented, or simulation of ADL. Fully, semi-or non immersive). Mixed study quality

- EXEC#7: One-to-one remotely delivered interventions (e.g., for goal management training), following telerehabilitation guidelines, recommend if remote delivery is most convenient or only mode of reaching the person (INCOG 2022).

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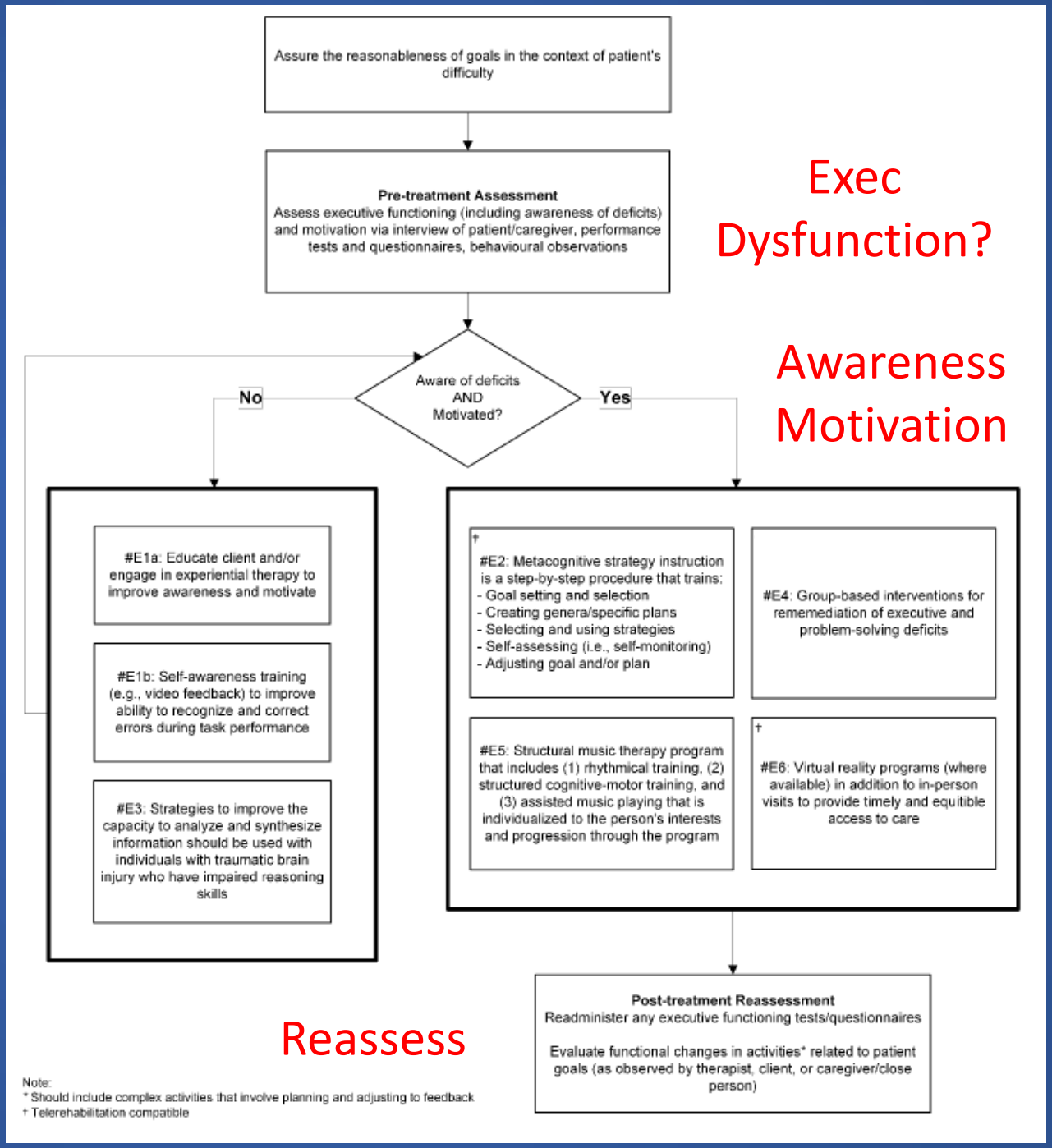
Executive Functions Algorithm



Cognitive-Communication
Togher et al.

