Brain Injury Rehabilitation: What Works and Where Should We Focus our Attention?

Mark Bayley, MD, FRCPC, CCPE
Program Medical Director, UHN Toronto Rehab Institute
Coriat Family Chair in Rehabilitation Innovations
Senior Scientist, KITE Research institute
Professor, Division of Physiatry, University of Toronto

UHN Toronto Rehabilitation Institute
The KITE Research Institute

Neurotrauma Care Pathways

Overview of the Approach

- **Dr. Paul Comper: "Provide comprehensive overview of evidence for what works in brain injury rehab"**
- **Me: All that In 45 minutes???!!!**

- **Dr. Paul Comper: Ok then do whatever you want**

- **My Plan therefore is to take you on a trip along the continuum of brain injury care (ideal pathway) and review *selected* recommendations and clinical trials that support those recommendations**
  - **Where the evidence has evolved and perhaps you should know**
  - **Gaps in best practice that I think we are not doing so well**
  - **Interactive- finish your coffee and get your phones ready**

Objectives

By the end of this presentation you should be able to:

1. Name at least 3 online resources that can be used to find evidence based guidance for brain injury care
2. Describe few key evidence based interventions at each step of the Brain injury pathway that enhance recovery/quality of life and the research that supports them
3. Name some factors that are important for long term quality of life amongst people with Brain injury.

Warm up Question 1

We are going to use a polling software called Slido.com

Which Superpower would you like to have ?

A. Flying
B. Teleportation
C. Invisibility
D. Mind Reading
E. I already have a super power

Slido.com #42583285

Question 2

Tell us about your background?

- Slido.com poll #42583285

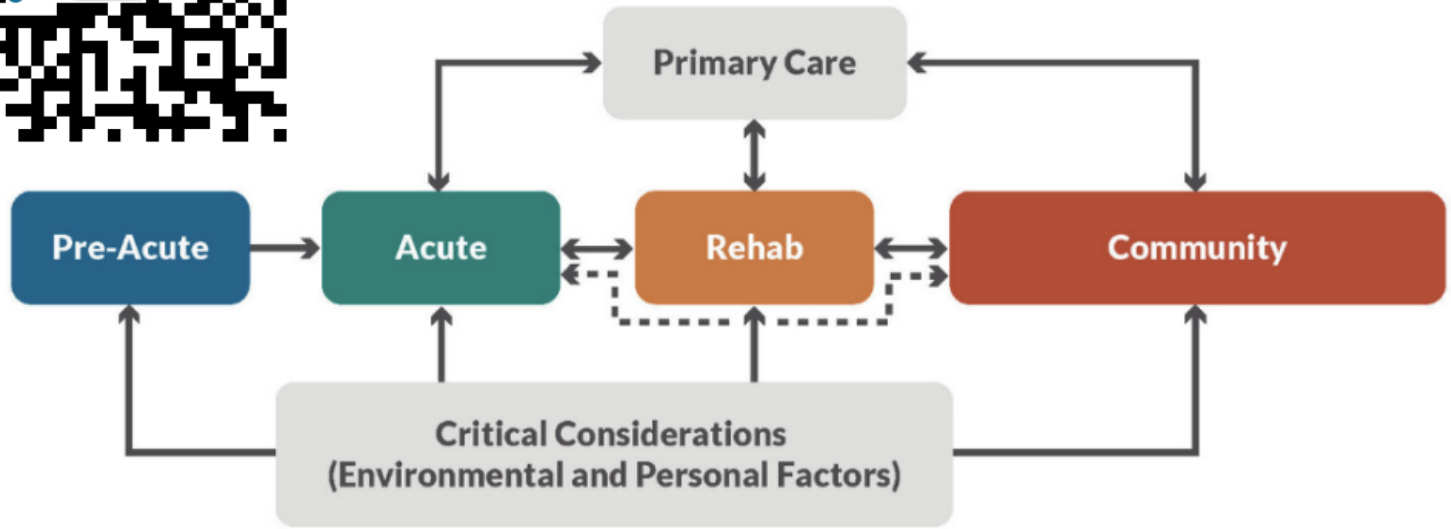
OBJECTIVE #1

Name at least 3 online resources that can be used to find evidence based guidance for brain injury care

OVERVIEW OF IDEAL PATHWAY

Link: https://www.neurotraumapathways.ca/

Neurotrauma Care Pathways

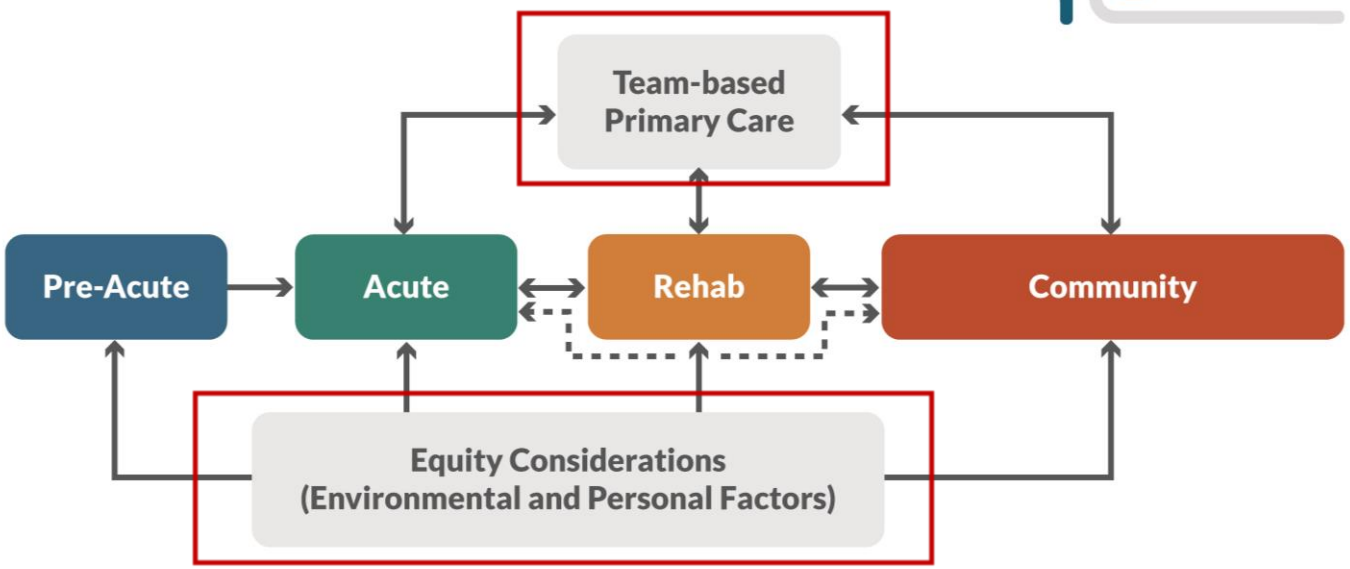


3 related but separated Pathways

- Concussion 
- Moderate to severe TBI 
- tSCI 

- Building blocks of ideal care linked to clinical practice guidelines have been created for each care stage across the lifespan
- It is a framework to develop strategies to assess the quality and equity of care across the heath care system and lifespan
- Personalization is possible based on geography and individual circumstances

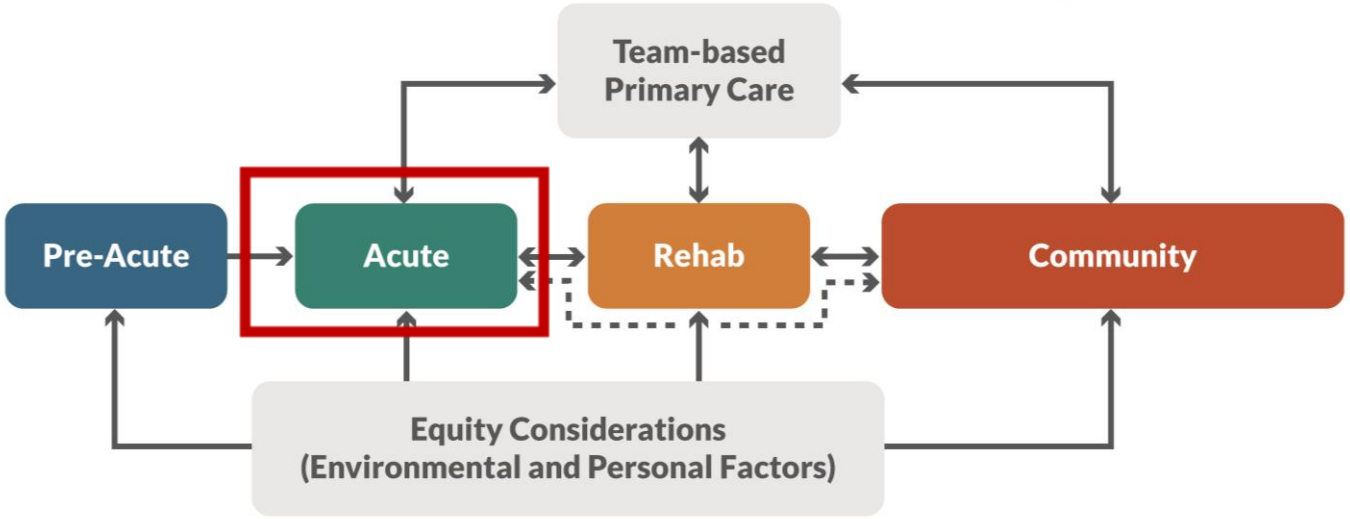
NEUROTRAUMA CARE PATHWAYS



Neurotrauma Care Pathways Interactive Website:
https://www.neurotraumapathways.ca

- Collaborated with 200 key partners (public, insurance and fee for service sectors) across Ontario in Canada
- Each care stage contains building blocks (key elements of care), which are linked to existing evidence-based Clinical Practice Guidelines; **outlines what you should get**

NEUROTRAUMA CARE PATHWAYS



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Question 3 – Post Traumatic Amnesia

Thinking about people with TBI in PTA - Which statements are true about your approach?

