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Using a Knowledge-Translation Approach to Advance Evidence-Supported Cognitive
Rehabilitation Practices in an Interdisciplinary Rehabilitation Setting

Kelly Breuer

St. Catherine University

Capstone Project completed in partial fulfillment of the Doctor of Occupational Therapy Degree

Faculty Advisor: Dr. Stephanie de Sam Lazaro

Capstone Committee Members: Dr. Mary Radomski and Dr. Kristen Maisano

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Abstract

There is an identified 17-year gap in implementing evidence into practice. Courage Kenny Rehabilitation Institute (CKRI) has the goal of updating their cognitive rehabilitation guidelines by 2023. This project aimed to provide the materials and supports necessary for CKRI to develop, implement, and have follow-up for new evidence-based interventions in their cognitive rehabilitation practice for people with acquired brain injuries and thus improve patient outcomes. A needs assessment, development of an evidence summary, implementation and provision of support were completed to address this need. An evidence table and summary, two presentations, and five intervention-specific handouts were created to support the outcomes of this doctoral project. The five members of the advisory team completed a survey following the delivery of materials in which they reported feeling that interventions were supported by evidence, that the OTD process was effective, deliverables will support their practice, and that they received adequate support. Recommendations for next steps for CKRI are to complete a system-wide survey identifying current rehabilitation practices across CKRI sites as well as interest items identified by therapists, based on the evidence and feasibility of implementation.

Introduction/Background Literature

For people with acquired brain injury (ABI), there are often a lack of evidence-based interventions used to improve occupational participation, leaving the question to be asked: are patients getting everything available to them from therapy? Evidence from interdisciplinary cognitive rehabilitation research indicates the need for effective interdisciplinary education to improve implementation of evidence-based practice, and therefore improve therapeutic outcomes. There is a lack of research in how to best implement this evidence among a clinical interdisciplinary team to support uptake of new evidence-based interventions.

Generally, there is a 17-year gap for new evidence to be implemented into rehabilitation practices (Rogers et al., 2020). This is due to a variety of factors but demonstrates a need for an analysis and change of how interdisciplinary education of rehabilitation teams is approached. In an effort to narrow this gap, the author completed a scoping review (Appendix A) identifying themes affecting the successful implementation of new evidence into cognitive rehabilitative practice.

A scoping review was conducted during the summer of 2021. The review identified four themes. The first was implementation strategies, including engaging key stakeholders at the clinical site early and often throughout the educational process and providing staff support to participate in the evidence-based process (Juckett et al., 2019; McEwen et al., 2019; Vingerhoets et al., 2020). The second theme provided insight into implementation facilitators, such as prolonged access to educational materials, support for team members after the initial implementation process, and providing site-specific recommendations (Cowie et al., 2020; Hamilton et al., 2017; Juckett et al., 2020; Lamontage et al., 2019). The third theme identified

barriers to education, specifically a lack of protected time for practitioners to explore evidence during the workday and unsupportive leadership within an organization (Giuliante et al., 2018; Hamilton et al., 2017; Juckett et al., 2020; Lamontage et al., 2019; Melnyk et al., 2017; Wilson et al., 2017). Finally, the fourth theme identified stakeholder perspectives on key components to successful implementation of evidence-based practice. The components of successful implementation of evidence-based practice include stakeholder involvement throughout the development, implementation, and follow-up of new evidence, and provision of face-to-face interaction during the educational process (Hamilton et al., 2017; Hines et al., 2017; McEwen et al., 2019; O'Reilly et al., 2017; Vingerhoets et al., 2020; Williams et al., 2020). In all, the scoping review concluded that identifying and using key stakeholders in the entire educational process is key to substantive use of new evidence in clinical practice.

At CKRI specifically, barriers that exist in supporting the use of new evidence include a lack of protected time for exploration of the literature and a lack of resources for consistency of dissemination across the entire institute. In part due to the lack of protected time to explore current literature, gaps in knowledge exist regarding what is available to therapists. However, there are strong facilitators in leadership and a desire for evidence-based practice within CKRI.

Purpose

This project aimed to use the strategies and facilitators suggested by the literature to support the education of interdisciplinary cognitive rehabilitation teams on new evidence to support the care of patients with ABI. It is a multi-faceted project, creating site-specific goals and outcomes to support lasting adherence after the conclusion of the doctoral project. This project provided the materials and supports necessary for CKRI to develop, implement, and

have follow-up for new evidence-based interventions in their cognitive rehabilitation practice for people with ABI and thus improve patient outcomes. This includes the synthesis and delivery of best practices in interdisciplinary cognitive rehabilitation after ABI. To do this, key stakeholders informed the compilation and delivery of selected literature and served as champions of this project to support continuance of this work. A needs assessment (Appendix B) was completed to serve as a mechanism to inform the development of this project.

Approach

The cognitive rehabilitation team at CKRI addresses cognition as it relates to functional performance after ABI (most commonly TBI or stroke). The Brain Injury Committee is a long withstanding group of interdisciplinary practitioners aiming to progress rehabilitation for individuals with brain injuries. This committee sets yearly goals to continue to progress evidence and quality of practice. One goal for 2022 was to update the cognitive rehabilitation practice guidelines for Allina Health. This need informed the focus of this project. The capstone student collaborated with staff therapists to develop the following learner outcomes for rehabilitation therapists across CKRI sites:

By the end of the capstone experience, interdisciplinary cognitive rehabilitation team members at CKRI will be able to:

1. Identify desired areas of exploration in cognitive rehabilitation after acquired brain injury
2. Select new interventions to explore in hopes of applying to practice
3. Describe how to implement and track the successful implementation of one new selected intervention to improve practice

IRB approval was requested and received through both St. Kate's and Allina Health. This project was deemed quality improvement and non human-subjects research by both IRB committees.

Participants

To inform the creation of deliverables for the capstone project, an advisory group was created. This group was made to be representative of an interdisciplinary cognitive rehabilitation team across the continuum of care. Members included the capstone mentor, the head of physical medicine and rehabilitation, one inpatient occupational therapist (OT), two outpatient OTs, one outpatient speech-language pathologist (SLP), and one outpatient physical therapist (PT). Each therapist had at least eight years of experience in ABI rehabilitation. The level of education for these participants are all master's degree or above, ensuring appropriate literacy levels of final deliverables.

Deliverables

Four deliverables were made to support dissemination of current evidence in cognitive rehabilitation after ABI. All deliverables were informed by the review of 26 systematic reviews and published professional practice guidelines. The review process consisted of reading, annotating, and compiling the evidence-based on cognitive impairment addressed. An evidence rating rubric was developed for this project for consistent language usage across evidence levels. Interventions were ranked by evidence level with the terms strong, moderate, and weak. The description of the evidence is included in Appendix C. Specific care was given to use International Classification of Functioning, Disability and Health (ICF) language rather than OT-specific jargon to appeal to the interdisciplinary audience.

The first deliverable was an evidence table, consisting of seven columns to categorize, rate, and describe the evidence (Appendix D). The second was a brief document summarizing recommendations from the table and providing ideas for implementation at CKRI (Appendix E). Third, a PowerPoint presentation with a full description of the project findings and specific intervention highlights based on interests identified by the advisory group was created. The presentation was disseminated to the advisory group and presented in an optional “Research Meets Practice” format to all cognitive rehabilitation therapists (Appendix F). Finally, one assistive technology handout and four intervention-specific handouts were created on clinician-identified interventions that highlight the evidence and piloting of these selected interventions at CKRI (Appendix G).

Each deliverable went through at least two review processes by two independent reviewers, the capstone site mentor and the academic supervisor. Suggestions were considered and applied to create the most accurate and helpful products for CKRI. Furthermore, information from the advisory group was used to inform the content of all deliverables as well as format for dissemination at the end of the capstone experience.

Evaluation Process

To evaluate the deliverables, a variety of methods were used. First, to inform the creation of an applicable deliverable specific to CKRI, a focus group consisting of advisory team members was utilized. The questions for this focus group are included in Appendix H. Theme identification and summation of this qualitative data was utilized, along with a member-check via email following the focus group to ensure accurate understanding. Notes during the focus group were taken by the capstone student and research specialist to ensure accurate

notetaking. Notes were compared following the meeting before summation and theme identification was completed.

A survey was developed for the final dissemination to the advisory group to gauge interest and helpfulness of the deliverables (Appendix I). The questions asked if therapists found the information helpful and could see themselves implementing selected interventions following the education session. The survey also gleaned qualitative data with the purpose of informing any further supports needed to support CKRI's goal to update cognitive rehabilitation guidelines after the conclusion of the doctoral capstone project. Furthermore, qualitative data was gathered through a guided discussion following the presentation of all deliverables in a second advisory group meeting.

Outcomes

An advisory focus group was utilized to identify goals for the capstone experience, engage key stakeholders, and narrow down interventions that therapists were interested in for further exploration. Each advisory focus group meeting consisted of five interdisciplinary rehabilitation professionals, including one SLP, one PT, an inpatient OT, and two outpatient OTs. A survey was also utilized with the participants after the second advisory group to gather feedback on the capstone project process and deliverables.

First Advisory Focus Group Meeting

This first of two advisory focus group meetings yielded five themes and informed the development and creation of all project deliverables. The first theme described current cognitive rehabilitation interventions currently used in practice and included self-awareness interventions, dual task training, attention and memory worksheets, metacognitive strategy

training, errorless learning, and external memory compensations. Secondly, therapists identified lack of protected time to stay up to date on research as a barrier to implementing new evidence-based practices. The third theme consisted of four interventions therapists were specifically interested in learning more about. These were: assistive technology, errorless learning, micro-prompting devices, and the CO-OP model. Advisory group members identified a desire for a shared language in documentation and communication across rehabilitation disciplines as an area of improvement. The last theme from this first advisory group meeting was how to best deliver capstone project findings to ensure use of the knowledge.

Group members influenced the creation of intervention-specific handouts and highlighted interventions in a final presentation, with multi-modal delivery (PowerPoint, handouts, & audio-visual). They identified the mode of dissemination of findings from the project to be via a “Research meets Practice” presentation worth CEUs to Allina Health OTs and SLPs for best chances of interest and attendance. (See Appendix J for more information on that presentation).

Second Advisory Focus Group Meeting

Following creation of deliverables, a second advisory group meeting was held to disseminate findings from the doctoral capstone project to representatives to champion this knowledge following the conclusion of the capstone project. After the presentation of the evidence, a guided discussion unveiled three themes.

The first is the desire for a shared language not only across professions, but also across CKRI sites. Advisory group members stated that evidence-based strategies may be used across

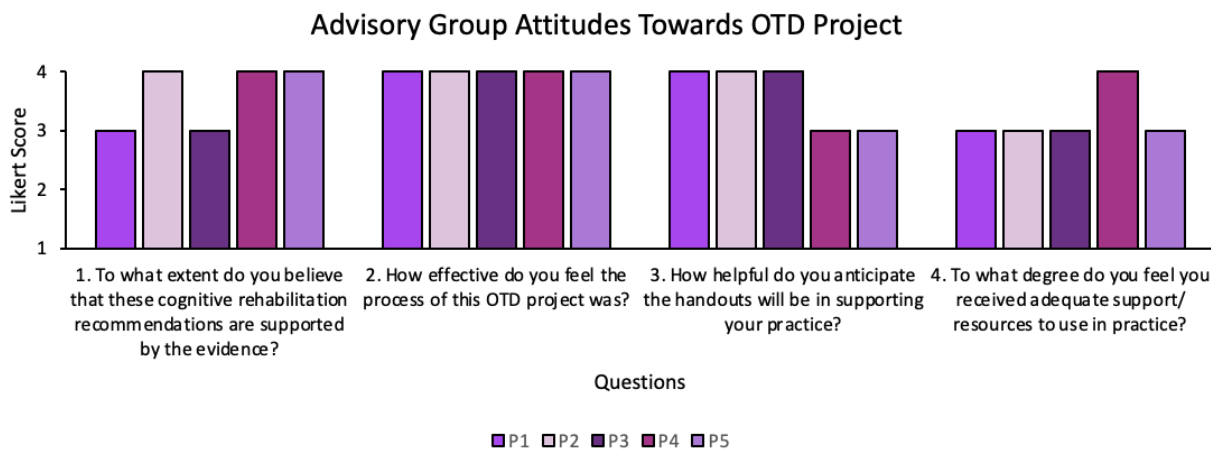
the board, but there is often lost communication across disciplines. Overall, there is a need for a shared and consistent therapeutic language in documentation and verbal communication.