INCOG 2.0: Part IV: Cognitive-Communication and Social Cognition Disorders

INCOG 2.0 Guidelines for Cognitive Rehabilitation Following Traumatic Brain Injury, Part IV: Cognitive-Communication and Social Cognition Disorders

- New Evidence
- Algorithm

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Recommendations

Cognitive-Communication #1-4: Assessment and rehabilitation needs to take into account the individual's

- cultural background
- gender identity
- pre-morbid abilities and communication style
- demands and priorities
- communication partners
- communication environment
- fatigue
- physical and sensory issues
- behavioural, emotional and psychosocial factors

Staff should receive cultural competence training. (Updated from INCOG 2014) *Level B*

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Recommendations

- Cog-Comm#4: Recommended cognitive-communication interventions, can be direct or indirect at any level of impairment and include:
  a. Communication partner training (Level A),
  b. Communication strategy and metacognitive awareness training (Level A),
  c. Reintegration to daily functions, productive activities, participation and competence, modification of the communication environment, and assistance with adjustment to impairments (Level C),
  d. Communication coping treatment (Level C),
  e. Focus on confidence, self-esteem and identity formation (Level C), and
  f. Provision of education and information regarding the nature of acquired cognitive-communication disorders to both the patient and close other and communication partners (Level C) (from INESSS-ONF 201633). *Level A-C*
- Cog-Comm#5: Provide practice in everyday situations.
- Use Goal Attainment Scaling to measure person-centred outcomes
- Cog-Comm#8: Telerehabilitation is as efficacious for communication partner training as in-person intervention (INCOG 2022). *Level B*

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Recommendations

- Cog-Comm#6: Individuals with severe communication disability following TBI should be provided with proper assessment to determine the appropriate augmentative and alternative communication (AAC) intervention by trained clinicians.
- The individual and close communication partners should be provided with training to effectively use AAC aids.
- This training should be ongoing as needs change and technology evolves

(Updated from INCOG 2014,23 Cognitive-communication 6, p. 357).

Level C

Recommendations

- Social Cognition #1: Clinicians should consider evaluating aspects of social cognition ability, including emotion perception, theory of mind (ToM) and emotional empathy (these interventions are recommended)
- Computerized social cognition treatments are **not recommended** given lack of evidence of generalization to real life activities (INCOG 2022). *Level A*
- Cog-Comm#7: Consider group therapy for cog-communication training when social communication impairments exist and goals align.(Updated from INCOG 2014, 23 cog-comm 7, p.361). *Level A*

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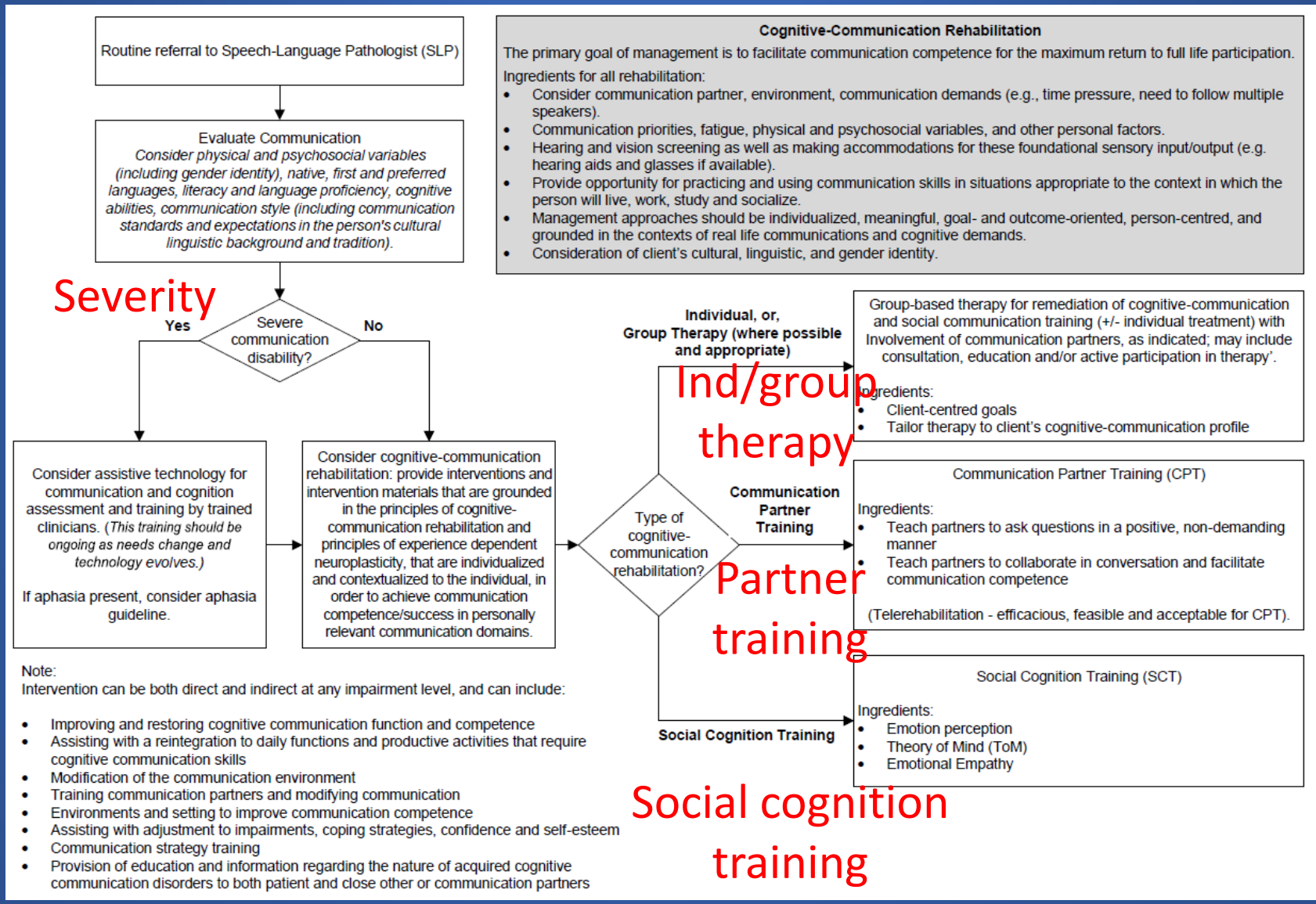
Cognitive-Communication Algorithm