Check all that apply

A. We don't admit people in PTA to our inpatient service
B. I don't see people in PTA post TBI in my practice as I work in the community
C. We practice Activities of daily living using an errorless approach
D. I like to keep asking people in PTA questions to keep them oriented
E. I assess PTA using Galveston Orientation and Amnesia Test
F. I assess PTA using Westmead Post-Traumatic Amnesia Scale

Where can I find the best practices?

If you click on the box in the pathway it takes you to the Canadian TBI Guidelines

Or ……

METHODOLOGY

ERABI EVIDENCE-BASED REVIEW of moderate to severe ACQUIRED BRAIN INJURY

CANADIAN CLINICAL PRACTICE GUIDELINE FOR THE REHABILITATION OF ADULTS WITH MODERATE TO SEVERE TBI

www.braininjuryguidelines.org

Establish an Expert Panel

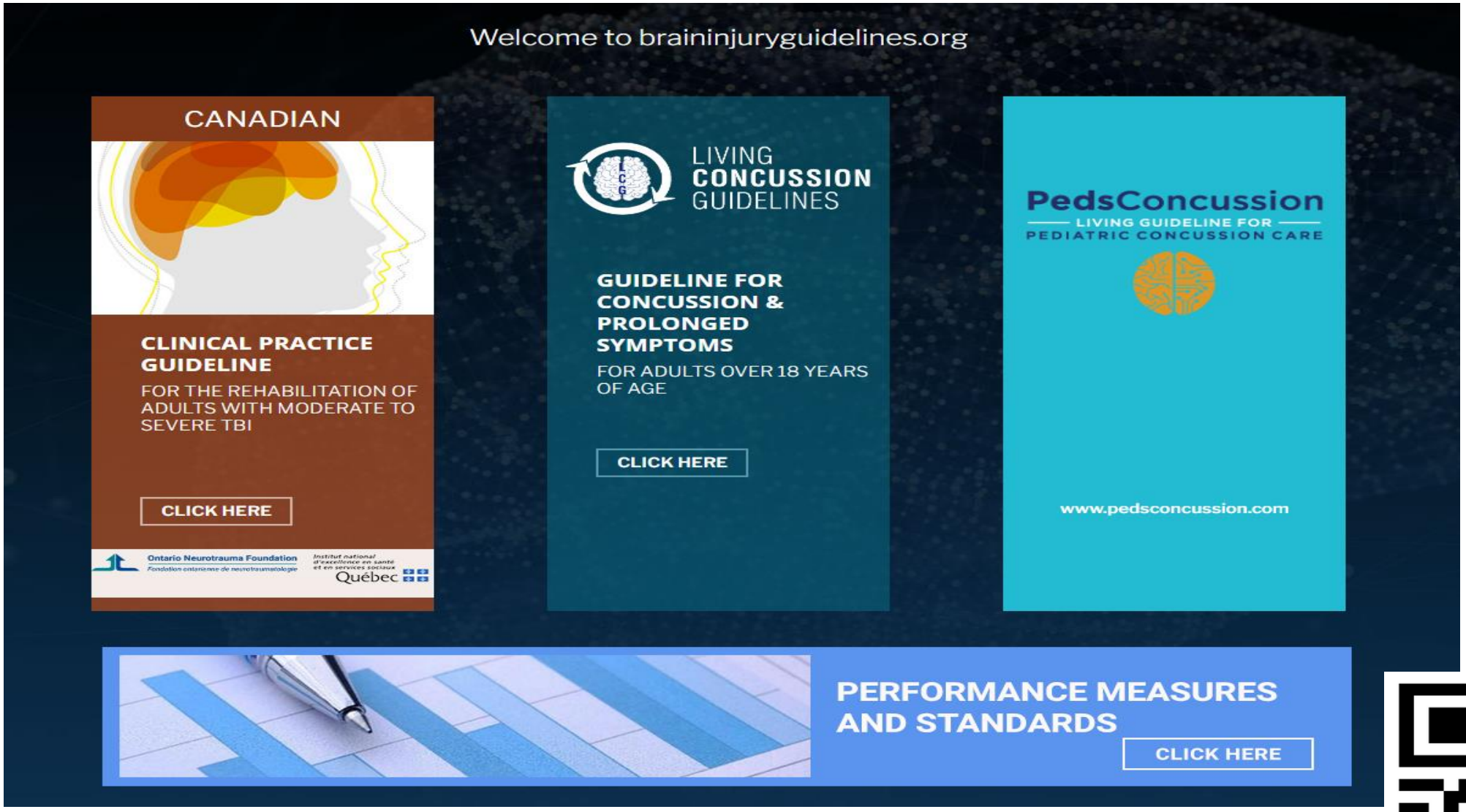
Comprised of clinicians, program leaders, researchers, and administrators

Systematic Evidence Search

Conducted by the ERABI Team
Systematic search of several databases - Medline, EMBASE, Cochrane, CINAHL, and PsycINFO

Expert Panel Meetings to Develop Recommendations

Twelve 1-hour videoconference meetings were organized



Link: https://braininjuryguidelines.org/

OBJECTIVE #2

Describe few key evidence based interventions at each step of the Brain injury pathway that enhance recovery and improve quality of life

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)

incog rehabilitation guidelines

Therapy Recommendations in PTA

- PTA#5 (new): 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

- PTA#3 (new): 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

- PTA#4 (new): 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

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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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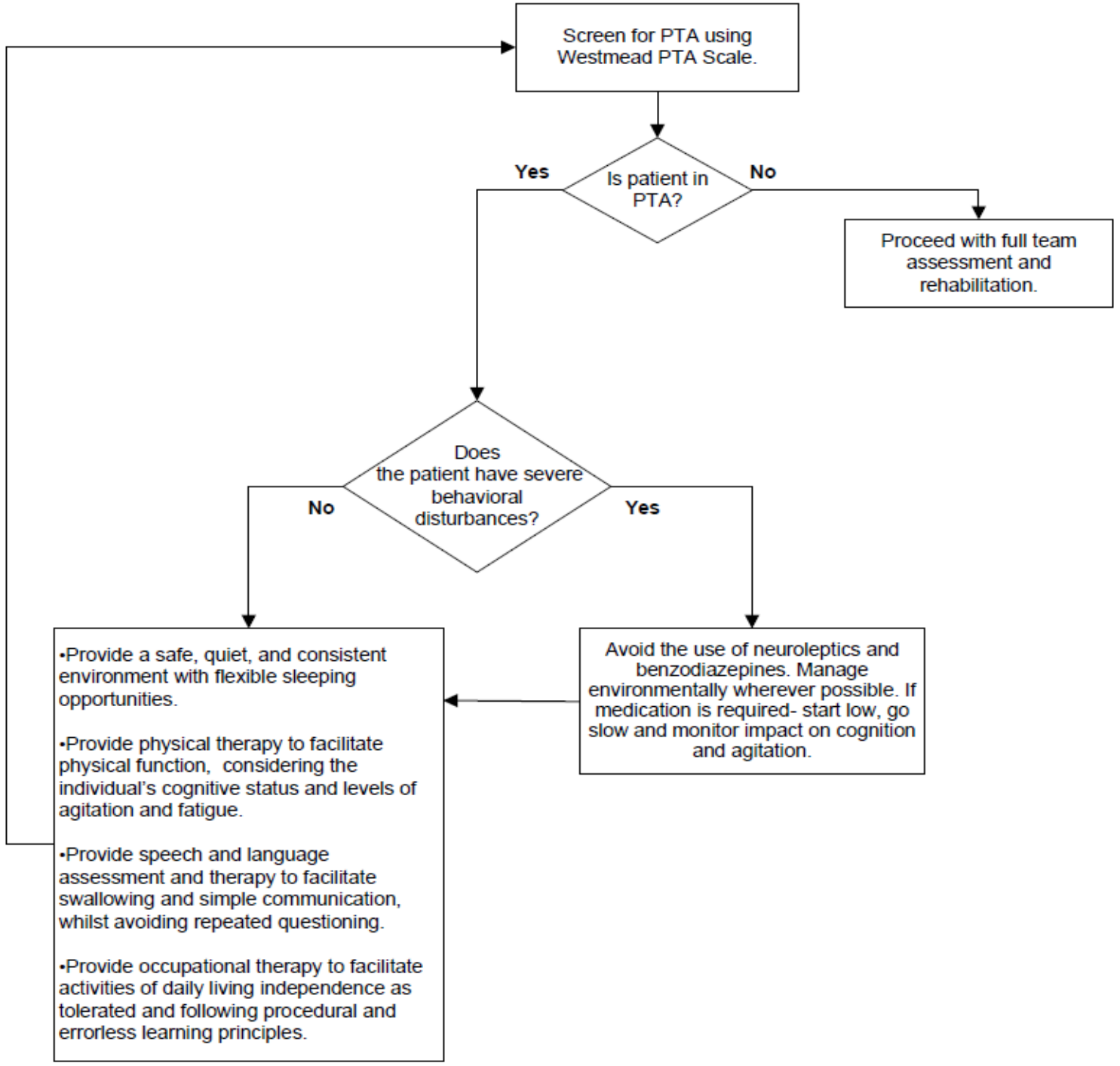
POSTTRAUMATIC AMNESIA ALGORITHM



Why has PTA Care Changed

Spiteri et al. *J Head Trauma Rehabil. 2021:36(3):156-163.*

- prospectively compared the three measures i.e. Galveston Orientation and Amnesia Test (GOAT), Westmead PTA Scale (WPTAS),, and Confusion Assessment Protocol (CAP),
- found that individuals with severe TBI emerged from PTA earliest on the CAP followed by the GOAT, and lastly, the WPTAS.
- It would appear that the WPTAS identifies the ability to form new memories at a later stage of PTA recovery thus more clearly defining the end of PTA

Hart et al*. Brain Inj. 2020;34(11):1518-1524*.

- showed success in minimizing questions demanding recall from explicit memory (e.g., orientation quizzing, and personal/medical questions),
- may produce unreliable information and exacerbate frustration and anxiety in patients in PTA.