Secondly, therapists agreed on two interventions that they would like to invest in for large-scale implementation across CKRI sites. These interventions are metacognitive strategy training and errorless learning. However, no specific metacognitive strategy was identified, and therapists agreed that a specific strategy would be needed for universal use. Errorless learning was agreed upon for moderate to severe brain injuries and was identified as a universal tool feasible for use by all therapeutic disciplines.

Finally, advisory group members identified the need for a guideline for cognition to be created. A system-wide effort would be needed to accomplish this goal, including smartworks and IT support, implementation in team rounds, and communication between inpatient and outpatient settings. Ideally, therapists stated that roll-out could occur in 2023, as is in line with the acquired brain injury committee goals.

Survey Results

Following dissemination of the capstone project deliverables, the advisory group was asked to complete a survey assessing their attitudes surrounding the capstone process and quality of deliverables. There were 5 total respondents. This survey (Appendix I) revealed participant attitudes regarding the OTD project process and outcomes which were primarily favorable.

Figure 1.*Advisory group attitudes towards OTD project*

Note. Participants answered all questions on a 4-point Likert scale specific to each question with 1 being the “not supported”, “not effective” end of the spectrum and 4 being “very supported”, “very effective” end of the spectrum.

A few themes emerged from the short answer survey items as well. First, participants stated that some interventions seemed more supported than others and that there would be hinderances to applying some interventions across practice settings (i.e., inpatient vs. outpatient). Advisory group members also stated that the handouts provided would be helpful for new staff in onboarding and as a starting point for creating patient handouts. When asked what advisory group members would change if another OTD student came, they stated more clinical opportunities for the student to apply knowledge and more advanced notice on meeting times for scheduling. Finally, when asked what additional resources they would need for the continued success of this project, participants stated the need for support from leadership and protected time to find and evaluate new evidence. Specific ideations of these needs would be

access to continuing education units (CEUs), continued Research Meets Practice presentations, and time to independently participate in the evidence-based process. For example, the Research Meets Practice presentation held over a lunch hour for this project was well received by system therapists, and attended by over 60 therapists, being OTs, PTs, and SLPs. More opportunities like this one, worth CEUs, would likely receive a similar response.

Implications

Several implications emerged from the outcomes of this capstone project. First, actionable next steps in cognitive rehabilitation guidelines development are needed for CKRI. The Brain Injury Committee has the goal of implementation of this guideline in 2023. Generally, interventions including virtual reality, errorless learning, dual-task training, and metacognitive strategy training have the highest combined evidence and feasibility for CKRI with their current resources. However, the advisory group assembled for this project identified a focus on IT support, smartworks, protected time, and application to team rounds as key factors to success. The first actionable step to take towards this goal would be a survey out to all rehabilitation professionals, across inpatient and outpatient sites. This survey should include definitions and descriptions to selected interventions with the highest levels of evidence and applicability to CKRI. Furthermore, it is recommended that the survey asks practitioners what they are currently doing, what interventions they are interested in, and their perceptions regarding the feasibility of the selected intervention for implementation at their sites.

The OT profession has an important role in cognitive rehabilitation, that often gets delegated to SLPs. Due to the overlap between these two professions, as well as PT, it is crucial that all use of cognitive rehabilitation interventions and strategies across team members are

clearly documented in patient charts and evaluations and directly relate to occupational performance to assist with return to maximum functional status. As the thematic analysis showed, there is often a lack of consistency across rehabilitation sites in interventions used and language in how they are documented. Things can get lost in communication this way, thus negatively affecting patient outcomes. Documentation of interventions and strategies using a shared, common language will help to improve interprofessional communication, and thus ensure best possible patient outcomes within a health system and across the continuum of care.

Finally, a few implications exist regarding the evidence-based process for this project and ones like it. Informed by the scoping review completed in the summer of 2021 (Appendix A), an explicit effort was made to involve the interdisciplinary rehabilitation team throughout the entire project process. This began with a needs assessment in April and continued for the duration of the project through creation of an advisory group, the use of weekly communications, two advisory group meetings, and adaptations to the project based on practitioner perspectives. This approach not only supported the success of this project, but also its continued success after its hand-off at the conclusion of the capstone experience. Additionally, multi-modal knowledge translation strategies were used for this project as informed by the scoping review. Use of varying types of knowledge dissemination strategies is recommended, including case study examples, discussions, handouts, videos, and presentations.

Due to the lack of time staff therapists often have to explore new literature, the OTD project process allowed a fast tracking of assembly, analysis, and dissemination of the evidence.

To quote a member of the advisory team, “You were able to do in 14 weeks what takes three staff therapists over two years to do.” This process could be applied to any interdisciplinary setting where professionals aim to create or update practice guidelines for a specific practice area.

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Appendix A: Scoping Review

Acknowledgement to Scoping Review Faculty Advisor: Dr. Hannah Oldenburg

Introduction and Background

As guidelines for cognitive rehabilitation for individuals with acquired brain injury (ABI) are continually changing, rehabilitation practitioners have an ethical obligation to stay updated on current evidence (American Occupational Therapy Association [AOTA], 2015). Professionals from all rehabilitative disciplines, including occupational therapy, physical therapy, and speech-language pathology, have a role in cognitive rehabilitation after an individual experiences an ABI (Bayley et al., 2014). To ensure most effective treatment for patients, implementation of evidence-based education methods is crucial. By understanding the factors affecting implementation of new knowledge into practice, one can better develop an engaging educational program that promotes practical application. For the purpose of this scoping review, the definition of ABI is “non-progressive damage to the brain which occurs after birth and has sudden onset” (Kettlewell et al., 2019, p. 1706). Additionally, cognitive rehabilitation refers to “therapeutic interventions designed to improve cognitive functioning and participation in activities that may be affected by difficulties in one or more cognitive domains” (Brain Injury Association of America, 2011, p. 1).

Experts suggest that it typically takes 17 years for research findings to be integrated into practice due to several apparent barriers that interfere with successful education and implementation (Rogers et al., 2020). This scoping review is an effort to narrow that timeline, aiming to identify current staff education practices and applying them to the implementation of evidence among an interdisciplinary rehabilitation team. This review is to be approached from an interdisciplinary perspective, identifying best practices for educating a cognitive

rehabilitation team on literature published within and outside the occupational therapy perspective. Therefore, this scoping review seeks to identify, analyze, and synthesize the evidence to promote integration of new evidence into practice, and therefore promote positive patient outcomes.

Materials and Methods

Approach

To thoroughly answer the objective above, a scoping review of the current literature was conducted. This scoping review used the five steps outlined by Arksey and O'Malley (2005): 1: identifying the research question; 2: identifying relevant studies; 3: study selection; 4: appraising the data; and 5: collating, summarizing, and reporting the results. Below, each stage is detailed. One independent reviewer completed each step of the process, with peer and supervisor review conducted after each stage. The scoping review was completed over a 12-week period from June-August 2021.

Identifying research question

Based on a Population-Intervention-Methods-Outcome (PICO) question format, the leading research question was developed:

In the existing evidence, what are the current practices for educating an interdisciplinary team (IDT) on the use of new evidence-based guidelines for cognitive rehabilitation for individuals with acquired brain injury?

Identifying relevant studies

To perform a comprehensive search of the available literature, two research databases, CINAHL plus with full text and PubMed, and two alternative sources, Google and AOTA.org,

were used. The former databases identified scholarly, peer-reviewed research, while the latter identified grey literature and alternative sources related to the scoping review question.

Publications were included in abstract review if they met inclusion criteria of being published between 2011-2021, were from reliable sources (such as a scholarly, peer-reviewed journal or .org/.gov website), and addressed part, or all, of the research question. The articles were then further narrowed for initial and critical appraisal based on applicability to the research question. Inclusion criteria consisted of one or more of the following: implementing evidence-based practice among an IDT, IDT cohesion, implementing practice guidelines for acquired brain injury, or supports and barriers to educating an IDT.

Search terms used to identify relevant articles included items like interdisciplinary, acquired brain injury, cognitive rehabilitation, education, and implementation. In the database search, limiters were used to keep results close to, or under, 40 publications to promote replicability. Tables 1 and 2 provide an overview of the article identification process. Table 1 is specific to the identification process in CINAHL Plus with Full Text.

Table 1

CINAHL Plus with Full Text Search

Filters / Years	Keywords	Total Yield / Relevant Hits
2013- 2021, Scholarly/peer-reviewed	“education” AND “interdisciplinary” AND “cognitive rehabilitation”	6/0
2016-2021, Language: English, scholarly/peer-reviewed, Full Text	“education” AND “interdisciplinary team” AND “healthcare”	44/3

2016-2021, Language: English, scholarly/peer- reviewed, Full Text	“education” AND “interdisciplinary team” AND “communication”	19/1
2013-2021, scholarly/peer- reviewed, Full Text	“education” AND “interdisciplinary team” AND “implementation”	26/2
2018-2021, scholarly/peer- reviewed, American Journal of Hospice and Palliative Medicine	“education” AND “interdisciplinary team”	8/1
2016-2021, scholarly/peer- reviewed	“multidisciplinary team” AND “implementation of evidence- based practice”	27/3

The second database used was PubMed. This search utilized similar search terms to the first database search but yielded different and slightly narrower results. The CINAHL database search yielded a total of 10 articles included in the abstract review while the PubMed database search yielded nine articles meeting the inclusion criteria.

Table 2

PubMed Search

Filters / Years	Keywords	Total Yield / Relevant Hits
2016-2021, Free Full Text, systematic review	“education” AND “interdisciplinary team” AND “implementation”	2/1
2011-2021, Free Full Text	“education” AND “interdisciplinary team” AND “acquired brain injury”	9/1

2016-2021, Free Full Text	(((((education) AND (interdisciplinary team)) AND (supports)) AND (barriers)) AND (implementation))	22/1
2019-2021, Free full text, systematic review	(((((education) AND (interdisciplinary team)) AND (facilitators)) OR (barriers)) AND (implementation)) AND (evidence-based practice)	30/2
2016-2021, Free full text,	((implementation) AND (evidence-based practice)) AND (cognitive rehabilitation)	36/1
2016-2021, Free full text, systematic reviews, randomized-controlled trials	(multidisciplinary) AND (implementation of evidence-based practice)	28/2
2016-2021, free full text	((training) AND (implementation)) AND (evidence-based practice)) AND (cognitive rehabilitation)	26/1

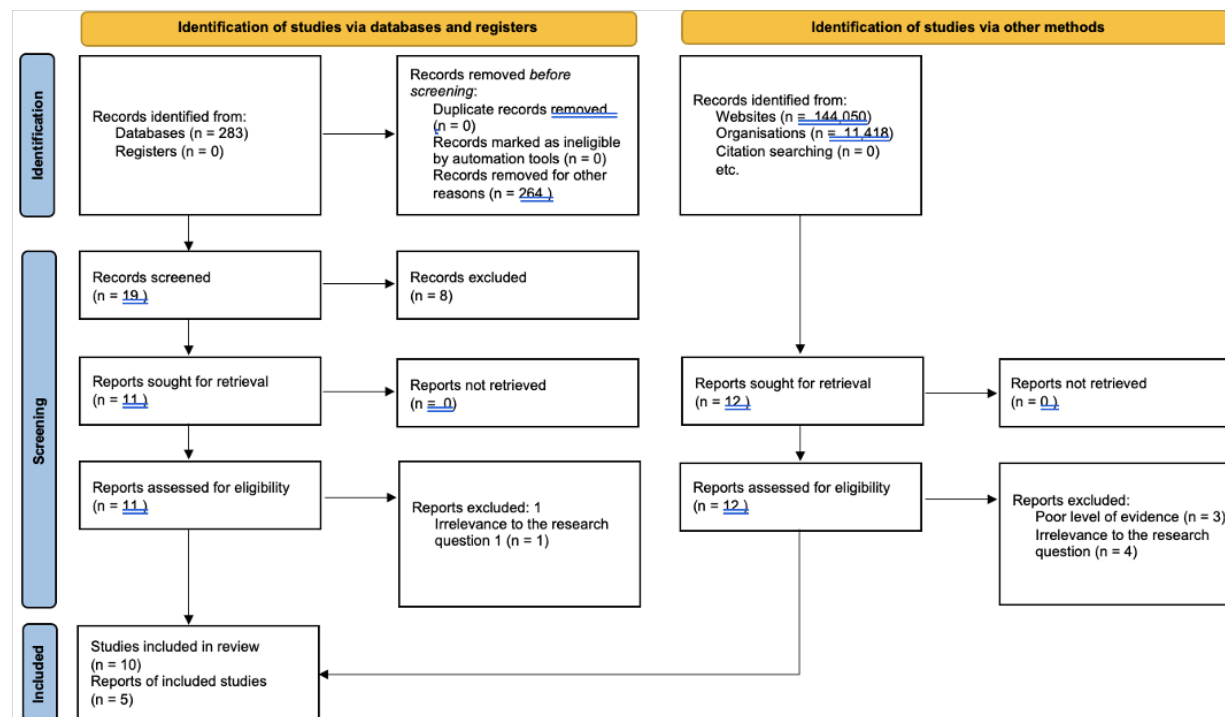
Study Selection

One reviewer examined the 31 article abstracts that met inclusion criteria. The database search yielded 19 articles, and the alternative search produced 12 articles and sources for review. Abstracts were reviewed to determine relevance to the scoping review question. Articles were excluded for lack of relevance to the scoping review question, addressing ABI treatment instead of therapist education, being too specific to one discipline, or examining interdisciplinary education within higher education rather than with a multidisciplinary therapy team. After abstract review, 15 articles were identified as addressing educational methods for

an IDT and kept for initial appraisal and full-text review. Ten of these articles were from the database search, five were identified through the alternative search strategies. Figure 1 provides a visual of the study selection process.