Memory
Velikonja et al.

INCOG 2.0 Guidelines for Cognitive Rehabilitation Following Traumatic Brain Injury, Part V: Memory

- New Evidence
- Algorithm

INCOG 2.0: Part V: Memory

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Recommendations

- Mem#1: Internal compensatory strategies may be used for individuals with TBI and mild-to-moderate memory impairments and/or some preserved executive cognitive skills.
  - Visual imagery
  - Repeated practice
  - Retrieval practice
  - Preview, Question, Read, State, Test (PQRST)
  - Metacognitive strategies (e.g., self-awareness, self-regulation)
- Multiple strategies is considered effective.
- Individually or group

(Updated from INCOG 2014,16 Memory 1, p.374).
Level A. Raskin et al., 2019

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Recommendations

- Mem#2: Environmental supports and reminders (e.g., mobile/smartphones, notebooks and whiteboards) are recommended for individuals with TBI and memory impairment, especially severe memory impairment. Individuals with TBI and caregivers must be trained to use these supports.
- Selection of environmental supports and reminders should take account of:
  - Age
  - Severity of impairment
  - Premorbid use of electronic and other memory devices
  - Cognitive strengths and weaknesses (e.g., executive cognitive skills)
  - Physical comorbidities
  - Affordability, portability, reliability

(Updated from INCOG 2014,16 Mem 2 and 3, p.378).

Level A: Evald et al. 2015; Ferguson et al., 2015; Charters et al., 2015

- Mem#3: All skills and strategies taught should be integrated into everyday activities; **limited evidence** to support restorative skills training.

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Recommendations

- Mem#4: instructional practices to promote learning for individuals with memory impairments:
  - Clearly defined intervention goals
  - Selection and training of goals relevant to person with TBI
  - Allow sufficient time and opportunity for practice
  - Breaking down tasks into smaller components when training multistep procedures
  - Use distributed practice
  - Teach strategies using variations in the stimuli being presented (e.g., multiple exemplars)
  - Teach strategies to promote effortful processing of information (e.g., verbal elaboration, etc.)
  - Use techniques that constrain errors (e.g., errorless, spaced retrieval)
  - Consider memory strategies with a focus on context and imagery in acquisition

(Updated from INCOG 2014,16 Memory 4, p. 379).

Recommendations

- Mem#5: Group-based interventions may be considered for teaching memory strategies, but there is no evidence that it is more effective than individual rehabilitation.
  - Consider reducing heterogeneity in group membership,
  - Encourage participation for an adequate number of sessions and
  - Teach generalization of learned skills

  (Updated from INCOG 2014,16 Memory 5, p.381). *Level A.*

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Recommendations

- Mem#6: The acetylcholinesterase inhibitor (AChEI), donepezil (Aricept), may be considered for adults with TBI and memory deficits only in the chronic stage of recovery. The effects of the medication should be assessed using objective and functional measures. Patients should be monitored for side effects such as diarrhea, stomach upset and nausea (Updated from INCOG 2014,16 Memory 6, p.381).
  Level A Evidence
- Memory #7: Transcranial direct current stimulation (tDCS) **should not** be used to improve memory outside of the context of a randomized controlled trial (INCOG 2022).
  Level A Evidence
- Memory #8: Methylphenidate and amantadine **should not** be used to improve memory (INCOG 2022).
  Level A Evidence