Why has PTA Care Changed

Trevena-Peters et al. *Arch Phys Med Rehabil. 2018;99(2):329-337*.

- RCT n= 104 patients with severe TBI remaining in PTA >7 days
- compared engagement in daily sessions of ADL retraining (<30 minutes) delivered following errorless and procedural learning principles in addition to usual care (i.e, physiotherapy, necessary speech therapy) with usual care alone.
- The early ADL training group showed significantly greater improvement on the Functional Independence Measure (FIM) at PTA emergence and at hospital discharge.
- the ADL training did not result in increased agitation
- An economic analysis showed that the reduction in length of stay associated with early ADL retraining resulted in average cost savings of $9654 AUD per treated patient
- At 2-month follow-up the group differences were no longer significant; there were no group differences on the Community Integration Questionnaire.

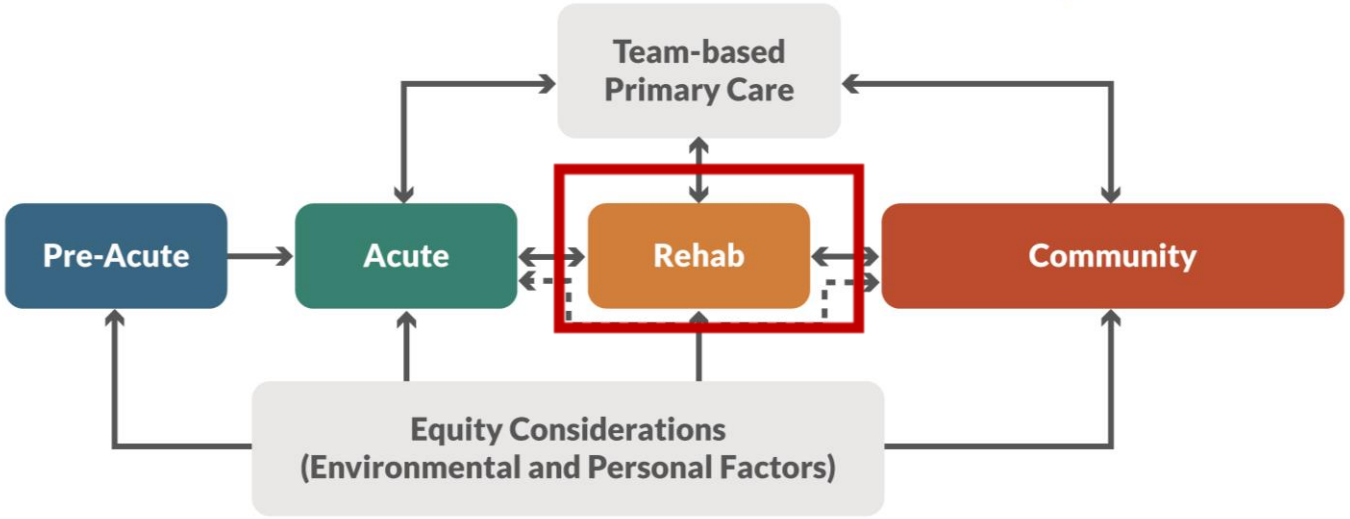
Why has PTA Care Changed

There is still no evidence that individuals in PTA benefit significantly from therapy to enhance orientation.

Lannin et al. *Int J Qual Health Care. 2021;33(1*).

- conducted a pilot RCT involving 40 patients with TBI in PTA to examine the feasibility and effectiveness of a structured reorientation program .
- The program provided twice daily environmental orientation to a calendar, clock and hospital signage; a reorientation script to standardize staff and visitor interactions; and flyer to encourage visitors to simplify communication, keep visits short, and bring familiar photos or objects.
- There were no statistically significant between-group differences in time to emergence from PTA on the WPTAS.

NEUROTRAUMA CARE PATHWAYS



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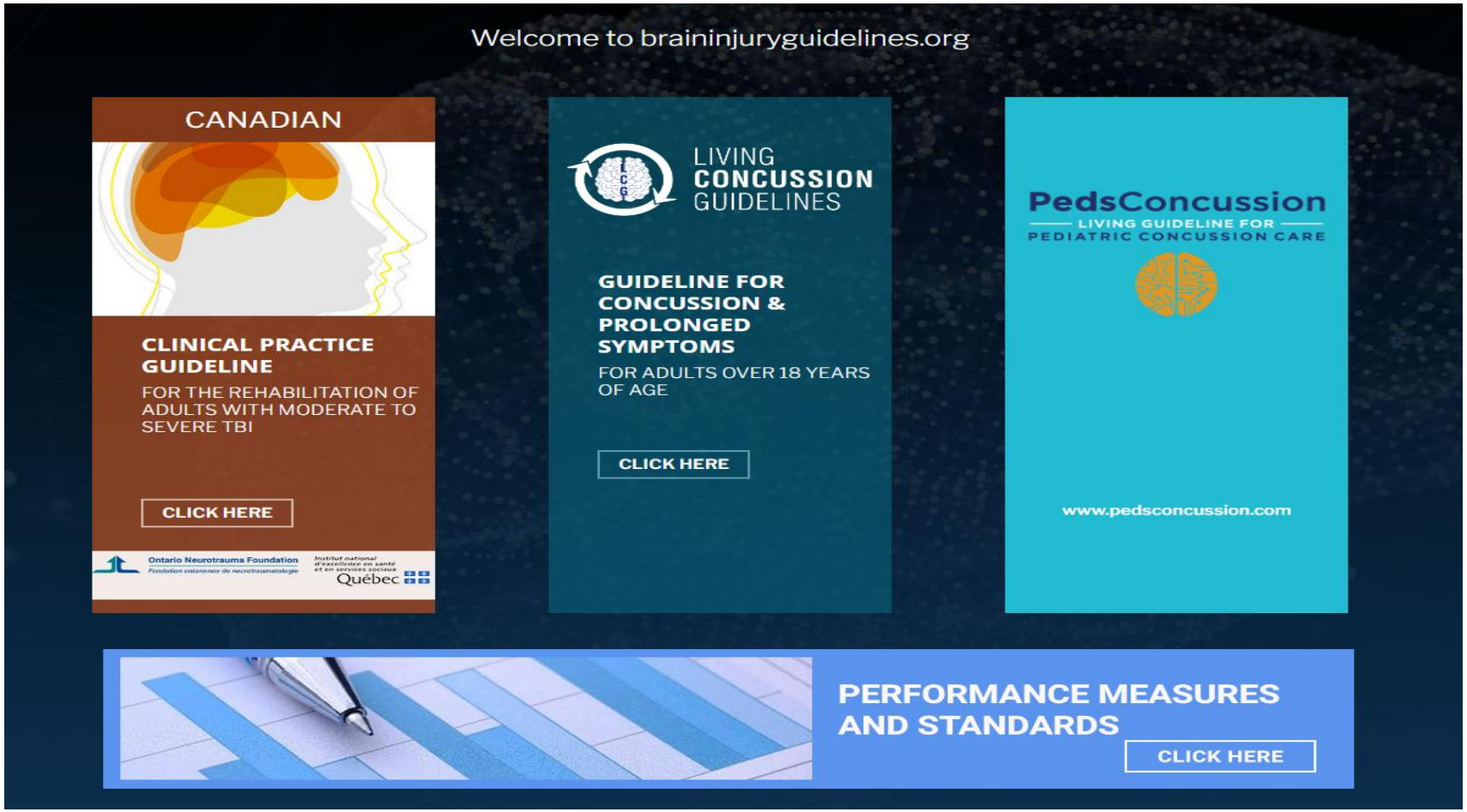

Link: https://braininjuryguidelines.org/

Go to section on subacute Rehabilitation

Guidelines for Inpatient. Rehab

- **Age should not be a limiting factor for early multidisciplinary intensive** rehabilitation. Adults between the age of 65 and 90 should have comparable access to early multidisciplinary intensive rehabilitation that maximizes their level of independence as age has not been associated with response to rehabilitation. The supporting research only included participants up to the age of 90 years.
- In order to optimize outcome following TBI, inpatient rehabilitation interventions should include evidence-based cognitive strategies to manage higher-level cognitive functions, as tolerated (e.g., goal management training, problem-solving skills, planning and pacing, working memory, memory, math skills, metacognitive awareness and strategies) starting early in rehabilitation.

Guidelines for Inpt Rehab

- **Rehabilitation interventions for patients with lower Cognitive FIM sub scores** (scores of ≤10 out of 35) and communication impairments **should target advanced communication, cognitive-communication, social communication function** (i.e., interventions focused on higher level functions, such as executive functions, that challenge patients in the areas of expression, auditory comprehension, and problem solving), competence (the ability to achieve communication goals in a socially appropriate manner), and advanced reading and writing.

- **Interventions that are challenging and require significant effort on the part of the person with TBI should be promoted** (i.e., the clinician should not avoid challenging activities unless it exacerbates problematic behaviour or irritability, and should explore alternate ways to provide the right challenge while considering the person's abilities, cognitive reserve, fatigue, and behaviours). To avoid frustration or misunderstanding on the part of the patient/family, the rationale for providing interventions that are challenging and require significant effort should be clearly, and repeatedly (as needed), communicated.

Question 4 - Survey Question

In regards to improving outcomes for people in inpatient rehabilitation, what does cognitively effortful mean to you?

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The Evidence behind the guidelines

- In a RCT by Zhu et al. (2001), patients were randomized into two groups based on rehabilitation intensity.
  - One group received 4 hours per day of therapy, and another received 2 hours per day, 5 days per week.
  - The authors reported that significantly more patients from the intensive group achieved good outcomes at 2 months as defined by the Glasgow Outcome Scale,
  - however, this effect was not sustained at 3 months as the conventional therapy group caught up.
  - This study suggests that more intensive rehabilitation may provide added benefits in the first two to three months post injury, although as time progresses, those who receive less intensive therapy eventually catch up.