Figure 1

PRISMA Study Identification



Note. This figure provides a flow chart of the article search, identification, inclusion, and exclusion process.

Appraising the data

Thirteen of the fifteen relevant articles selected were primary research, systematic reviews, or theoretical methodology. The two sources found using an alternative search included a scoping review and an official association publication. Levels of evidence varied from Level II to Level VII. Grey literature sources were useful in answering aspects of the scoping review question. Potential strategies to inform the educational program were identified.

Three primary research articles were selected for critical appraisals based on relevance to the research questions. Relevance to interdisciplinary education, healthcare settings, and study methodology were primary considerations in the decision of the critically appraised articles. Despite limited research on best practices for educating an IDT in a cognitive rehabilitation setting, one can derive strategies through the present scoping review. The current evidence has the potential to inform the development of educational opportunities that would be effective, relevant for individuals with acquired brain injury, and stakeholder inclusive.

Results

Included Studies

This search identified 31 articles for initial appraisal, including primary (n=19) and grey literature (n=12). Fifteen articles met the established inclusion criteria for the scoping review. Ten of these articles were identified as primary research, four were categorized as reviews of research, and one article was grey literature. Initial appraisals were completed on all 15 articles that met inclusion criteria, and critical appraisals were conducted for three of the most relevant primary research articles.

Characteristics of the Included Studies

All fifteen of the articles chosen for this review were retrieved from scholarly peer-reviewed journals published in the United States and internationally. All of these articles were published between 2016-2021. Articles included in the review consisted of one mixed-methods study, one randomized-controlled trial, five qualitative studies, one cross-sectional study, one quasi-experimental study, one pre-post longitudinal study, two systematic reviews, one scoping

review, one integrative review, and one theoretical article embedded as grey literature. Levels of evidence ranged from II-VII (Table 5).

Table 3

Articles and Evidence

Level of Evidence	Number of Articles	Articles
II	1	Hamilton et al. (2017)
III	3	Giuliante et al. (2018) McEwen et al. (2019) Melnyk et al. (2017)
IV	1	Lamontagne et al. (2019)
V	4	Cowie et al. (2020) Juckett et al. (2020) O'Reilley et al. (2017) Rogers et al. (2020)
VI	5	Hines et al. (2017) Vingerhoets et al. (2020) Williams et al. (2020) Wilson et al. (2017) Wirpsa et al. (2019)
VII	1	Mayo & Woolley (2016)

Of the five qualitative studies, one used 463 healthcare chaplains to determine their role in an IDT (Wirpsa et al., 2019). The second implemented an educational evidence-based practice (EBP) program in a large medical center (n=25), and the third interviewed 87 IDT members about training preferences at a Veterans Affairs (VA) medical center (Williams et al., 2020; Wilson et al., 2017). The fourth used a focus group of five IDT members to determine team member preferences for the implementation of EBP (Vingerhoets et al., 2020). Finally, Hines et al. (2017) used interviews and focus groups of 17 IDT members to determine the efficacy of eHealth.

The longitudinal study conducted by Melnyk et al. (2017) tested the Advancing Research and Clinical practice through close Collaboration (ARCC) model's efficacy in implementing EBP in a hospital among an IDT (n=58). McEwen et al. (2019) investigated how the cognitive orientation to daily occupational performance (CO-OP) approach could affect three interdisciplinary constructs (n=35). Furthermore, the cross-sectional study investigated how to best implement a peer-mentoring program for individuals with spinal cord injury with 18 caregivers (Lamontagne et al., 2019). The randomized-controlled trial designed a quality improvement project to best engage 87 stakeholders at VA medical centers (Hamilton et al., 2017). Finally, Guiliante et al.'s (2018) mixed-methods study used 90 total participants to test the effectiveness of an interdisciplinary practice tool for fall prevention.

Of the four review articles, Rogers et al.'s (2020) systematic review aimed to assess what works best in implementing healthcare interventions (n=64). The scoping review conducted by Juckett and colleagues (2020), identified three themes in the content of 25 articles. Themes regarded the barriers and facilitators to implementing evidence-based practice in stroke rehabilitation practice (Juckett et al., 2020). Furthermore, the integrative review conducted by O'Reilly and colleagues (2017) further assessed facilitators and barriers of IDT work within primary care (n=49). The final systematic review looked at 32 articles, further determining facilitators and barriers in hospital interventions and identified factors affecting their sustainability (Cowie et al., 2020). Lastly, the theoretical article did not use a sample size but instead explained how to best operate in IDTs in healthcare (Mayo & Woolley, 2016).

Of the fifteen articles selected for initial appraisal, eight took place in the United States (Giuliantte et al., 2018; Hamilton et al., 2017; Juckett et al., 2020; Mayo et al., 2016; Melnyk et al., 2016; Williams et al., 2020; Wilson et al., 2017; Wirpsa et al., 2018) and seven took place

internationally, including in Australia (Hines et al., 2017), New Zealand (Vingerhoetts et al., 2020), Canada (Lamontagne et al., 2019; McEwen et al., 2019), Scotland (Cowie et al., 2020), and Ireland (O'Reilly et al., 2017; Rogers et al., 2020). Many articles had an interdisciplinary focus and were often led by nurses. Less frequently, there was occupational or physical therapist-led research. All but two of the papers used healthcare professionals in their sample. Most of the articles answered various parts of the scoping review question. Overall, the evidence could be grouped into four subcategories: addressing educating and IDT and multidisciplinary team attitudes, how to best implement evidence-based practice in the clinic, facilitators and barriers to education or evidence-based practice implementation, or the population, being individuals with acquired brain injury. The scoping review completed by Juckett et al. (2020) was most insightful for answering the scoping review question. However, no single article fully and thoroughly answered all portions of the scoping review question.

Themes

The purpose of this scoping review was to identify evidence on current practice for educating an IDT on new and updated evidence-based guidelines in cognitive rehabilitation for individuals with ABI. Experimental research on this topic is uncommon due to the nature of the question. Qualitative review of primary research and primary literature reviews provides a method to determine which themes or current evidence-based approaches are essential when educating IDTs in cognitive rehabilitation. Four themes were identified from the literature: strategies to support successful implementation of evidence into practice, facilitators to interdisciplinary education and implementation, barriers to interdisciplinary education and implementation, and engaging stakeholders.

Theme 1: Implementation Strategies

While there are no concrete guidelines for integrating evidence into practice, several strategies support successful implementation. Lamontagne and colleagues (2019) completed a cross-sectional study in which they investigated methods for successful implementation of a peer-mentor training program for individuals with spinal cord injury. They found that executing a training program can be sustained by fostering a positive attitude towards EBP and a general openness to evidence (Lamontagne et al., 2019). Furthermore, successful implementation requires the relevance of the EBP to practice, dedicated plans for training, and organizational readiness to change (Lamontagne, et al., 2019). Understanding the context in which an organization will carry out a new intervention is crucial when developing training programs. The search identified two major subthemes for the successful education of IDTs: staff and team engagement are vital components of a successful educational program.

Staff Support. Overall, a significant consideration when attempting to implement new evidence into practice is support for team members (Cowie et al., 2020; Lamontagne et al., 2019; McEwen et al., 2019; Vingerhoets et al., 2020). Involving team members early, often, and throughout the entire implementation process, including developing and evaluating the curriculum, is cited as essential tenets of success by multiple authors (Lamontagne et al., 2019; McEwen et al., 2019). Additionally, an increase in provider knowledge often is not enough for program success. The use of site-specific goals and site-driven implementation strategies can increase the likelihood of EBP adoption and sustainment (Cowie et al., 2020; Lamontagne et al., 2019; McEwen et al., 2019).

Engaging Stakeholders. Engaging the stakeholders at a site is key to educational retention. Engaging healthcare administrators, department directors, and direct-contact providers promote implementation of EBP. The use of multimodal knowledge translation, such

as in-person workshops, online modules, educational materials, and email reminders, was the most effective way to implement EBP in stroke rehabilitation (Juckett et al., 2020). McEwen and colleagues (2019) further demonstrated this in their quasi-experimental study. In the study, they implemented the CO-OP approach with a two-day workshop and a follow-up support period of six months; provision of a support period after initial implementation can support sustained use of practices (McEwen et al., 2019). A support period is best accomplished through a user/provider partnership in which team members use their knowledge and preferences to develop and implement the program (McEwen et al., 2019; Vingerhoets et al., 2020). Furthermore, fostering a positive, collaborative interdisciplinary culture surrounding EBP can further support successful program actualization (Melnyk et al., 2017). Numerous strategies support successful EBP implementation, such as engaging stakeholders, supporting IDT members, and sufficient organizational context to support it.

Theme 2: Facilitators to Interdisciplinary Education and Implementation

Two primary research studies and two review articles addressed factors that facilitate EBP implementation (Cowie et al., 2020; Hamilton et al., 2017; Juckett et al., 2020; Lamontage et al., 2019). Three of these articles identified support, both from fellow team members and multilevel management, to be conducive to the sustainment of EBP. These supports include clear management and peer support from fellow members of the interdisciplinary rehabilitation team, EBP embedment within the organization's culture, and strong advocacy for the use of the new intervention (Cowie et al., 2020; Juckett et al., 2020; Lamontage et al., 2019). This sub-theme of support seems to be a significant indicator of sustainment in practice. Organizational factors that facilitate successful implementation include strong relationships among stakeholders, engaging interprofessional multilevel stakeholders early in the educational

process, and having clear role delineation within the team to promote efficiency (Cowie et al., 2020; Hamilton et al., 2017; Juckett et al., 2020).

Team Support

Juckett et al. (2020) and Lamontage and colleagues (2019) further explicated the importance of supporting the IDT to advance the implementation of EBP. They propose using supporting resources such as access to educational modules after the initial educational session, encouraging prolonged use of new ideas from training. Ensuring that the modules are relevant and site-specific will also facilitate the adoption of practices (Lamontage et al., 2019). Data and discussion regarding EBP during an educational session can also promote its implementation (Hamilton et al., 2017). These discussions can take many different forms, such as case studies, group discussions of interventions, or general conversations about the role of EBP or new interventions at the site.

Theme 3: Barriers to Interdisciplinary Education and Implementation

Two sub-themes regarding barriers to interdisciplinary education and implementation of evidence-based practice emerged, suggesting that several common barriers hinder the successful education of an IDT on new practice evidence.

Protected Time. Facilitators to successful EBP implementation have partnered barriers. Wilson and colleagues (2017) created a two-part educational series with a face-to-face didactic approach to improve attitudes and practices in a medical center. They found that these classes improved attitudes regarding EBP but did not sustainably change practice and identified barriers to the program's success (Wilson et al., 2017). Initially, they observed significant gains in attitudes and practice regarding EBP after the educational series in their 26 participants (Wilson et al., 2017). However, at the one-year follow-up, the authors noticed that these

benefits were not sustained. Through surveys and interviews, they discovered that lack of accessibility in the face-to-face implementation and limited available time to attend the classes interfered with durability of their earlier success (Wilson et al., 2017). They discovered that there is no one-size-fits-all approach to EBP implementation or education. Implementation strategies must be adapted to best fit organizational culture and site needs (Wilson et al., 2017).

These barriers have been confirmed throughout the literature. Lack of protected time to engage in learning about new practice guidelines was identified as a significant barrier by four of the six articles that discussed barriers to EBP implementation and education (Hamilton et al., 2017; Juckett et al., 2020; Lamontage et al., 2019; Wilson et al., 2017). These barriers include constraints in practice and a lack of time to engage in lengthy search processes outside of working hours (Hamilton et al., 2017; Juckett et al., 2020). This can often lead to an unfavorable view of EBP and create inconsistencies in delivering interventions as intended (Juckett et al., 2020). The complexity of interventions and perceived inapplicability to a wide range of clients can seem intimidating (Juckett et al., 2020). Coupled with communication barriers among team members, these factors both serve as barriers to implementing practice guidelines and new evidence into practice.