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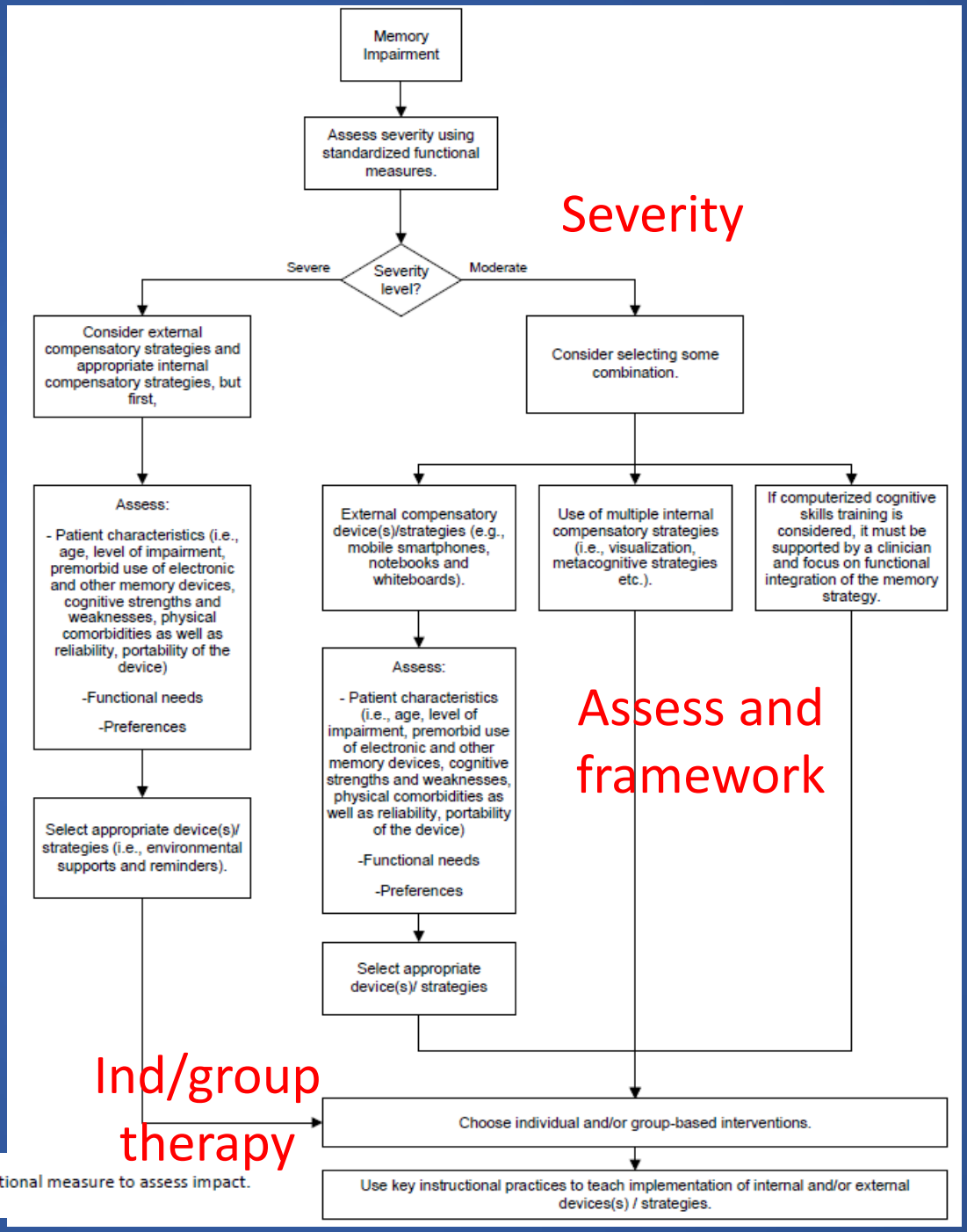
Memory Algorithm



Note: Consider AChEI donepezil only if in chronic TBI and using a functional measure to assess impact.

Future of INCOG
Bragge et al.

INCOG 2.0: The Future of INCOG (is Now)

The Future of INCOG (Is Now)

- Getting the question right: Codesigning and prioritizing research questions ensure that research effort is focused on areas where impact is most needed.
- Streamlining the reviews that drive the guidelines: Technology has brought us closer to the “holy grail” of guidelines that are both comprehensive and up to date.
  - Creating an INCOG Eco-system
- Connecting recommendations to practice: The considerable research effort that goes into guidelines is wasted if implementation and connection to practice are inadequate or unsupported.
  - Importance of a Learning Health System

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Conclusions

- INCOG Guidelines are a resource to promote cognitive recovery that have been extensively updated with new recommendations, algorithms and audit tools.
- Emergence of telerehabilitation offers promise for improvements in access.
- Considerable efforts are required to continue to overcome the barriers, however, technology can support all phases including synthesis of the evidence, collection of audits and incorporation of algorithms.

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THANK YOU
QUESTIONS?

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