The Evidence behind the guidelines

Horn et al. (2015) longitudinal non-randomized study (practice based evidence)

- examined associations of patient and injury characteristics, inpatient rehabilitation therapy activities, and neurotropic medications with outcomes at discharge and 9 months
- Consecutive patients (N=2130) enrolled between 2008 and 2011, and admitted for inpatient rehabilitation were studied.
- admission FIM cognitive score was used to create 5 relatively homogeneous subgroups for subsequent analysis of treatment outcomes.
- Patient and injury characteristics explained 35.7% of the variation in discharge outcomes
- when they included effort in therapy and time in specific activities, prediction increased beyond that using only total time in therapy (Time did not appear to be as important as effort/complexity)
- They concluded that greater effort during therapy sessions, time spent in more complex therapy activities, and use of specific medications were associated with better outcomes for patients in all admission FIM cognitive subgroups at discharge

The Evidence behind the guidelines

But how do we measure effort?

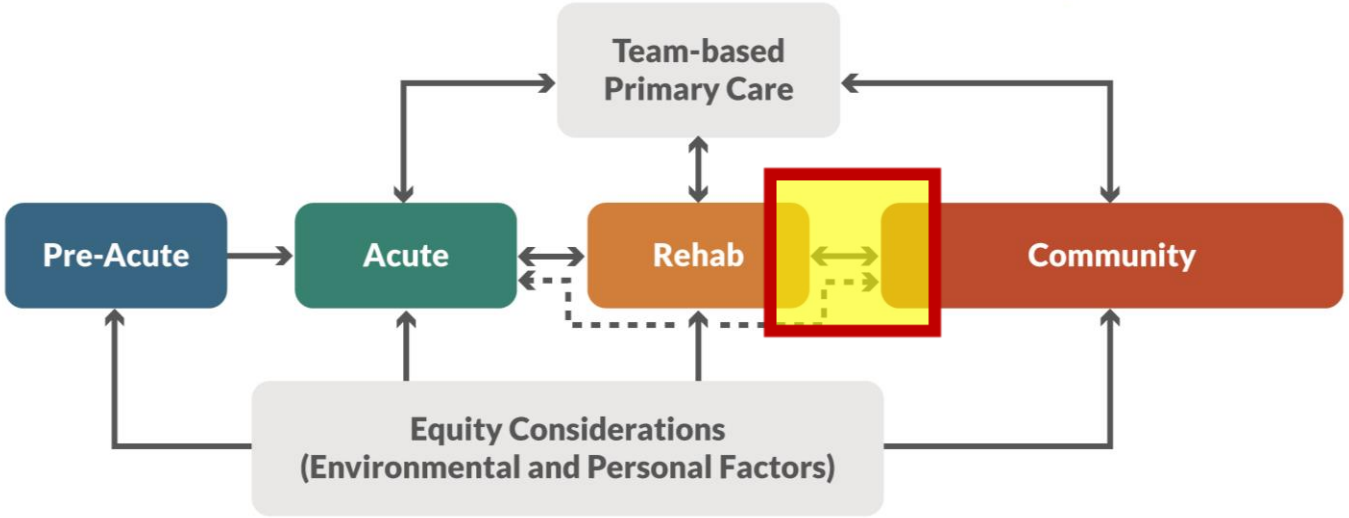
- *Seel, R et al . Arch Phys Med Rehabil, 96(8 Suppl), S235–S244*
- Effort in rehabilitation sessions rated on the Rehabilitation Intensity of Therapy Scale
- The Rehabilitation Intensity of Therapy Scale, a single-item, 7-point, behaviorally anchored rating scale, was used to rate patients' level of effort during each PT, OT, and ST individual therapy session
- The level of effort ratings in individual therapy sessions by OT (n=45,770), PT (n=50,383), and ST (n=42,402) were completed
- Patients who sustain TBI show a wide range of effort levels in their therapies. The level typically improves over the course of their stay. Presence of PTA and agitated behavior are primary factors that substantially reduce patient effort.

The Evidence behind the guidelines

Appendix 1 Rehabilitation Intensity of Therapy Scale: level of effort ratings and behavioral anchors

Effort Rating	Behavioral Anchor
7 (superior)	Patient sustains full attention and goal-directed activity throughout the entire therapy session. The patient consistently initiates activity; seeks performance feedback and/or self-monitors performance; adjusts activity based on feedback; and requests more challenging activities. The patient perseveres with therapy tasks, even when activities are extremely physically or mentally challenging.
6 (very good)	Patient sustains full attention and goal-directed activity throughout the entire therapy session. The patient sometimes initiates activity, may seek performance feedback, and adjusts activity based on feedback. The patient perseveres with therapy tasks that are physically or mentally challenging without encouragement or prompting.
5 (above average)	Patient sustains full attention and goal-directed activity during most of the therapy session. The patient rarely initiates activity or seeks performance feedback but consistently adjusts activity when performance feedback is provided. The patient perseveres with therapy tasks that are physically or mentally challenging with some encouragement or prompting.
4 (average)	Patient is generally attentive, follows instructions, and works toward goals during the therapy session. The patient relies on the therapist to direct all tasks. The patient does not seek feedback but sometimes adjusts activity when performance feedback is provided. The patient requires prompting and/or encouragement to continue with therapy tasks that are physically or mentally challenging.
3 (below average)	Patient is inconsistently attentive and may require repetition of instructions and/or redirection toward therapy session goals. The patient is generally unresponsive to performance feedback and rarely adjusts activity when feedback is provided. The patient gives up easily when therapy tasks become physically or mentally challenging.
2 (minimal)	Patient is inconsistently attentive and requires frequent repetition of instructions and/or redirection toward therapy session goals. The patient may refuse to comply with the therapist's instructions and/or requests and may end the session early. The patient does not attempt therapy tasks that are physically or mentally challenging.
1 (absence of effort)	Patient is rarely attentive and is engaged in virtually no goal-oriented activity. The patient either refuses or is unable to comply with the therapist's instructions and/or requests, which may lead to early termination of the session.

NEUROTRAUMA CARE PATHWAYS



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Question 5 - Survey Question

In your opinion, which is the most frequently missed education topics for patients and families in typical TBI rehabilitation?

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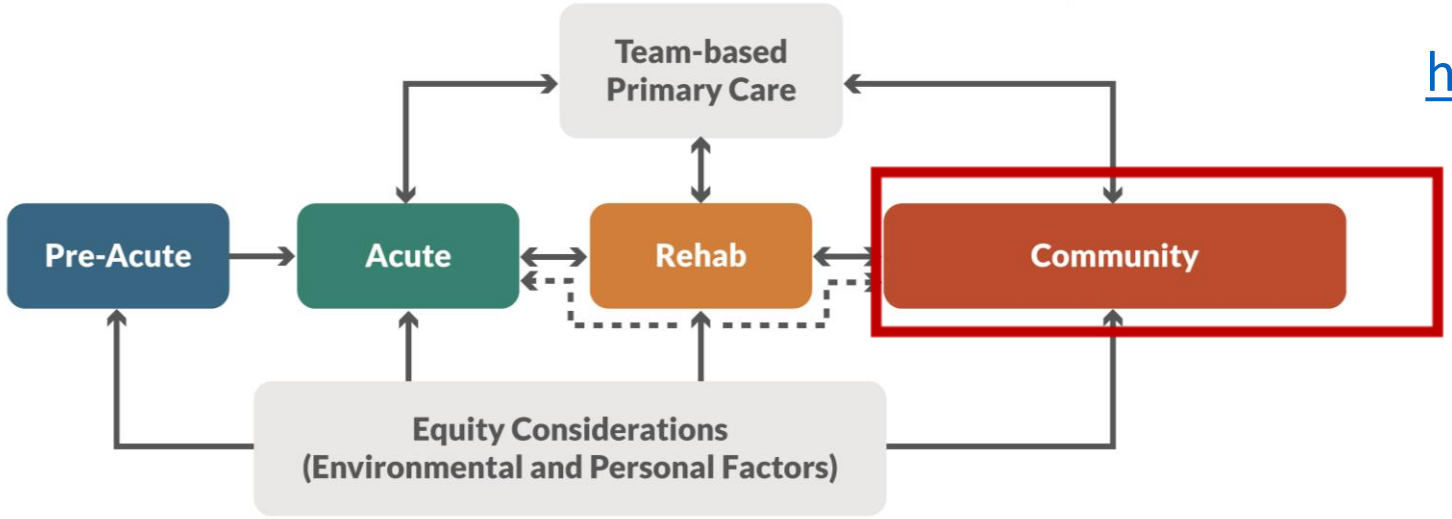
A. How to cope with memory impairment
B. How to adapt to changes in Sexual function after TBI
C. How to cope with changes in Social Cognition/recognizing emotions
D. Living with changes in Self Awareness and how to adapt
E. Behavioural changes after Brain injury

Objective 3-

Name at least 5 factors that are important for long term quality of life amongst people with Brain injury

NEUROTRAUMA CARE PATHWAYS



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Question 6

Which one of the factors below is NOT associated with worse self-reported quality of life after TBI?

A. Being Female
B. Difficulty reading other's emotions
C. Lower Self-awareness and insight
D. Being Socially isolated
E. Behavioural changes

- Slido.com poll #42583285

Quality of Life after TBI

Correlated with three factors

1. Biological Factors (related to the injury)
2. Psychological Factors
3. Social Factors

Reference: Biopsychosocial factors of quality of life in individuals with moderate to severe traumatic brain injury: a scoping review Mamman et al
Quality of Life Research (2024) 33:877–901
https://doi.org/10.1007/s11136-023-03511-0

Biological Factors and QOL

Better QOL	Reduced QOL
Being Male	Epilepsy
Time Since Injury	Cognitive impairment
Greater independence in ADL	More Severe Disability
Severity of injury	Fatigue/
	Sleep impairment
	Pain
	Preinjury illness or injury

Surprising !