Leadership. Finally, support from leadership and peers, or lack thereof, is the final identified barrier. Inconsistent communication from leadership and lack of support in the implementation of new evidence after initial training can create a culture in which practitioners may not feel comfortable nor confident using a new evidence-based intervention (Giulante et al., 2018; Hamilton et al., 2017; Juckett et al., 2020; Melnyk et al., 2017). Inconsistent leadership engagement can make practitioners uncertain about their new training and make it

less of a priority for the healthcare site (Juckett et al., 2020). Therefore, an organization-wide culture supporting EBP and updated with best practices in cognitive rehabilitation is crucial to a successful program.

Theme 4: Stakeholder Perspectives

Stakeholders are defined as clinicians, managers, and team members looking to implement new evidence. The previous themes have mentioned the importance of engaging stakeholders in the development of an educational program, so it is essential to discuss the six articles that bring about provider perspectives in EBP and learning preferences (Hamilton et al., 2017; Hines et al., 2017; McEwen et al., 2019; O'Reilly et al., 2017; Vingerhoetts et al., 2020; Williams et al., 2020). Two subthemes regarding stakeholder perspectives emerged from the literature: the need for stakeholder involvement and face-to-face interactions.

Stakeholder Involvement. A significant commonality among the literature is the desire for stakeholder involvement; IDT members want active participation in planning, design, and implementation (Hamilton et al., 2017; Hines et al., 2017; Vingerhoetts et al., 2020; Williams et al., 2020). Creating an EBP program should be a collaborative process that builds experiential, interactive, and meaningful components into the education (Hamilton et al., 2017; Hines et al., 2017; Vingerhoetts et al., 2020; Williams et al., 2020). Team members know their site and team best and, therefore, can give recommendations that best accommodate site readiness and goals (Hamilton et al., 2017; McEwen et al., 2019). Their insights and preferences are valuable assets when deciding on educational modes and will build a better framework for practice sustainability (McEwen et al., 2019).

Face-to-Face Interaction. Two studies mentioned the preference for face-to-face training over virtual interaction (O'Reilly et al., 2017; Williams et al., 2020). Williams and

colleagues (2020) completed a 46-site study, offering both an in-person and virtual workshop. Overall, most participants from both options (75.9 %) preferred in-person training because it fosters better engagement and focus, shows commitment, and better delivers meaning and relevance of practice (Williams et al., 2020). These face-to-face interactions can bring clarity on team member roles, allow for the ability to practice working together with the new material, and provide an opportunity for feedback (O'Reilly et al., 2017). All in all, it is crucial to engage stakeholders early and often, enlist their perspectives in program development, and provide the opportunity for face-to-face interaction to better facilitate learning.

Discussion

This scoping review aimed to answer the scoping review question, “In the existing evidence, what are the current practices for educating an IDT on the use of new evidence-based guidelines for cognitive rehabilitation for individuals with acquired brain injury?”. This scoping review found qualitative evidence of facilitators, barriers, implementation strategies, and stakeholder perspectives that influence the success of educating a team and implementing new evidence into a practice setting. Despite the variety of contexts in which the studies were conducted, there are shared perspectives across healthcare disciplines and rehabilitative backgrounds. The studies reveal evidence that several factors support the adoption and sustainment of guidelines in practice and numerous barriers that should be avoided.

The results indicate that there is no single best way to implement evidence into practice, however several strategies promote success, and others may be barriers that should be avoided when educating IDTs. The findings suggest facilitators that can support successful implementation include organizational readiness, attitudes of the multidisciplinary team, and strong leadership advocating for change. Barriers to a successful educational module must be

addressed early. They may consist of negative perceptions related to EBP, impressions of not being client-centered, or lack of dedicated time to participate in the learning process.

Stakeholder perspectives suggest the need to engage stakeholders early and often during the entire development process, making sure to encourage them to use the new information in practice (Hamilton et al., 2017; Hines et al., 2017; Vingerhoets et al., 2020; Williams et al., 2020). Furthermore, multimodal knowledge translation modules, including online supplements to in-person interactive learning, are promising implementation strategies to support educational delivery (Juckett et al., 2020).

While no articles addressed the entire scoping review question, the themes from varying articles can answer the entirety of the question. The aforementioned strategies provide suggestions of current practices in educating an IDT for individuals with acquired brain injury. The best way to implement these findings is by using the strategies mentioned in developing educational content, by engaging stakeholders and ensuring the integration of new guidelines into practice and long-term retention. Defining an effective way to implement evidence into practice through the education of an IDT can improve both professional practice, quality of service delivery, and patient outcomes (Melnyk et al., 2017).

Limitations

Five limitations are noted in this scoping review. First, databases included in this review were searched only in English and from one library system, meaning some articles may have been missed. Second, due to the nature of the topic, this scoping review was composed of primarily qualitative research and reviews, meaning it comprised majority Levels V and VI of research, thereby excluding higher levels of randomized quantitative research and reviews (See Table 5 for a complete list of articles included and levels of evidence). Third, no articles

answered the entirety of the scoping review question except one, which was exclusive to occupational therapy (Juckett et al., 2020). Fourth, this scoping review was completed by only one reviewer, making it difficult to control for any biases in the article identification and review process. Lastly, this scoping review was completed by an entry-level doctoral student, without any previous practice or scoping review experience limiting the experiential occupational therapy and IDT knowledge applicable to this review.

Limitations within the literature include use of small sample sizes within qualitative measures. Additionally, there was no article specific to the target population: individuals with acquired brain injury. Therefore, it is difficult to draw conclusions for that population. Finally, many of the qualitative articles lacked valid and reliable measures. Most created their own measures or rather used means like focus groups to gather their data, therefore weakening the methodology of these studies. A review with more rigorous inclusion criteria may yield more robust results.

Implications for Practice and Research

More evidence is needed regarding the process and implementation of education on evidence-based practice among IDTs in rehabilitation settings. Much of the current literature regarding interdisciplinary education focuses on academia. Furthermore, research in this area should aim to include standardized quantitative measures to be more generalizable and ensure qualitative understanding of clinical perceptions and information integration.

Practice guidelines are valuable within any setting, however, less is known about the practical implementation of these guidelines. This scoping review provides an overview of facilitators, barriers, implementation strategies, and rehabilitation provider perspectives as a start to understanding how to best educate an IDT in new guidelines for their population.

Specifically, the findings from this review have implications for educating a multidisciplinary team working in cognitive rehabilitation for individuals with acquired brain injury. The recommendations for optimization of education and integration of evidence-based health care practice include using multimodal educational methods, engaging the diverse disciplines early and often, and providing support after the initial education process.

There are three main implications that emerge from this scoping review. First, more research specific to cognitive rehabilitation after acquired brain injury is needed because guidelines differ among settings, so educational strategies may vary as well. Second, research specific to educating IDTs for individuals with acquired brain injury may yield more specific results, thus improving outcomes for both providers and those affected by acquired brain injury. Finally, there is no set “best practice” in educating IDTs in healthcare, so it is important to consider stakeholder and site perspectives and stay current on educational literature on the topic. The clinical bottom line for sharing and utilizing current evidence from this scoping review is the importance of involving key stakeholder perspectives in the education development and implementation process.

Conclusion

This scoping review aimed to answer the scoping review question, “In the existing evidence, what are the current practices for educating an IDT on the use of new evidence-based guidelines for cognitive rehabilitation for individuals with acquired brain injury?”. 15 scholarly articles addressing varying aspects of this question were initially appraised; Of these 15 articles, three primary research studies were critically appraised. The literature review resulted in the discovery of four themes. Some recommendations that emerged from these themes include

the use of multi-modal educational modules, support after initial training, and engaging the stakeholders early and often throughout the development and educational process.

Appendix B: Needs Assessment

Part 1: Description of the Organization or Community

Courage Kenny Rehabilitation Institute (CKRI) is a rehabilitation institute spanning much of the Twin Cities metro, greater Minnesota, and western Wisconsin. CKRI was formed in 2013 through a merger between Courage Center and Sister Kenny Rehabilitation Institute, founded in 1928 and 1942, respectively (Allina Health, n.d.). CKRI locations have varying specialties, focusing generally on rehabilitation from a variety of conditions, adaptive sports, and engaging the community.

CKRI's mission is to partner with their clients and patients to help them achieve their highest level of independence, health, and wellness (Allina Health, n.d.). The strategic plan to support this mission is through providing innovative programs and services, championing advocacy, and progressing research (Allina Health, n.d.). They also work with people across the lifespan and support their mission through interdisciplinary rehabilitation therapy, offering in home and community settings. CKRI is comprised of a large physical community, with locations all over the Minnesota and western Wisconsin. They provide 46 different services to their clients, varying by location. Some physical structures include pools for aquatic therapy, gymnasiums for adaptive sports, and therapy gyms to support progress in physical and mental health (Allina Health, n.d.). All buildings are wheelchair accessible and inclusive to the community.

Primary stakeholders include CKRI rehabilitation staff and board members, the CKRI research foundation, and CKRI patients and their families. Secondary stakeholders include Allina health staff and board members and staff at CKRI outside the rehabilitation team. The organization of CKRI itself is a collaborative model. They provide a variety of services, including

inpatient and outpatient rehabilitative services at a variety of clinics in Minnesota and Wisconsin. Socially, the team at CKRI is a Physical Medicine and Rehabilitation (PM&R) team. Groups of physiatrists, nurse practitioners, nurses, physical, occupational, and speech therapists all work collaboratively for the best possible outcomes and patient care. Culture and values at CKRI follow their mission and emphasize inclusion and advocacy. They support patients in reaching therapeutic goals, regardless of what they may be. They do their best at CKRI to foster an inclusive environment with an emphasis on diversity and client-centered care.

Priority/Need/Issue 1: Evidence for cognitive rehabilitation is constantly updating/evolving.

Primary Goal: Define current evidence-based treatment guidelines to improve occupational performance outcomes for individuals with acquired brain injury.

Strategy: Complete a literature review of current evidence for best and emerging practices in acquired brain injury. Compare this information with current CKRI practices to assist with identifying gaps.

Priority/Need/Issue 2: Unsure of how to best implement these practices to ensure best adherence from staff.

Primary Goal: Establish how to best implement these treatment protocols among an interdisciplinary therapy team at Courage Kenny Rehabilitation Institute (CKRI).

Strategy: Utilize focus groups, surveys, interviews, and observation to identify gaps in practice and identify staff preferences for new learning. Use results from these means to inform development of deliverable.

Priority/Need/Issue 3: Difficulty with long-term adherence to new practice guidelines.

Primary Goal: Present a best practice guide utilizing staff perspectives to ensure best uptake of new evidence at CKRI.

Strategy: Develop a deliverable in the form of a guide, handout, or module that outlines best practices in an easily understandable format for best staff adherence. This deliverable will summarize best practice guidelines to fill gaps identified at CKRI by key stakeholders. It will be given as a guide for ongoing practice with staff perspectives in mind for best chances of uptake.

Part 2: Preliminary Information and Resources for Learning about a Priority/Need/Issue

Internal Information and Resources

Name of Information or Resource	Description of Information or Resource	Brief Summary of Key Learning
Brain Injury Clinic	Document about outpatient rehabilitation provided by CKRI/Allina for people with mild to moderate brain injury	The Brain Injury Clinic is a part of the brain injury rehabilitation services provided by CKRI. It is an outpatient program to assist with return to IADLs like work and school. It is a holistic program, focusing on family education, mental health and coping strategies, improving relationships and confidence, and returning to prior level of function at work or school.
Stroke program	Document about CKRI and Abbott Northwestern's Neuroscience Institute and their collaboration to provide a comprehensive stroke rehabilitation program	Abbott Northwestern hospital has a Comprehensive Stroke Center certification. They utilize a comprehensive team approach and follows along for the entire recovery process. They offer 37 stroke rehabilitation services, ranging from inpatient stay to assisting with transition back into the community. These include physical,

		cognitive, and mental health rehabilitation. Inpatient acute rehabilitation provides accessible fitness centers, dining rooms, gardening, swimming. CKRI provides 3 hours of therapy per day, 5 days per week mixing physical, occupational, speech, recreational, or behavioral therapy as well as intensive fitness and psychological testing.
Brain injury rehabilitation services	Document describing services provided by CKRI/Allina for inpatient and outpatient settings	CKRI provides inpatient, outpatient, and community-based rehabilitative services, and consists of the brain injury clinic and community reintegration program. They use a multi-disciplinary approach surrounding improving independence and return to prior of level of function. They utilize programs like ABLE, adaptive sports, mental health services, support groups, and driving training.