Psychological Factors and QOL

	Better QOL	Reduced QOL
		
Surprising !	☐ Lower Self Awareness	☐ Higher Self Awareness
	☐ Active Task Oriented Coping Style	☐ Avoidant Coping Style
	☐ Self-Efficacy and Self Determination	☐ Depression/Anxiety
	☐ Positive affect/Optimistic life orientation	☐ Substance use disorders
	☐ Better Facial Recognition ability	☐ Behaviour changes
		☐ Difficulty identifying emotions (alexithymia)

Social Factors and QOL

Better QOL

- Community Integration
- Married
- Number of Friends
- Higher Education
- Employed

Reduced QOL

- Lower productivity
- Single
- Socially isolated

QOL- not as associated with

- Mobility- We typically spend a lot of time on this but may not be as important as we think
- Age-not a strong relationship

QOL of Family and Caregiver?

Poor family functioning and symptoms of anxiety and depression in the relatives were predicted by:

- behavioural changes in the injured individual
- mood in the injured individual

What QOL- Biological Factors can we address?

- Difficulty with Activities of Daily living
- Fatigue
- Sleep impairment
- Pain
- Cognitive impairment

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INCOG 2.0 SERIES (2022)

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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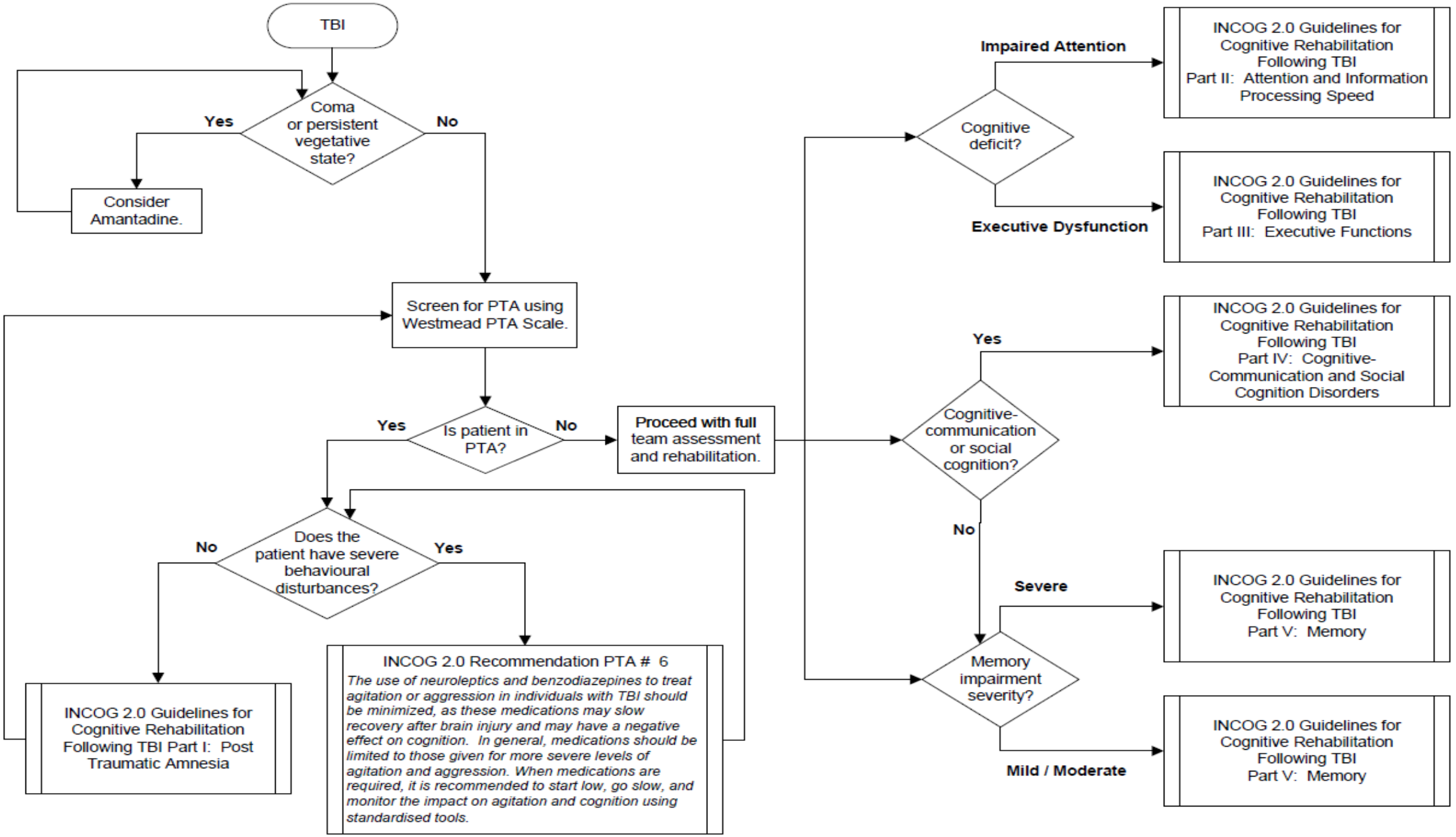
PRINCIPLES ALGORITHM



What QOL Psychological Factors can we address?

- **Difficulty with recognizing others emotions and impact**
- **Depression**
- **Behavioural Changes**
- **Active Task oriented coping**

What is Cognitive Communication?

- communication impairments resulting from underlying cognitive deficits due to neurological impairment
- difficulties in communicative competence (listening, speaking, reading, writing, conversation, and social interaction) that
- result from underlying cognitive impairments (attention, memory, organization, information processing, problem solving and executive functions). (CASLPO)

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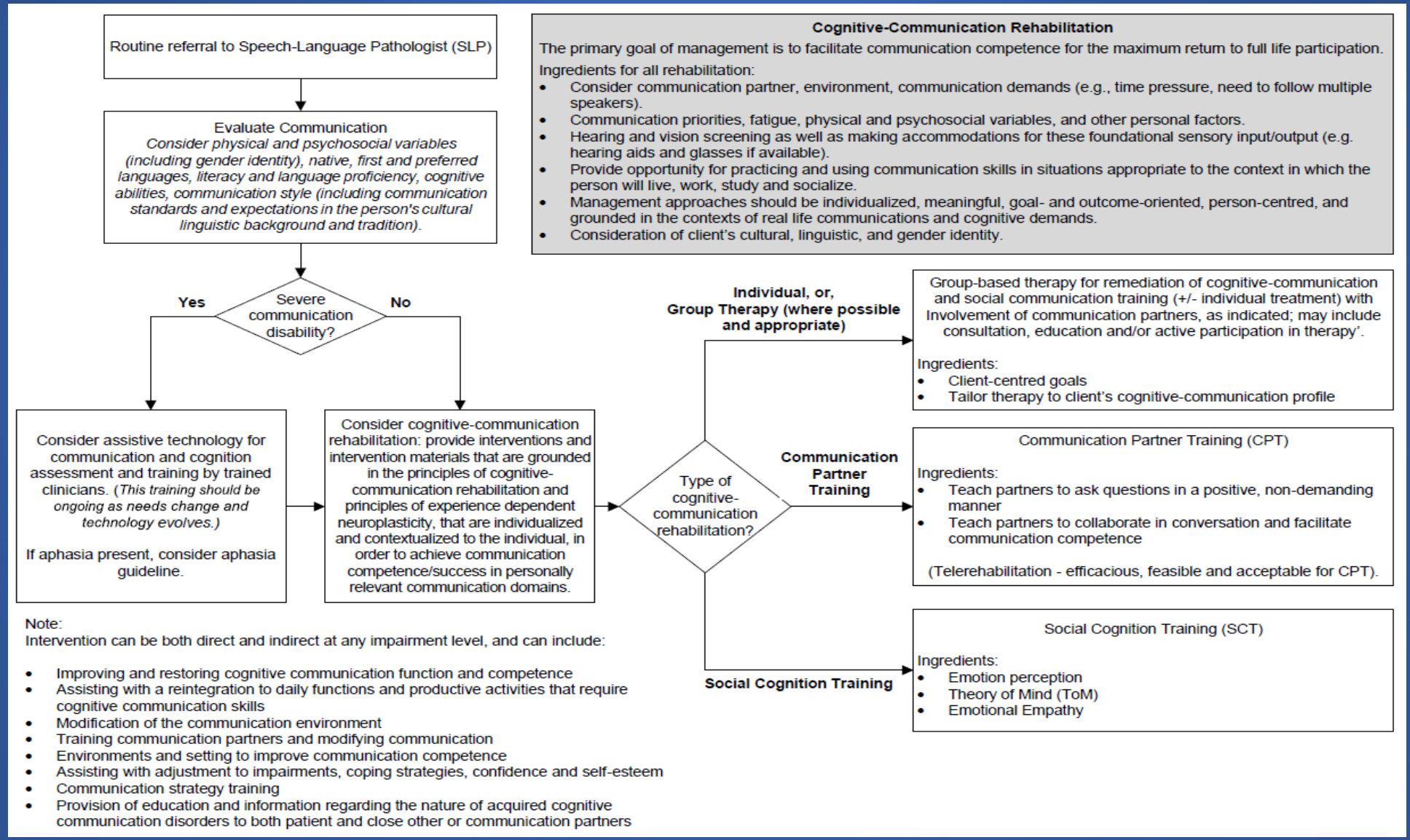
Cognitive-Communication Algorithm



Social cognition

- Social cognition includes processes such as emotion recognition from facial affect and voice and Theory of Mind, the belief that others have thoughts separate from one's own and that these thoughts influence others' behaviors.

- Facial affect recognition difficulties in traumatic brain injury rehabilitation services. Biszak AM; Babbage DR. Brain Injury. 28(1):97-104, 2014.