External Information

Name of Information or Resource	Description of Information or Resource	Brief Summary of Key Learning
Evidence-based cognitive rehabilitation: Systematic review of the literature from 2009 through 2014. (Cicerone et al., 2019)	This systematic review provides updates to evidence and recommendations in the cognitive rehabilitation manual below.	Generally, new recommendations include support for visual scanning after R stroke, compensatory strategies for mild memory deficits, metacognitive strategy training for executive functioning, and comprehensive neuropsychological rehabilitation after acquired brain injury to promote the most positive outcomes. Evidence supports starting

		rehabilitation early and intensely, using global cognitive strategies such as the CO-OP approach, and errorless learning with external cuing for moderate to severe injuries.
Cognitive Rehabilitation Manual (Haskins et al., 2014)	This manual was published by the American Congress of Rehabilitation Medicine and is a manual for translating evidence-based recommendations into practice.	This manual provides an overview of the most recent evidence for cognitive rehabilitation for acquired brain injury to treat executive function, memory, attention, hemispatial neglect, and social communication deficits. Most recent evidence supports a variety of interventions, but most generally using an interprofessional collaborative client centered approach.
Traumatic Brain Injury & Concussion	CDC page defining explaining general population statistics about TBI and concussion in the United States	176 people die each day from TBIs, and there were more than 223,000 TBI-related hospitalizations in 2019. It is important to seek medical attention after any TBI, regardless of severity to determine if there is any damage. Rehabilitation includes learning, memory, concentration, and problem solving. Only 26% of people with moderate to severe TBIs improved in function over the course of 5 years, emphasizing the need for rehabilitative services and evidence in this area.

Gaps in Learning:

There are some important areas to note where more information is needed prior to educating staff in cognitive rehabilitation guidelines. Initially, an understanding of current practices, evaluation, and treatment practices will need to be developed. This will occur through interprofessional collaboration, informal interviews, observation of practice, and review of current guidelines used at CKRI. Furthermore, an idea of staff preferences for new learning and staff-identified gaps in practice is essential for stakeholder engagement and uptake of new practices. Focus groups and formal interviews/completion of surveys will inform this area of need. Finally, an idea of the format and delivery of cognitive rehabilitation guidelines will provide a form for this project to base itself off of. Review of current guidelines will further support this area.

Part 3: Informational Interviews

Summary of Interview Guide

Mary Radomski, PhD, OTR/L, senior scientific advisor at CKRI

Interview Questions:

- 1. What are some strengths you see from staff that encourages you about implementing evidence-based practice?*
- 2. What gaps do you see now in cognitive rehabilitation currently?*
- 3. If you could change one thing at CKRI, what would it be?*
- 4. What are some of your goals and aspirations for CKRI in the upcoming year?*
- 5. What do you hope to come of this doctoral capstone project?*
- 6. Any additional comments and/or questions?*

Interview Summary

Dr. Mary Radomski is the senior scientific advisor at CKRI and is the site supervisor for this capstone project and experience. She identified several hopes for this project, as well as strengths and resources to assist with accomplishing project goals. There is a motivated rehabilitation staff, both inpatient and outpatient, with an appetite to learn and implement evidence. There is a common value surrounding providing patients with the best care possible and doing the work required to achieve that. While Dr. Radomski did not note any large or noticeable gaps in current rehabilitation practices, she noted that there was a consensus of burnout from staff since the onset of COVID-19. Rehabilitation staff at CKRI are incredibly busy, as most healthcare professionals are, and would benefit from motivating practices and slowly rolling in any changes. Her hopes generally align with one goal: improving and making practice easier for therapists. That includes identifies best practices, facilitating conversations surrounding options for provisional implementation, and setting up the team to implement these changes as seamlessly as possible.

Part 4: Public Records and Organizational/Community Resources

Allina Health: Brain Injury Rehabilitation Services

Allina Health provides intensive acquired brain injury services (TBI, stroke, encephalitis, etc.) through inpatient, outpatient, and community-based services. They have a variety of groundbreaking and new evidence-supported interventions and programs, as well as tried-and-true programs. CKRI provides 67 programs, including, but not limited to, ABLE, an activity-based locomotor exercise program, behavioral and mental health services, inpatient rehabilitation from an interdisciplinary team, pool therapy, driver assessment and training, and access to assistive technology. Their brain-spine team communicates for a solid continuum of care from inpatient stay to continued rehabilitation in the community. There are specialists and programs

available for variations of brain injuries, including vestibular rehabilitation, pain management, and robotics. Most of these services target populations with mild to moderate brain injury from a variety of sources.

American Congress of Rehabilitative Medicine: Cognitive Rehabilitation Manual

The American Congress of Rehabilitative Medicine (ACRM) provides a Cognitive Rehabilitation Manual, outlining the treatment of cognitive deficits from acquired brain injury. This manual touches on 5 different areas of cognitive rehabilitation: executive functions, memory, attention, hemispatial neglect, and social communication. They provide practice standards, which are evidence-based with high quality research, practice guidelines, and practice options, which are supported with emerging evidence. For executive functions, metacognitive strategy training is recommended as a practice standard and training in formal problem-solving strategies is included as a practice guideline. Group based interventions are included as a practice option. For memory, memory strategy training is recommended as a practice standard. The practice guideline recommended is external compensations. Errorless learning and group-based interventions are provided as practice options. To address attention, post-acute rehabilitation is stated as a practice standard, including direct attention training, specifically Attention Process Training (APT) and Time Pressure management. The practice option suggested is computer-based interventions. The ACRM recommends visuospatial rehabilitation with a focus on visual scanning training for Left Hemispatial neglect. As practice options, the ACRM recommends limb activation and visual organization. Finally, for social communication rehabilitation, specific intervention for functional communication deficits is included for the practice standard. This includes social skills treatment and treatment of emotional perception deficits. As a practice option, group-based interventions are suggested.

Part 5: Organization or Community Assets

Alisa Kocian and Joe Yunek: Outpatient & Inpatient OTs and members of brain injury rehabilitation board/team

Both Alisa and Joe are community assets to CKRI as inpatient (Joe) and outpatient (Alisa) members of the brain injury rehabilitation team. They will both be valuable assets to inform education and program development at CKRI as a part of the doctoral capstone project. They will provide insight into current practice and guidelines used at CKRI, educational preferences of staff, and perspectives on current gaps in practice. They will also serve as a connection to other resources and assets that could be used for the development and implementation of this capstone project.

Brain Injury Clinic (BIC) – outpatient rehabilitation program for mild to moderate brain injury

The Brain Injury Clinic (BIC) is a rehabilitation program that combines mental health and rehabilitation therapies. They focus on numerous cognitive areas for rehabilitation. It will provide a setting to see evidence-based rehabilitation strategies into practice and observation opportunities of community integration skills. Furthermore, it is a part of the brain injury rehabilitation program, which will allow me to see the progression from inpatient to outpatient care. The BIC itself is an outpatient rehabilitation and follow up care clinic. It is led by the neuropsychology department and focuses on improving memory, concentration, communication, organization, and coping skills. It consists of an interprofessional team, including a PM&R physician, care coordinator, neuropsychologist, occupational, physical, and speech therapists, vision therapist, and psychologist. The program requires that patients be 2-3 months post injury to attend. The next step after this clinic is the community reintegration

program (CRP). The numerous professionals who are a part of this team will help inform educational practices of this doctoral capstone project.

Part 6: Proposed Methods to Collect Other Information During the Doctoral Capstone

Experiences and Project

Internal Information and Resources

Name of Information or Resource	Description of Information or Resource	Brief Summary of Focus of Learning
CKRI rehabilitation staff meetings	Monthly staff meetings involving all CKRI staff members to discuss current trends and goals for the rehabilitation teams	Gain insight into current staff dynamics and goals for CKRI for the summer/upcoming months.
CKRI rehabilitation staff interviews/survey results	Informal and formal interviews with staff members related to learning preferences and identified gaps in practice/things they would like to learn more about	Learn about staff preferences and perspectives to inform what best practices they want to learn more about and how to best deliver that information.
CKRI therapy session observations	Observation of inpatient and outpatient therapy sessions during the first two weeks followed by informal questions to therapists about decision making processes and evidence used to inform practice	It will be useful to see what current practice looks like in action, including the decision-making processes utilized by staff when choosing intervention activities. This could potentially influence the development of a deliverable.

External Information

Name of Information or Resource	Description of Information or Resource	Brief Summary of Focus of Learning
Conducting Focus Groups – Community Toolbox	Information regarding how to structure, perform, and analyze focus group results	This community toolbox section provides in depth instructions and ideas for how to best conduct a focus group. Describes components and items to consider and how to suggestions for best delivery.

Professional Practice Guidelines – American Psychological Association	Guidance for developers and users on developing practice guidelines (APA)	Provides requirements and recommendations for how to create the best quality practice guidelines to guide clinical practice.
Writing Survey Questions – Pew Research Center	Pew research Center information about best practices in survey research	Includes information on focus groups, question development, measuring change, question types, and question order for most effective survey development and administration.

Part 7: SWOT Analysis: Strengths, Weaknesses, Opportunities, and Threats

Internal		External	
Strengths	Weaknesses	Opportunities	Threats
Office available on-site	Staff schedules – very busy therapy schedules creating limited scheduling options for focus groups	Societal push in health care for evidence-based practice	Limited research available regarding interprofessional education related to cognitive rehabilitation
Therapy team motivated for project and available to help	Lack of time for survey completion from staff	Cognitive rehabilitation is a growing field	COVID-related staff burnout
Current existing guidelines for cognitive rehabilitation at CKRI	Breadth of services at CKRI – may be difficult to cover inpatient, outpatient, and community services	High quality research in the cognitive rehabilitation field	Large hospital systems and changing team members can make interprofessional communication limited
Opportunities for hybrid collaboration and remote work	Staff has higher level of knowledge than capstone student on cognitive rehabilitation	CE opportunities in cognitive rehabilitation and guideline development	
Access to Google and Microsoft TEAMS for virtual meetings as needed	Short timeframe of project to allow for need assessment, development, implementation, and full follow-through	Several evidence-based guidelines already published	

Access to Allina library			
Inpatient and outpatient rehabilitation programs within same building			

Part 8: Preliminary Evidence Review on Populations, Interventions, and Programs of the Organization/Community

Documents critically appraised:

- American Psychological Association. (2015). Professional practice guidelines: Guidance for developers and users. *American Psychologist*, 70(9), 823-831. <http://dx.doi.org/10.1037/a0039644>
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- Lancôt, K., Lindsay, M.P., Smith, E.E., Sahlas, D.J., Foley, N., Gubitz, G., Austin, M., Ball, K., Bhogal, S., Blake, T., Herrmann, N., Hogan, D., Khan, A., Longman, S., King, A., Leonard, C., Shoniker, T., Taylor, T., Teed, M., ... & Swartz, R.H. (2019). Canadian stroke best practice recommendations: Mood, cognition, and fatigue following stroke, 6th edition update 2019. *International Journal of Stroke*, 15(6), 668-688. <https://doi.org/10.1177/1747493019847334>.
- Ponsford, J., Bayley, M., Wiseman-Hakes, C., Togher, L., Velikonja, D., McIntyre, A., Janzen, S., Tate, R. (2014). INCOG recommendations for management of cognition following traumatic brain injury, part II: Attention and information processing speed. *Journal of Head Trauma Rehabilitation*, 29(4), 321-37. <https://doi.org/10.1097/HTR.0000000000000072>.
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- Radomski, M.V., Anheluk, M., Bartzan, M.P., & Zola, J. (2016). Effectiveness of interventions to address cognitive impairments and improve occupational performance after traumatic brain injury: A systematic review. *American Journal of Occupational Therapy*, 70, 1-7. <http://dx.doi.org/10.5014/ajot.2016.020776>
- Tate, R., Kennedy, M., Ponsford, J., Douglas, J., Velikonja, D., Bayley, M., Stergiou-Kita, M. (2014). INCOG recommendations for management of cognition following traumatic brain injury, part III. *Journal of Head Trauma Rehabilitation*, 29(4), 338-352. <https://doi.org/10.1097/htr.0000000000000068>
- Togher, L., Wiseman-Hakes, C., Douglas, J., Stergiou-Kita, M., Ponsford, J., Teasell, R., Bayley, M., & Turkstra, L. S. (2014). INCOG recommendations for management of cognition following traumatic brain injury, part IV. *Journal of Head Trauma Rehabilitation*, 29(4), 353-368. <https://doi.org/10.1097/htr.0000000000000071>
- Velikonja, D., Tate, R., Ponsford, J., McIntyre, A., Janzen, S., & Bayley, M. (2014). INCOG recommendations for management of cognition following traumatic brain injury, part V. *Journal of Head Trauma Rehabilitation*, 29(4), 369-386. <https://doi.org/10.1097/htr.0000000000000069>
- Waldron-Perrine, B., Mudar, R., Mashima, P., Seagly, K., Sohlberg, M., Bechtold, K.T., Paul, D., Milman, L., Ashman, T., Peña, K.A. & Dunn, R. (2022): Interprofessional collaboration and communication to facilitate implementation of cognitive rehabilitation in persons with brain injury. *Journal of Interprofessional Care*, 1-10. <https://doi.org/10.1080/13561820.2021.1971956>