Social cognition

- Social Cognition #1: Clinicians should consider evaluating aspects of social cognition ability, including emotion perception, theory of mind (ToM) and emotional empathy. Interventions which aim at improving emotion perception, perspective taking, Theory of Mind and social behavior are recommended. Computerized social cognition treatments are not recommended given lack of evidence of generalization to real life activities (INCOG 2022). *Level A*

Social cognition

- Westerhof-Evers HJ, JHTR 2017 Sep 1;32(5):296-307.
- multifaceted treatment of social cognition and emotion regulation (T-ScEmo)
- n = 60 randomized to T-ScEmo intervention (20-hour program of individual sessions to improve social cognition)or a Cogniplus control computerized control condition
- 3 modules, including emotion perception, perspective taking and ToM, and social behavior, with the primary aim focusing on improving social relationships.
- Treatment ingredients included facial feature processing, mimicry, personal emotional experiences, asking others about their thoughts and feelings, attending to the feelings of others, and social skills training.
- T-ScEmo-effective in improving aspects of social cognition, namely, facial affect recognition and ToM, as well as proxy-rated empathic behavior, quality of life, quality of the life partner relationship, and societal participation

What about Behaviour Changes?

Special Issue on Emotional Wellness just published in Journal of Head Trauma Sept 2024 (Mirrors what is available on the braininjuryguidelines.org site)

Updated Canadian Clinical Practice Guideline for the Rehabilitation of Adults With Moderate to Severe Traumatic Brain Injury: Behavioral Recommendations MacKenzie, Heather M. MSc, MD, FRCPC; Velikonja, Diana MA, PhD, MScCP; Devito, Julia BMSc; Devito, Lauren BMSc; Patsakos, Eleni M. MSc; Bayley, Mark MD, FRCPC; Teasell, Robert MD, FRCPC; Mehta, Swati PhD

Mental Health- Depression

Special Issue on Emotional Wellness just published in Journal of Head Trauma Sept 2024

(Mirrors what is available on the braininjuryguidelines.org site)

- **Updated Canadian Clinical Practice Guideline for the Rehabilitation of Adults With Moderate to Severe Traumatic Brain Injury: Mental Health Recommendations Mehta, Swati PhD; Devito, Lauren BMSc; Patsakos, Eleni M. MSc; Devito, Julia BMSc; Velikonja, Diana MA, PhD, MScCP; Bayley, Mark MD, FRCPC; Teasell, Robert MD; MacKenzie, Heather M. MSc, MD, FRCPC**

Mental Health guidelines

Individuals with traumatic brain injury who have been diagnosed with a depressive disorder should receive appropriate multimodal treatment, which can include:

- Psychotherapeutic and behavioural interventions, including mindfulness-based cognitive therapy and psychotherapy
- Lifestyle interventions, including exercise, diet, mindfulness meditation
- Pharmacological treatment (e.g., selective serotonin reuptake inhibitors (SSRI)

Cognitive behaviour therapy (CBT), adapted for individuals with traumatic brain injury, should be considered for individuals with depressive symptoms. CBT can be offered in individual, group, modified videoconference and telephone-based formats. (A)

What QOL Social factors can we address?

- Productivity- Vocational Rehabilitation
- Active Task oriented coping through Cognitive Behavioural therapy/counseling
- Promoting Community Integration
- Relationships and Social Isolation

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Intimacy and Relationships

Special Issue on Emotional Wellness just published in Journal of Head Trauma Sept 2024

(Mirrors what is available on the braininjuryguidelines.org site)

INTIMASY-TBI Guideline: Optimization of INTIMAcy, SexualitY, and Relationships Among Adults With Traumatic Brain Injury

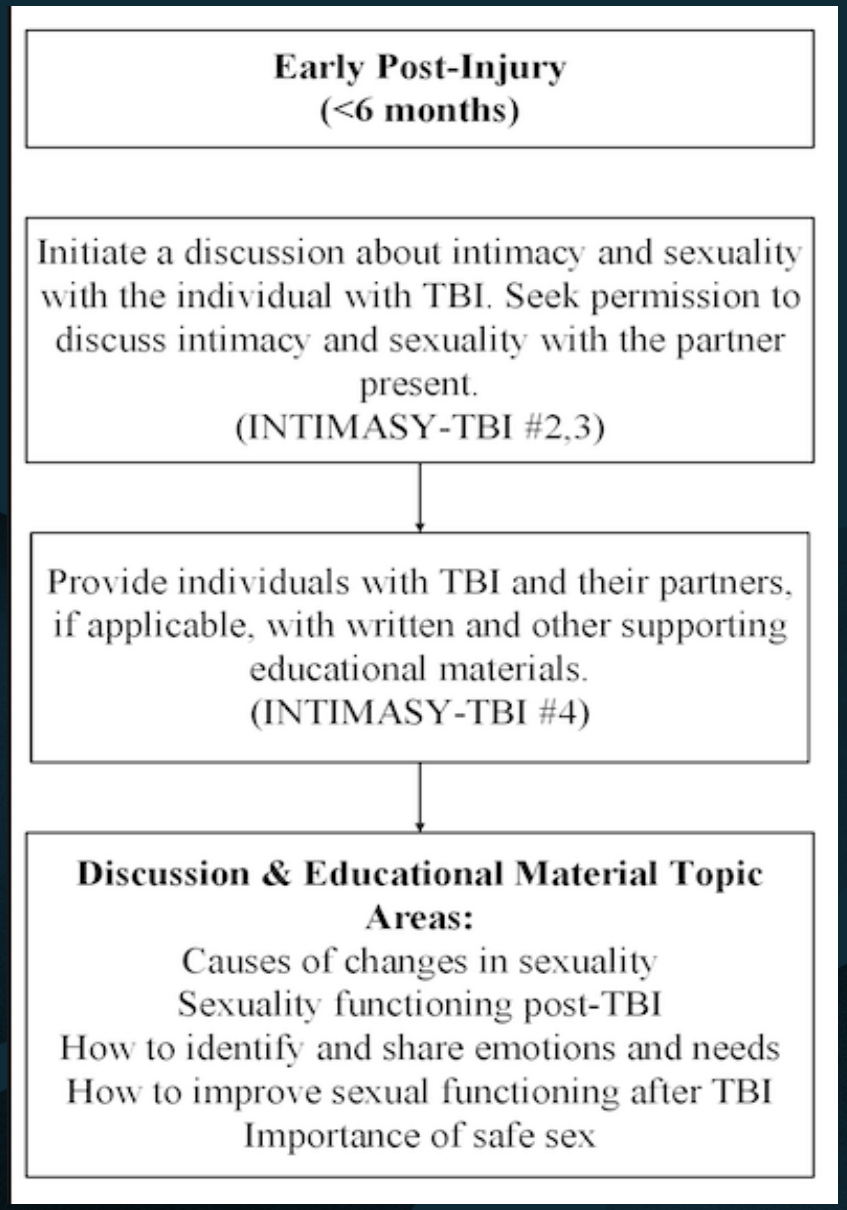
Patsakos, Eleni M. MSc; Backhaus, Samantha PhD; Farris, Kathryn OTR/L; King, Marisa PT, DPT; Moreno, Jhon Alexander PhD; Neumann, Dawn PhD; Sander, Angelle PhD; Bayley, Mark T. MD

INTIMASY-TBI ALGORITHM

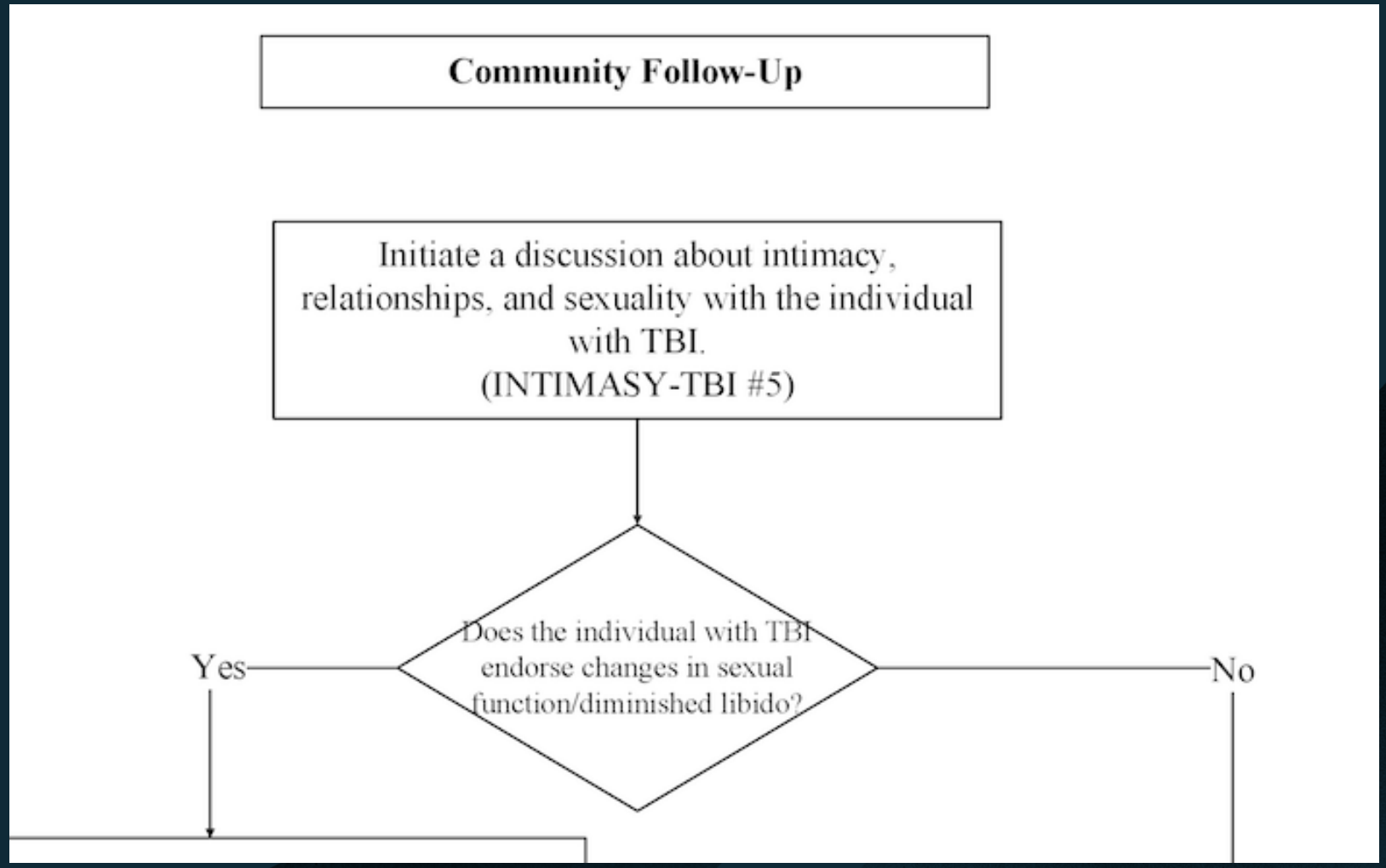
INTIMASY-TBI Principles

1. All interprofessional team members should have a basic understanding and training on how TBI can affect intimacy and sexuality. (INTIMASY-TBI #1)
2. Interprofessional teams should identify key members of the team who will always initiate a discussion about intimacy and sexuality with the individual with TBI and/or their partner. Team members should be appropriately trained to initiate this discussion. (INTIMASY-TBI #2)
3. Patients and their partners should at a minimum, be provided with written and other supporting educational materials regarding sexuality, relationships, and intimacy early during inpatient and/or outpatient rehabilitation. Provide patients with the opportunity to discuss the materials and ask questions when they feel ready. (INTIMASY-TBI #4)
4. Intervention and education about sexuality individuals with TBI should consider cultural factors, cultural identity, gender, age, sex, sexual orientation, gender expression and gender identity. (INTIMASY-TBI #12)