Appendix C: Evidence Rubric

Strong evidence: based on at least 1 published guideline level A recommendation/practice standard with potential support from levels B and C evidence from published guidelines and/ or systematic reviews that directly addresses a cognitive rehabilitation intervention domain specifically considered for people with ABI

Moderate evidence: based on at least 1 published guideline level B recommendation/practice guideline with potential support from level C evidence from published guidelines and/or systematic reviews that directly addresses a cognitive rehabilitation intervention domain specifically considered for people with ABI

Weak evidence: based on at least 1 published guideline at level C recommendation/practice option or systematic reviews that directly addresses a cognitive rehabilitation intervention domain specifically considered for people with ABI

Appendix D: Evidence Table

Cognitive Impairment(s)	Source	For who/severity	Description of intervention	Level of evidence	Dosage/intensity (if provided)	Notes/ implications for CKRI
Attention	1.Ponsford et al., (2014): INCOG part II 2.Lanctôt et al., (2019) 3.Cicerone et al., (2019) 4.Haskins et al., (2014): Cognitive Rehabilitation Manual 5.ERABI Guidelines	Mild-moderate attentional deficits after ABI	Metacognitive strategy training (MST) with focus on everyday activities; including: ^{1,3,4,5} <ul style="list-style-type: none"> - direct attention training with compensatory strategies for generalization used in combination with MST^{1,2,3,4,5} - Time pressure management (TPM) - 3 step training for slow information processing^{1,4} 	Strong evidence	TPM: 10 hours of training at least 3 months post stroke	
Attention	Ponsford et al., (2014): INCOG part II Radomski et al., (2016)	Adults with TBI	Dual-task training Consideration: must provide training on direct tasks for life rather than hoping for generalization to novel tasks	Strong evidence		

Cognitive Impairment(s)	Source	For who/severity	Description of intervention	Level of evidence	Dosage/intensity (if provided)	Notes/ implications for CKRI
	ERABI Guidelines					
Attention	Ponsford et al., (2014): INCOG part II ERABI Guidelines	Mild - moderate TBI in which anxiety/depression is impacting attention	Cognitive behavioral therapy (CBT), including stress management, relaxation, and meditation tools. Significantly improves emotional functioning and divided attention when combined with cognitive remediation therapy	Moderate evidence		
Attention and executive functioning	1.Bogdanova et al., (2016) 2.Teasell et al., (2020): EBRSR 3.DoD/VA (2021): mTBI	Adults with ABI	Computerized cognitive rehabilitation ^{1,2} <ul style="list-style-type: none"> - CogMed QM (5 studies) - Combination of VR and computerized rehab program¹ - THINKable¹ - Assessment and involvement from therapist (against self-administered)³ 	Weak evidence		No access to programs - consider exploration where evidence is strongest (CogMed?) Teasell et al., (2020): EBRSR supports only for attention - not EF
Attention	Ponsford et	Adults with	Decreased environmental	Weak		

Cognitive Impairment(s)	Source	For who/severity	Description of intervention	Level of evidence	Dosage/intensity (if provided)	Notes/ implications for CKRI
	al., (2014): INCOG part II ERABI Guidelines	TBI	demands and task adaptations to reduce attentional deficit impact on daily activities	evidence		
Attention	Cicerone et al., (2019) Haskins et al., (2014): Cognitive Rehabilitation Manual Radomski et al., (2016) Teasell et al., (2020): EBRSR Lee et al., (2019) - CPG review	Adults with ABI in postacute rehabilitation	Direct attention training for specific impairments in working memory for cognitive and functional outcomes - Computer based interventions	Moderate evidence	Cogmed QM, WM training, RehaCom	
Attention (complex attention: working memory)	Winstein et al., AHA stroke guidelines	Adults with stroke	Anodal tDCS over left dorsolateral prefrontal cortex for language-based complex attention → experimental	Moderate evidence		Teasell et al., (2020): EBRSR does not support

Cognitive Impairment(s)	Source	For who/severity	Description of intervention	Level of evidence	Dosage/intensity (if provided)	Notes/ implications for CKRI
Executive functioning	1.Tate et al., (2014): INCOG part III 2.Radomski et al., (2022) 3.Cicerone et al., (2019) 4.Radomski et al., (2016) 5.Engel et al., (2019) 6.Teasell et al., (2020): EBRSR 7.DoD/VA (2021): mTBI 8.Lee et al., (2019) - CPG review 9.ERABI Guidelines	People with problem-solving difficulties following mild-moderate TBI Occupation-based interventions includes stroke	Metacognitive strategy training, including goal management training (GMT), and 6 problem solving therapy (PST) ^{1,2,3,4,9,10,11} Time pressure management (TPM), self-talk procedures, pause prompt praise ^{1, 11} Focus on functional (occupation-based) outcomes. Best when patient is aware of need for strategies. Include self-monitoring and feedback into future performance ^{1,3,9}	Strong evidence	3 months PST: 12 sessions: 2x/wk for 6 wks GMT: 1 day every other week - 8, 2 hour sessions over 4 days	

Cognitive Impairment(s)	Source	For who/severity	Description of intervention	Level of evidence	Dosage/intensity (if provided)	Notes/ implications for CKRI
	10. Lanctôt et al., (2019) 11. Haskins et al., (2014): Cognitive Rehabilitation Manual					
Executive functioning	Tate et al., (2014): INCOG part III ERABI Guidelines	Adults with TBI with impaired reasoning	Strategies to improve capacity to analyze and synthesize information such as Strategic memory and reasoning training (SMART) to improve gist reasoning and generalization for working memory and community participation	Strong evidence	small groups of 4-5 over 12 sessions (10 sessions of 1.5 hours/5 weeks and two 1.5 hour booster sessions over the next 3 weeks)	
Executive functioning	Tate et al., (2014): INCOG part III Radomski et al., (2016) Engel et al., (2019) ERABI Guidelines	Adults with TBI experiencing impaired self awareness	Direct corrective feedback within context of multi contextual awareness program. Use in context of metacognitive strategy training and in combination with both verbal and audiovisual feedback vs experiential feedback alone - Direct feedback in context of awareness and	Strong evidence		

Cognitive Impairment(s)	Source	For who/severity	Description of intervention	Level of evidence	Dosage/intensity (if provided)	Notes/ implications for CKRI
			client-specific goals			
Executive functioning	1.Tate et al., (2014): INCOG part III 2.Radomski et al., (2022) 3.Cicerone et al., (2019) 4.Haskins et al., (2014): Cognitive Rehabilitation Manual 5.ERABI Guidelines	Adults with TBI with executive functioning and problem solving deficits Severe TBI	Group based interventions including: ^{1,2,3,5,11} <ul style="list-style-type: none"> - Metacognitive strategy training for self awareness, goal setting, and compensatory strategies, problem solving, emotional regulation - In combination with individual therapy² - Specific treatment in small group settings (4-5 patients)¹ 	Moderate evidence	Self-awareness: 1 session/wk for 10 weeks Rusk institute problem-solving group: 2 sets of 12, 2-hour groups <ul style="list-style-type: none"> - increase awareness of functioning and development management strategies - Increase awareness of barriers to clear 	

Cognitive Impairment(s)	Source	For who/severity	Description of intervention	Level of evidence	Dosage/intensity (if provided)	Notes/ implications for CKRI
					thinking Daily log, personal strategy list, modeling, role play, etc.	
Executive functioning, memory, attention	Giles et al., (2022) Winstein et al., AHA stroke guidelines DoD/VA (2021): mTBI	Adults with mild to moderate TBI or stroke	Virtual reality (VR) alone or in combination with traditional intervention to improve pre-driving skills, memory, word fluency, and life satisfaction. Good for problem solving and with visual imagery for prospective memory, attention, executive functioning	Moderate evidence	EF and problem solving: 12 Individual 20-25 min sessions Cog flexibility: 24, 1 hour sessions for 8 weeks Driving: 6, 90 min sessions over 4 weeks	There is access to VR at most CKRI site → potentially most feasible tech. application Teasell et al., (2020): EBRSR does not support
Executive functioning	Giles et al., (2022) Radomski et al., (2016)	Adults with mild to severe TBI	Short Term executive Plus (STEP) with attention process training (APT) program for problem solving and self-awareness/executive function (self-report)	Weak evidence	2, 45 min group and 1, 60 min individual session 3 days/wk over 12 weeks	Groups only completed on weekend in inpatient; not completed in outpatient
Executive functioning	Cicerone et al., (2019)	Adults with severe deficits after	Skill-specific training with errorless learning for functional tasks → compensatory strategies	Moderate evidence		

Cognitive Impairment(s)	Source	For who/severity	Description of intervention	Level of evidence	Dosage/intensity (if provided)	Notes/ implications for CKRI
	Winstein et al., AHA stroke guidelines	stroke or TBI (including emergent awareness and use of compensatory strategies)	<ul style="list-style-type: none"> - No expectation of generalization - NFT (more specific CO-OP) 			
Executive functioning	1.Haskins et al., (2014): Cognitive Rehabilitation Manual 2.Cicerone et al., (2019) 3. Hallock et al., (2016)	Adults with impaired self-awareness after TBI	Formal problem solving strategies and application to everyday contexts ^{1,2,3} <ul style="list-style-type: none"> - Problem solving, memory notebook (goal, plan, do, check), faded cuing Explicit (verbal and video) performance feedback ²	Moderate evidence		
Global cognitive functioning/ memory	Vanderbeken & Kerchofs (2017) Winstein et al., AHA stroke guidelines Teasell et al.,	Adults at least 1 year post TBI or stroke	Physical exercise program with patient directed goal making <ul style="list-style-type: none"> - Activity training and aerobic training combined with resistance training Adjunctive therapy	Weak evidence	> 4 wk program. 30 min/day; 3 days/wk	

Cognitive Impairment(s)	Source	For who/severity	Description of intervention	Level of evidence	Dosage/intensity (if provided)	Notes/ implications for CKRI
	(2020): EBRSR					
Cognitive communication impairment	Togher et al., (2014): INCOG part IV ERABI Guidelines	Adults with moderate-severe TBI at least 6 months post injury	Rehearse communication skills in situations appropriate to the context of where the patient will live, work, and study	Weak evidence	2-4 weeks, 2 hour session or 1 hour/day	Does speech do all communication here?
Cognitive communication impairment	Togher et al., (2014): INCOG part IV Herbert & Teasell (2015): CSBPR ERABI Guidelines	Adults with moderate-severe TBI at least 6 months post injury Stroke	Provide education and training of communication partners Teach partners to ask positive questions, encourage discussion, and solve communication problems collaboratively	Strong evidence	2.5 hour group/10 weeks with weekly 1 hour individual sessions OR 17 hour program across 8 weeks with 6 month follow-up for post training	Groups only completed on weekend in inpatient; not completed in outpatient
Cognitive communication impairment	Togher et al., (2014): INCOG part IV Herbert & Teasell (2015): CSBPR Lee et al., (2019) - CPG	Adults with severe TBI at least 6 months post injury	People with severe communication disability should be assessed, provided and trained in alternative and augmentative communication aids by qualified clinicians (OT, SLP) Includes devices, writing aids, seating, etc.	Moderate evidence	Training in at least 2, 45 minute sessions with systematic instruction (opposed to trial and error)	