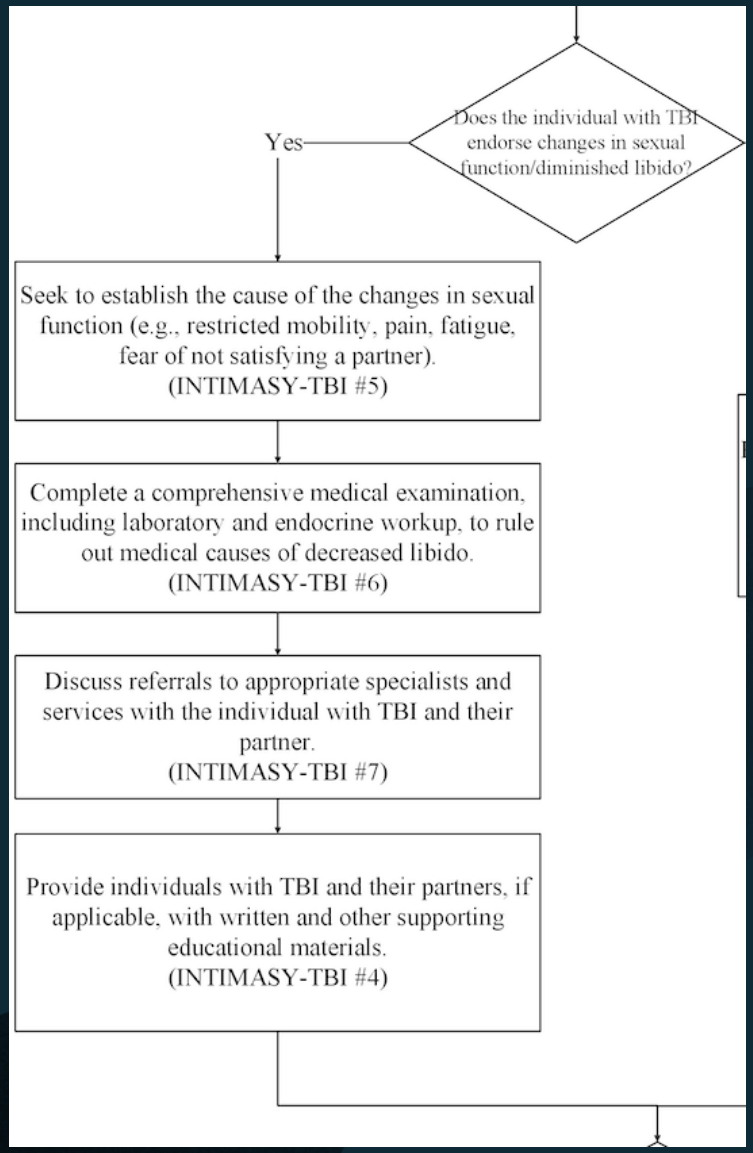
INTIMASY-TBI ALGORITHM



INTIMASY-TBI ALGORITHM



INTIMASY-TBI ALGORITHM



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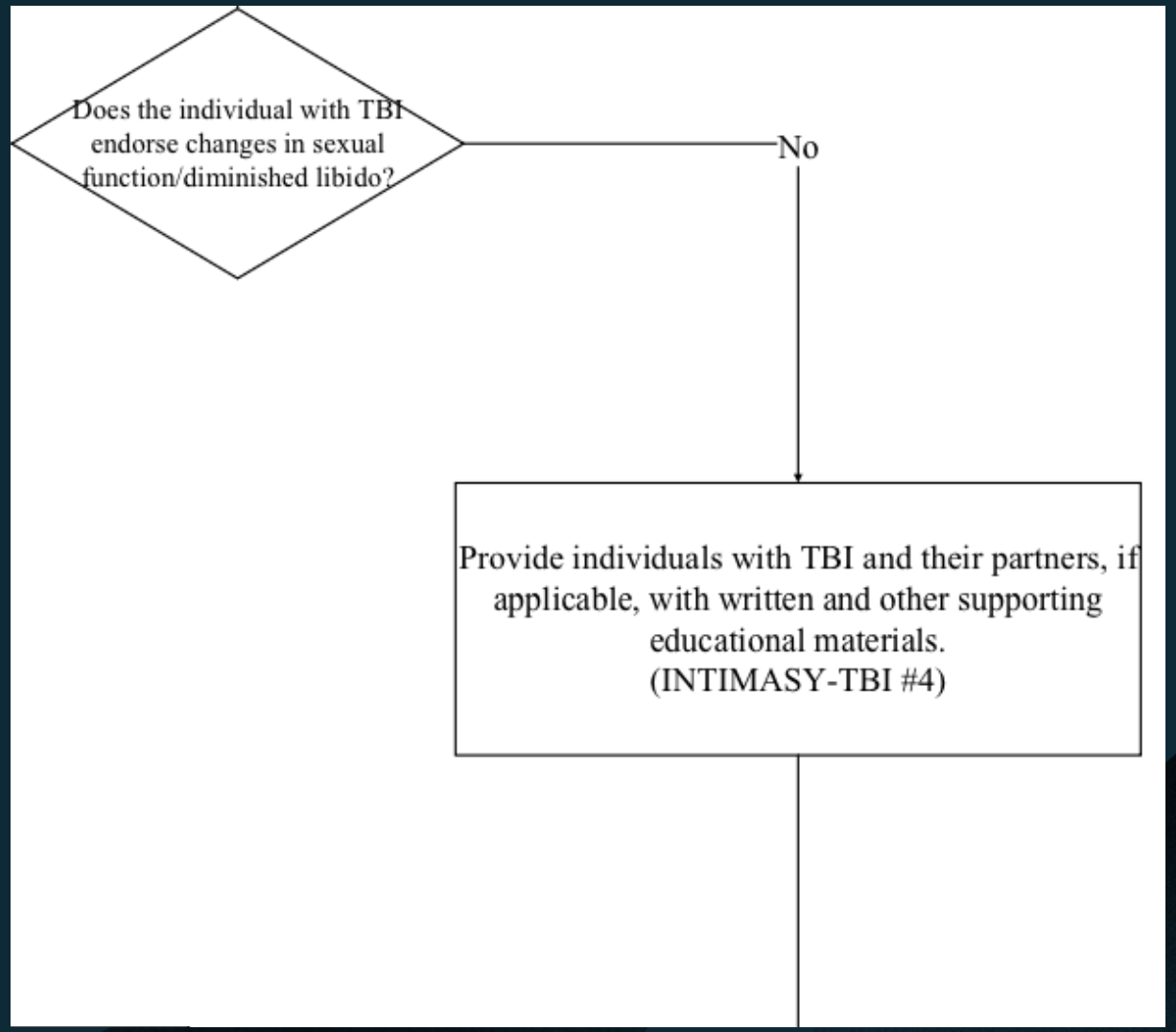