Cognitive Impairment(s)	Source	For who/severity	Description of intervention	Level of evidence	Dosage/intensity (if provided)	Notes/ implications for CKRI
	review ERABI Guidelines					
Cognitive communication impairment	Togher et al., (2014): INCOG part IV	Adults with moderate-severe TBI at least 6 months post injury	After TBI, create patient centered goals for rehabilitation, with outcome measures at level of participation in daily life. Group communication rehabilitation.	Strong evidence	8, 10, or 12 weeks for standardized group social skills training or conversational skills training	Groups only completed on weekend in inpatient; not completed in outpatient
Cognitive communication	Radomski et al., (2022)	Adults with moderate to severe ABI	BrainHQ for improved memory, word fluency, and life satisfaction	Weak evidence	1 hour sessions, 5 days/wk, 5 months	No current access to BrainHQ
Cognitive communication	1.Cicerone et al., (2019) 2.Haskins et al., (2014): Cognitive Rehabilitation Manual 3.Herbert & Teasell (2015): CSBPR	Adults with L hemisphere stroke or with social-communication deficits after TBI (aphasia)	Group based intervention for language deficit remediation ^{1,2,3} - Group interactive structured treatment (GIST) for social competence ² - Focused training in emotional perception ² - Errorless learning, pragmatic	Moderate evidence	13 week social-communication skills group GIST: 4-8 participants	Groups only completed on weekend in inpatient; not completed in outpatient

Cognitive Impairment(s)	Source	For who/severity	Description of intervention	Level of evidence	Dosage/intensity (if provided)	Notes/ implications for CKRI
			communication added to psychotherapy ²			
Cognitive communication	Cicerone et al., (2019)	Adults with L hemisphere stroke experiencing language deficits during acute and post-acute stages of therapy	Cognitive linguistic therapies for language deficits <ul style="list-style-type: none"> - Reading and recall of information - Oral metaphor interpretation 	Strong evidence		
Cognitive communication	Cicerone et al., (2019) Haskins et al., (2014): Cognitive Rehabilitation Manual ERABI Guidelines	Adults with social communication deficits after TBI	Specific interventions for functional communication deficits <ul style="list-style-type: none"> - Pragmatic conversation skills (groups, practice, generalization in community, WSTC) - Emotional and facial recognition (errorless learning, WATER) 	Strong evidence		Groups only completed on weekend in inpatient; not completed in outpatient
Cognitive	Cicerone et	Adults with L	Treatment intensity is key factor	Moderate		

Cognitive Impairment(s)	Source	For who/severity	Description of intervention	Level of evidence	Dosage/intensity (if provided)	Notes/ implications for CKRI
communication	al., (2019)	stroke	in language skills rehab	evidence		
Cognitive communication	Cicerone et al., (2019)	Adults with cognitive-linguistic deficits after L hemisphere stroke or TBI	Computer-based interventions as adjunct to therapist-led treatment. Reliance on solely computer tasks without therapist involvement is NOT recommended	Weak evidence		
Memory	Velikonja et al., (2014): INCOG part V Giles et al., (2022) Radomski et al., (2022) Lanctôt et al., (2019) O'Neil- Pirozzi et al., (2016) Radomski et al., (2016) Winstein et al., AHA	Adults with mild-severe TBI with some intact executive functioning skills	Internal compensatory strategies are recommended for TBI with memory impairments, including instructional and metacognitive strategies. Includes visualization, <i>visual imagery</i> , repeated practice, retrieval practice, PQRST, self-cueing, self-generalization, and self-talk.	Strong evidence	Either group or individual format. Varied dosage. 12 wk group for internal compensatory strategies specified Visual imagery: 1 hour, 1-2x/wk for 6 months	Groups only completed on weekend in inpatient; not completed in outpatient

Cognitive Impairment(s)	Source	For who/severity	Description of intervention	Level of evidence	Dosage/intensity (if provided)	Notes/ implications for CKRI
	stroke guidelines Teasell et al., (2020): EBRSR DoD/VA (2021): mTBI Lee et al., (2019) - CPG review ERABI Guidelines					
Memory	1.Haskins et al., (2014): Cognitive Rehabilitation Manual 2.Cicerone et al., (2019) 3.Radomski et al., (2016) 4.Winstein et al., AHA	Adults with mild memory impairments after TBI or stroke	Memory strategy training ^{1,2,3,4} - Visual imagery, association, external supports, assistive technology, PDA, GPDR, PQRST, CNN (difference between above and this is level of impairment) n-back procedure ¹ Specific memory training for visual-spatial memory (language-	Strong evidence	CNN discontinuation for memory notebook: 100% accuracy on 3 consecutive role plays with no cuing on last two days N-back procedure for WM: 60 min session: 20 - 30 min for feedback	

Cognitive Impairment(s)	Source	For who/severity	Description of intervention	Level of evidence	Dosage/intensity (if provided)	Notes/ implications for CKRI
	stroke guidelines		based memory) ⁴		and discussion	
Memory	<p>1.Velikonja et al., (2014): INCOG part V</p> <p>2.Radomski et al., (2022)</p> <p>3.Lanctôt et al., (2019)</p> <p>4.Cicerone et al., (2019)</p> <p>5.Haskins et al., (2014): Cognitive Rehabilitation Manual</p> <p>6.Radomski et al., (2016)</p> <p>7.Winstein et al.: AHA stroke</p>	Adults with amnesia or severe memory impairment after TBI/ ABI	<p>Environmental supports and reminders. Must train patients and caregivers in external supports. Includes NeuroPage, smartphones, SIRI, PDA, notebooks, whiteboards. Specific prospective memory prompts reduce need for monitoring. External compensations with direct application to functional activities. Orientation book for severely impaired^{1,2,3,4,5,6,8}</p> <p>Enriched environments to increase engagement⁷</p>	Strong evidence	<p>PDA: 7-8 hours over 8-9 session (8 weeks)</p> <p>Discontinuation of memory notebook after 100% accuracy on all areas for 3 days</p> <p>Errorless learning, spaced retrieval: cue fading based on severity</p>	<p>Kettlewell et al., (2019) does NOT support personal smart technologies for memory (systematic review of 6 articles)</p> <p>No current use of electronic pagers - phones and tablets for visual feedback in MST</p>

Cognitive Impairment(s)	Source	For who/severity	Description of intervention	Level of evidence	Dosage/intensity (if provided)	Notes/ implications for CKRI
	<p>guidelines</p> <p>8.ERABI Guidelines</p>					
Memory	<p>1.Velikonja et al., (2014): INCOG part V</p> <p>2.Hallock et al., (2016)</p> <p>3.ERABI Guidelines</p> <p>4.Haskins et al., (2014): Cognitive rehabilitation manual</p>	Adults with mild to severe memory impairment after TBI	<p>Key instructional practices to improve memory practices:^{1,3}</p> <ul style="list-style-type: none"> - Clearly defined intervention goals² - Activity analysis and breaking down activities⁴ - Sufficient time and opportunity for practice - Distributed practice (improved prospective and episodic memory)⁴ - Teach strategies with variations in stimuli⁴ - Strategies for effortful processing of information 	Strong evidence	Distributed practice (spaced retrieval): 1x/day for 30 minute sessions over 7 weeks	Practical to implement distributed practice frequency?

Cognitive Impairment(s)	Source	For who/severity	Description of intervention	Level of evidence	Dosage/intensity (if provided)	Notes/ implications for CKRI
			<ul style="list-style-type: none"> - Select and train goals relevant to patient⁴ - Constrained error teaching for new learning/ procedures (errorless, spaced retrieval) - better results for severe⁴ 			
Memory	1.Velikonja et al., (2014): INCOG part V 2.Cicerone et al., (2019) 4.ERABI Guidelines	Adults with mild to moderate memory impairment after ABI	Group-based interventions <ul style="list-style-type: none"> - Combined internal and external strategies (errorless learning) for improved memory, recall, and performance on functional memory tasks^{1,4} - Internal strategies with external → errorless learning with metacognitive strategies 	Moderate evidence	4-9 weeks 4 wk: 1 hr 2x/wk I-MEMs: 12 sessions 9-week memory notebook program over 4 stages: anticipation, acquisition, application, adaptation TEACH-M	Shorter time post stroke = less improvement? Groups only completed on weekend in inpatient; not completed in outpatient

Cognitive Impairment(s)	Source	For who/severity	Description of intervention	Level of evidence	Dosage/intensity (if provided)	Notes/ implications for CKRI
			<p>for mild to moderate impairment and those with intact executive functioning</p> <ul style="list-style-type: none"> - Improvement of prospective memory and information recall in performance of everyday tasks^{2,4} 		Memory rehab: 8 sessions; 60 min each 2x/wk over 4 weeks	
Memory	<p>Haskins et al., (2014): Cognitive Rehabilitation Manual</p> <p>Cicerone et al., (2019)</p> <p>Winstein et al., AHA stroke guidelines</p> <p>ERABI Guidelines</p>	Adults with severe memory impairments after TBI or stroke	Errorless learning for learning specific skills or knowledge with limited transfer to novel tasks. Emerging evidence for use with route/navigation	Moderate evidence		

Cognitive Impairment(s)	Source	For who/severity	Description of intervention	Level of evidence	Dosage/intensity (if provided)	Notes/ implications for CKRI
Memory	Jamieson et al., (2014) ERABI Guidelines	Adults with ABI with prospective memory impairments	Assistive technology (PDAs, micro-prompting devices) - NeuroPage, PDA - Multimodal, time-specific cues that engage users	Weak evidence		No current use of electronic pagers - phones and tablets for visual feedback in MST
Memory, attention	Giles et al., (2022) DoD/VA (2021): mTBI	Adults with TBI	Computer based cognitive training and t'ai chi for improved cognition (memory, attention)	Moderate evidence		DoD/VA (2021): mTBI recommends against VR and computer-based rehab as sole rehab for mTBI (weak-against)
Visual and verbal working memory	Fernandez Lopez & Antoli (2020)	Adults with ABI	Computer based cognitive interventions	Weak evidence	10-20 hours of intervention, across 20-30 sessions: 5 sessions/wk. 30-45 min sessions	Only access to BITS
Cognition	Lanctôt et al., (2019)	Adults with stroke	MoCA for vascular cognitive impairment screening and reassess at different stages of care	Moderate evidence	Transition points in care with different versions to avoid practice effects	CKRI uses SLUMS - preference for MoCA?

Cognitive Impairment(s)	Source	For who/severity	Description of intervention	Level of evidence	Dosage/intensity (if provided)	Notes/ implications for CKRI
Post-stroke fatigue	Lanctôt et al., (2019)	Adults with stroke	Graded activity training: treadmill walking, strength training, and homework (mindfulness and stress reduction)	Moderate evidence	12 week program	
Post-ABI Fatigue	ERABI Guidelines	Adults with ABI	<p>Sleep hygiene and energy conservation strategies</p> <ul style="list-style-type: none"> - Consistent sleep schedule, quiet and dark room, no naps, etc. 	Weak evidence		
Visuoperceptual deficits/ Hemispatial neglect	<p>Cicerone et al., (2019)</p> <p>Haskins et al., (2014): Cognitive Rehabilitation Manual</p> <p>Herbert & Teasell (2015): CSBPR</p> <p>Teasell et al., (2020): EBRSR</p> <p>Lee et al.,</p>	Adults with L visual neglect after R-hemisphere stroke	Visual scanning training (Lighthouse strategy, computer based reading, scanning, tracking, etc.)	Strong evidence	Computerized visual scanning training: 30 min sessions in which pt is shown 20 sequences of 20 digits	

Cognitive Impairment(s)	Source	For who/severity	Description of intervention	Level of evidence	Dosage/intensity (if provided)	Notes/ implications for CKRI
	(2019) - CPG review					
Visuoperceptual deficits/ Hemispatial neglect	<p>1.Cicerone et al., (2019)</p> <p>2.Haskins et al., (2014): Cognitive Rehabilitation Manual</p> <p>3.Winstein et al., AHA stroke guidelines</p> <p>4.Herbert & Teasell (2015): CSBPR</p> <p>6.Lee et al., (2019) - CPG review</p>	Adults with L neglect after R-hemisphere stroke	<p>L hand stimulation or forced limb activation used in combination with visual scanning training to increase treatment efficacy (mirror therapy, contralateral limb activation, imagined, spatial reconding, spatio-motor, or visuo-spatio-motor)^{1,2,3}</p> <p>Herbert & Teasell (2015): CSBPR only supports mirror therapy (B) for unilateral attention and L neglect → supports mirror therapy COMBINED with limb activation⁴</p> <p>Prisms for neglect - short term⁶</p>	Moderate-strong evidence	Spatial reconditioning: 20 days of Bon Saint Come protocol w/ biofeedback	<p>CSBRP does NOT recommend limb activation ALONE (B) also does not recommend prism glasses or eye patches as compensatory strategies for neglect (B)</p> <p>Teasell et al., (2020): EBRSR does not support limb activation for neglect, but does support mirror therapy - does not support patching for neglect</p> <p>DoD/VA does not recommend or advise against any eye patching or prism use</p>