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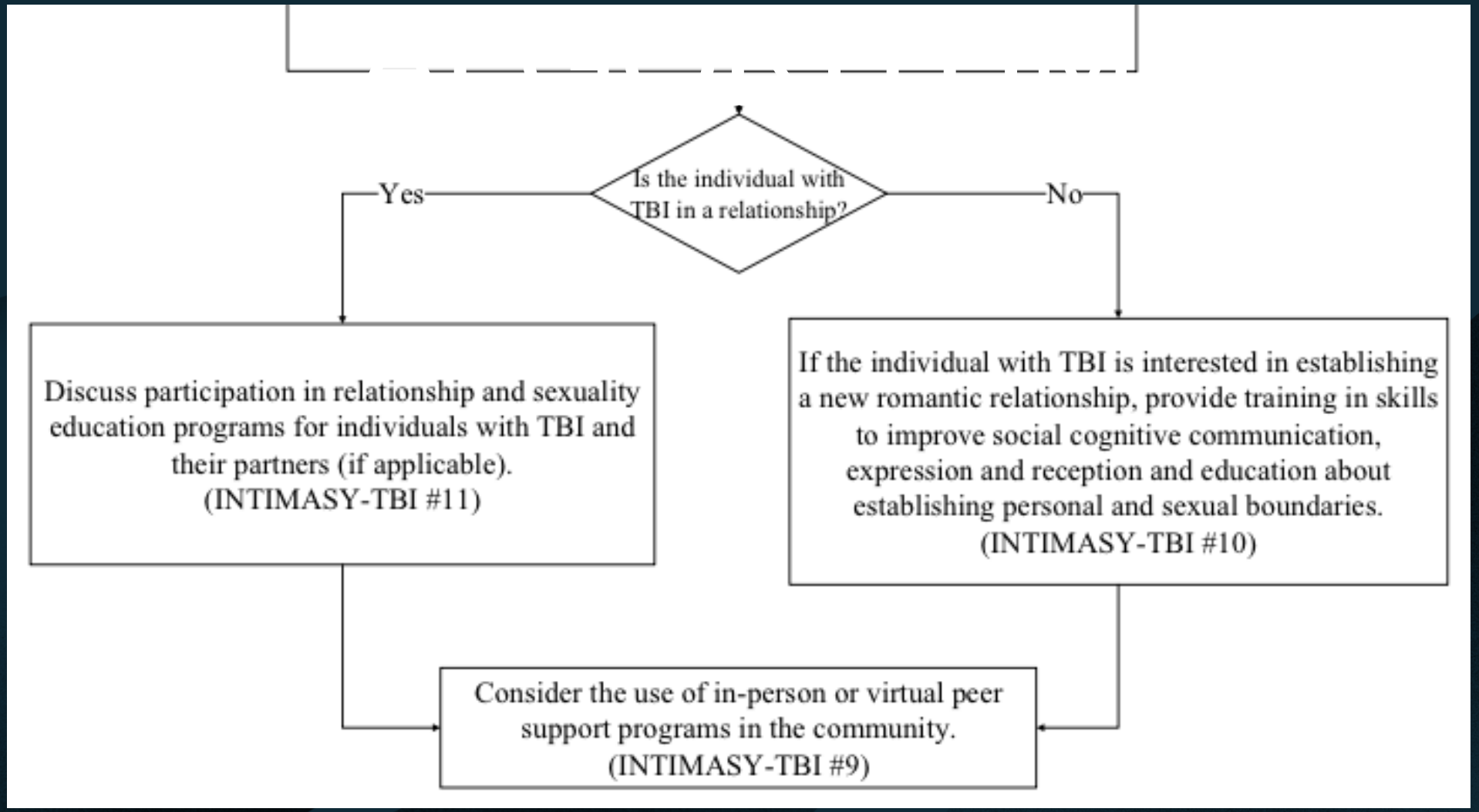

Relationships and intimacy

Study	Methods	Aim	Intervention	Main Outcome Measures	Outcomes
Backhaus et al. (2019)[32]	Design: Randomized waitlist-controlled trial Setting: Midwestern outpatient brain injury rehabilitation center Country: United States Participants: Persons with TBI and their intimate partners (n = 22)	(1) Examine the efficacy of a treatment to enhance a couple's relationship after brain injury particularly in relationship satisfaction and communication; and (2) Determine couples' satisfaction with this type of intervention.	Couples caring and relating with empathy (CARE) intervention 16-week, 2-hour, manualized small group treatment Uses psychoeducation, affect recognition, empathy training, cognitive-behavioral and dialectical-behavioral strategies, communication skills training, and Gottman's theoretical framework for couples adjusted for persons with TBI. Participants were randomly allocated to the treatment or waitlist-controlled group.	Dyadic adjustment scale Quality of marriage index 4 horsemen of the apocalypse communication questionnaire Completed by both partners at baseline, immediate postintervention, and 3-month follow-up.	Significant improvement at post-test and follow-up on the dyadic adjustment Scale and the horsemen questionnaire compared to baseline. Waitlist-controlled group which showed no significant changes on the outcome measures. No significant effects were observed on the quality of marriage index for either group. 95% reported satisfaction with the quality of the service, 90% would recommend the group to a friend in similar need, 79% were satisfied with CARE workbook.
Kreutzer et al. (2020)[33]	Design: Two-arm parallel, randomized, controlled trial with wait-listed control Setting: Outpatient brain injury rehabilitation center Country: United States Participants: Persons with TBI and their intimate partners (n = 75)	Examine the effectiveness of the therapeutic couples intervention, designed to improve relationship quality for couples after TBI.	Therapeutic Couples Intervention 5 to 6 2-hour sessions Structured treatment program to improve relationship quality and stability after TBI using education, skill-building, and psychological support. Participants were randomly allocated to the treatment or waitlist-controlled group.	Revised dyadic adjustment scale (RDAS) Marital status inventory Neurobehavioral functioning inventory Completed by both partners at baseline, posttreatment and 3-month follow-up.	Persons with TBI and partners in the therapeutic couples intervention group showed increased RDAS scores after completing the intervention. Waitlist control participants did not. 62% of individuals within the intervention group did not meet the cut-off for relationship distress. At post-treatment and 3-month follow-up, RDAS scores in the intervention group showed the treatment effects were lasting.

Relationships and intimacy

Study	Methods	Aim	Intervention	Main Outcome Measures	Outcomes
Graham et al. (2020)[34]	Design: Two-arm, parallel, randomized trial with a waitlist control Setting: Outpatient brain injury rehabilitation center Country: United States Participants: Persons with TBI and their intimate partners/caregivers (n = 75)	Examine the effectiveness of the therapeutic couples intervention on caregiver needs and burden after brain injury.	Therapeutic Couples Intervention Five 2-hr sessions, with a sixth optional session on parenting after brain injury. Structured treatment program to improve relationship quality and stability after TBI using education, skill-building, and psychological support. Participants were randomly allocated to the treatment or waitlist-controlled group.	Family needs questionnaire (FNQ-R) Zarit burden interview (ZBI) Marital status inventory (MSI) Neurobehavioral functioning inventory (NFI) Completed by both partners at baseline, post-treatment and 3-month follow-up.	Caregivers in the TCI group demonstrated reduction in unmet needs for 5 of the 6 FNQ-R subscales; individuals on the waitlisted group did not demonstrate the same reduction. ZBI scores improved significantly for only TCI caregivers. At the 3-month follow-up, benefits were maintained on the ZBI. Benefits were maintained for 4 of the 6 FNQ-R subscales (health information, emotional support, Professional support, and community support network).
Boakye et al. (2022)[35]	Design: Single case methodology with bi-phasic A-B design Setting: Specialist neuro-rehabilitation outpatient service Country: United Kingdom Participants: Persons with TBI and their partners (n = 8)	Explore the outcomes of behavioral couples therapy (BCT) for couples with TBI.	Behavioral Couples Therapy (BCT) Fourteen weekly 1-hour sessions The treatment consisted of: (i) behavioral interventions (ie, skill-based interventions); (ii) guided behavior change (eg, couples were encouraged to schedule a routine date night) and (iii) psychoeducation on the emotional and behavioral changes following TBI.	Couples satisfaction index scale-8 (CSI-8) Patient health Questionnaire-9 items (PHQ-9) Generalized anxiety Disorder Assessment-7 items (GAD-7) Completed by both partners at baseline, posttreatment, and 6-month follow-up.	Significant improvement in relationship anxiety and satisfaction by both the individual with TBI and their partner. Significant reduction in overall depression scores in partners of the individual with TBI.

Relationships and intimacy

Study	Methods	Aim	Intervention	Main Outcome Measures	Outcomes
Fraser et al. (2022)[36]	Design: Nonconcurrent, multiple baselines, AB single-case experimental design (SCED) with follow-up (ie, baseline; treatment; follow-up) Setting: Not provided Country: Australia Participants: Persons with TBI (n = 9)	Evaluate the preliminary efficacy of an individualized intervention using a cognitive behavior therapy framework to treat sexuality problems after TBI.	Cognitive behavior therapy framework Eight 60-min sessions delivered weekly and 1 booster session completed approximately 2 months later. Treatment guide was organized into 12 modules with accompanying handouts. The goals of the cognitive behavior therapy framework were to: (i) shift cognition and behavior to let couples/individuals feel more in control of their sexuality; (ii) improve satisfaction with sexuality; and (iii) aid persons with TBI in accepting and managing sexuality changes. Medical review was also incorporate into the treatment design to help to understand the organic and psychogenic causes.	Author-developed rating scale to measure participants' subjective satisfaction with their sexuality. Brain injury questionnaire of sexuality (BIQS) Hospital anxiety and depression scale (HADS) Participation assessment with Recombined Tools-Objective (PART-O) goal attainment scaling (GAS) Subjective satisfaction with sexuality was measured 3 times weekly. Other outcome measures completed pretreatment, posttreatment, and 8-week follow-up.	All participants reported an improvement in a minimum of 1 goal area after the treatment. Improvements in sexuality satisfaction were maintained for 2 months following treatment completion. Five participants demonstrated treatment response in the therapeutic direction. Only 3 participants recorded being "satisfied" with their sexuality. One participant minimal maintenance on treatment gains on the author-developed rating scale. This may have been due to a participant's expectations that all physical sexual issues would be resolved at treatment completion. Treatment intervention demonstrated treatment adherence and feasibility.

Conclusions

As we end of this presentation, :

1. People with brain injury should receive all the novel interventions and there are lots of online resources to help you offer the best practice including Canadian TBI guidelines, INCOG, Evidence based review of ABI and Neurotrauma pathways
2. There is emerging evidence for
    1. rehab during PTA,
    2. challenging our patients more in inpatients
    3. Access for older patients
    4. Group therapy for relationships and intimacy
    5. Improving Social Cognition
    6. Behavioural rehab

Conclusions continued

Quality of life is related to

- **Biological factors**
- **Psychological Factors**
- **Social Factors**

- **Many of these are not properly addressed in brief course of inpatient rehab and we should keep these in mind in outpatient and community phase of recovery**

Question 7 –opportunities to adopt?

What are two topics that you think are significant opportunities for improvement in your practice?

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Question 5 - Commitment to Change?

Which areas will you try to incorporate into your practice and plans in the next weeks or month?

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UHN Toronto Rehabilitation Institute
The KITE Research Institute

Neurotrauma Care Pathways

THANK YOU and ACKNOWLEDGMENTS

judith.gargaro@uhn.ca
Matheus Wiest
arman.ali@uhn.ca
Olga Yaroslavtseva
Ailene Kua
Eleni Patsakos
Parwana Akbar

ERABI team

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@NeurotraumaPath, @DocMarkBayley

Neurotrauma Care Pathways

https://docmarkbayley.com/

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