Cognitive Impairment(s)	Source	For who/severity	Description of intervention	Level of evidence	Dosage/intensity (if provided)	Notes/ implications for CKRI
Visuoperceptual deficits/ Hemispatial neglect	1.Cicerone et al., (2019) 2.Herbert & Teasell (2015): CSBPR	Adults with apraxia after L hemisphere stroke	Specific gestural or strategy training ¹ Errorless learning, graded strategy training, gestural training ²	Strong evidence Moderate evidence		
Visuoperceptual deficits/ Hemispatial neglect	1.Cicerone et al., (2019) 2.Herbert & Teasell (2015): CSBPR 3.Teasell et al., (2020): EBRSR	Adults with neglect after R hemisphere stroke	Electronic technologies for visual scanning training ^{1,2} Virtual reality/ computer based interventions to improve visual perception ^{2,3}	Weak evidence Moderate evidence		
Visuoperceptual deficits/ Hemispatial neglect	Cicerone et al., (2019) Haskins et al., (2014): Cognitive Rehabilitation Manual	Adults with visual perceptual deficits, without visual neglect, after R hemisphere stroke during acute rehab	Systematic training of visuospatial deficits and visual organization skills	Weak evidence		
ADL performance	Swanton et al., (2020)	Adults with acquired	Cognitive strategy training (CO-OP, metacognitive strategy)	Weak evidence	30 - 120 min sessions between	

Cognitive Impairment(s)	Source	For who/severity	Description of intervention	Level of evidence	Dosage/intensity (if provided)	Notes/ implications for CKRI
	Hallock et al., (2016)	brain injuries	training, multifaceted strategy training, occupation-based, occupational performance coaching, self-regulation, strategy training for and not for apraxia, TPM) provided in inpatient and outpatient settings across continuum of care		1-5 days/wk and 1-16 wks	
Self-Awareness	1.Engel et al., (2019) 2.Lee et al., (2019) - CPG review	Adults with ABI/ TBI	Multiple intervention techniques including metacognitive strategy training, external feedback from multiple sources, and multi-modal feedback in occupation-based activities and task practice → improve participation ¹ Feedback and group-interventions ² Patient education ²	Weak evidence		Groups only completed on weekend in inpatient; not completed in outpatient

Appendix E: Evidence Summary

Kelly Breuer, OTS

St. Catherine University

Cognitive Rehabilitation Evidence Review

August 2022

Question: What is the evidence for cognitive rehabilitation interventions to improve cognitive functioning for people with ABI and cognitive impairments?

Answer: Findings from this review suggest that there are strong evidence bases supporting the use of 14 interventions, each specific to the cognitive rehabilitation of a cognitive domain after acquired brain injury (ABI). Based on the guidance of the author and five expert clinicians at Courage Kenny Rehabilitation Institute (CKRI), some interventions with the highest level of evidence and best applicability are metacognitive strategy training, errorless learning, dual-task training, and virtual reality training.

Context for this review

This review was completed as a component of the completion of a Doctor of Occupational Therapy degree at St. Catherine University. At the request of CKRI, the doctoral candidate undertook this review to identify and evaluate evidence from existing cognitive rehabilitation guidelines and systematic reviews for the cognitive rehabilitation of specific cognitive domains after ABI. Five specific cognitive domains were the focus of this review, including attention, executive functioning, cognitive-communication, memory, and visuospatial deficits/neglect. Members of the advisory group provided the author with a set of 26 documents, composed of systematic reviews and published clinical practice guidelines, to start with. In order to determine that no valuable resources were missing, the author completed searches in two major databases, PubMed and CINAHL, narrowing to guidelines and systematic reviews related to cognitive rehabilitation after ABI. No other articles were identified. Articles were published between 2014 and 2022.

Findings

A total of 26 documents were reviewed, published between 2014 and 2022, and either systematic reviews or published professional practice guidelines. Evidence was grouped by level of evidence and cognitive domains as defined below

Attention

To address attentional deficits following ABI, metacognitive strategy training (MST) and dual-task training are recommended. refers to an overarching intervention approach in which people with ABI learn to use and apply a variety of cognitive strategies with the intention of generalizing to novel tasks. Dual-task training asks its participants to complete a motor and cognitive task simultaneously to address divided attention.

Executive Functioning

MST, including goal management training (GMT), problem solving training (PST), and time pressure management (TPM) is recommended to address executive functioning following ABI. Several strategies to improve capacity, including the ability to analyze and synthesize information, memory training, and reasoning training is recommended. Finally, direct corrective feedback in relation to client-specific goals should be used to address executive function deficits.

Cognitive Communication

Trained communication partners used for communication training, whether in individual or group settings, and the use of function-based communication goals are recommended to address this area after ABI. Specific interventions could include pragmatic communication skills training and emotional/ facial recognition training.

Memory

Several compensatory strategies are recommended to address memory following ABI. Visual imagery, assistive technology for prospective memory, global cognitive strategies, and external supports are all recommended as a component of general memory strategy training. Generally, it is important to have clearly defined goals, use activity analysis, utilize distributive and sufficient practice, present variations in stimuli, and constrained error learning (including errorless learning and spaced retrieval) in a memory rehabilitation program.

Visuoperceptual Deficits/ Neglect

Visual scanning training is the most supported intervention for visuoperceptual deficits following ABI. This is supported both with and without forced limb activation (imagined or facilitated use of affected limb to complete functional tasks or activities, i.e. mirror therapy, imagined, spatio-motor, spatial reconditioning). However, forced limb activation is not recommended for intervention separate from visual scanning training. For more severe apraxic deficits, gestural training with errorless learning is recommended.

Definitions

Acquired brain injury (ABI): Brain injury caused by an event after birth. For the purpose of this paper, it is related specifically to non-traumatic/ traumatic brain injury (TBI) and stroke.

Metacognitive strategy training (MST): Supports goal setting, comparison of performance, decision making, and executing changes in behavior. Metacognitive strategy training is a broad umbrella that hopes to improve client awareness of deficits and ability to apply higher cognitive strategies such as self-talk, problem-solving, or self-regulatory strategies to daily functional and novel tasks.

Problem solving training (PST): A type of MST in which patients are trained to be aware of their problems, internalize a system to analyze responses to problems, and develop better ways of dealing with them

Time pressure management (TPM): A type of MST in which patient are trained to use a strategy for coping with slow information processing and includes teaching strategies to assist with time management. These are things like asking for repetition, reducing background noise, and tape recording.

Goal management training (GMT): A type of MST that targets information awareness, goal setting, initiation, execution, and regulation and application to everyday activities.

Transcranial direct cranial stimulation (tDCS): Anodal tDCS over left dorsolateral prefrontal cortex for language-based complex attention is referred to in this summary.

Virtual reality (VR): The use of computer-generated simulations to simulate the completion of functional tasks/activities.

Errorless learning: Used for the acquisition of simple or multi-step functional behaviors. Most simply, it is introducing a task and having the patient complete it immediately after (i.e. ADL retraining by helping patient successfully complete each step on a checklist).

CO-OP (goal plan do check): An MST approach that asks the patient to create a motivating goal and teaches patients an overall strategy that involves planning how they could approach the task, predicting their performance on a task, completing the task, identifying barriers to success and solutions to circumvent those problems, and reviewing their performance.

External compensatory strategies: Tools outside of the user to compensate for cognitive deficits. Includes notebooks, reminders, calendars, etc.

Internal compensatory strategies: A set of internal self-talk skills to compensate for cognitive deficits. Includes visual imagery, self-cuing, PQRST, etc.

Summary of Evidence

The single reviewer identified 26 systematic reviews and professional practice guidelines published since 2014 that evaluate interventions to address cognitive deficits after acquired brain injury. As a part of the synthesis of evidence, a table was created, organized by cognitive domain, describing the intervention, domain it addresses, level of evidence, and dosage if provided (Appendix 1). This summary of evidence is organized by cognitive domain, and interventions to address them will be described under the respective heading. Under each selected domain, interventions are further organized by level of evidence using an evidence rubric created for this review (Table 1).

Table 1

Classification of Evidence

Strong Evidence	Based on at least 1 published guideline level A recommendation/practice standard with potential support from levels B and C evidence from published guidelines and/ or systematic reviews that directly addresses a cognitive rehabilitation intervention domain specifically considered for people with ABI
Moderate Evidence	Based on at least 1 published guideline level B recommendation/practice guideline with potential support from level C evidence from published guidelines and/or systematic reviews that directly addresses a cognitive rehabilitation intervention domain specifically considered for people with ABI
Weak Evidence	Based on at least 1 published guideline at level C recommendation/practice option or systematic reviews that directly addresses a cognitive rehabilitation intervention domain specifically considered for people with ABI

Footnote: Adapted from Haskins et al., (2014) and Cicerone et al., (2019) ACRM clinical practice guidelines. Refer to these publications for further details on levels of evidence/practice standards, guidelines, and options.

Attention

Eleven documents were identified supporting interventions to address attentional deficits after ABI. Two interventions were supported by strong evidence, three by moderate evidence, and two by weak evidence. Four interventions had evidence suggesting that they were not efficacious and are not recommended.

Strong Evidence

In the area of attention, dual-task training for adults with traumatic brain injury (TBI) is recommended with strong evidence when using functional tasks with direct application to daily life, rather than hoping for generalization.

Moderate Evidence

Cognitive behavioral therapy (CBT) has moderate evidence supporting its use for attentional deficits with comorbid anxiety and depression following TBI. Direct attention training for specific working memory impairments and anodal transcranial direct cranial stimulation (tDCS) have conflicting, but moderate support to address attentional deficits after ABI.

Weak Evidence

Computerized cognitive rehabilitation, using programs such as CogMed QM and THINKable, with direct therapist involvement has a low and conflicting level of evidence to address attention and executive functioning deficits after ABI. Environmental adaptations to support attention also has a low level of support.

Evidence Against

Mindfulness training, the use of auditory alerting tones, and direct attention training all have evidence suggesting that they were not efficacious for their efficacy to improve attention. Solely computer-based attention training is also not recommended.

Executive Functioning

Fourteen documents were identified supporting interventions to address executive functioning deficits after ABI. Two interventions were supported by strong evidence, four by moderate evidence, and one by weak evidence. One intervention had evidence suggesting that they were not efficacious and are not recommended.

Strong Evidence

In the area of executive functioning, individual metacognitive strategy training (MST), including goal management (GMT) and problem-solving training (PST) is supported. Furthermore, providing direct, corrective feedback in the context of a multi-contextual cognitive rehabilitation program and client-centered goals is recommended.

Moderate Evidence

Executive functioning has several treatment options with moderate evidence, including group-based MST and PST, and skill-specific training with errorless learning for severe TBI. Virtual reality (VR) has conflicting support to address executive functioning deficits after ABI.

Weak Evidence

Short Term Executive Plus (STEP) training in conjunction with attention process training is recommended for executive functioning deficits after TBI.

Evidence Against

Error-based learning has evidence suggesting it is not efficacious for use to improve executive functioning following ABI.

Cognitive Communication

Seven documents were identified supporting interventions to address cognitive communication deficits after ABI. Four interventions were supported by strong evidence, three by moderate evidence, and three by weak evidence. One intervention had evidence against its efficacy and is not recommended.

Strong Evidence

Cognitive communication has a strong evidence base supporting four interventions. These include communication partners trained in asking positive questions, collaborative problem solving, and encouraging discussions. Function-based goals are recommended, being measured at the level of participation in daily life. Furthermore, cognitive-linguistic therapy should be provided by a speech-language pathologist (SLP) targeting information recall and reading. Finally, pragmatic communication skills training in the context of groups or facial recognition practice using errorless learning is recommended.

Moderate Evidence

Cognitive communication deficits have moderate evidence to be addressed using augmentative communication aid assessment, provision, and training by occupational therapy (OT) and SLP services. Groups for emotional perception training are recommended.

Weak Evidence

Cognitive communication deficits can be addressed using computer-based treatments using high-intensity programs, such as BrainHQ, and rehearsing communication skills in the appropriate context.

Evidence Against

Solely computer-based training without direct, skilled therapist involvement for goal setting and program management is not recommended to address cognitive communication deficits after ABI.

Memory

Sixteen documents were identified supporting interventions to address memory deficits after ABI. Four interventions were supported by strong evidence, three by moderate evidence, and two by weak evidence. Two interventions had evidence against their efficacy and are not recommended.

Strong Evidence

Specific memory interventions with strong evidence supporting them include memory strategy training as a broad umbrella term, consisting of several internal and external strategies. Internal compensatory strategies such as visual imagery and self-talk are recommended, as are environmental supports including external prospective memory aids.

Moderate Evidence

Memory interventions with moderate evidence include groups with internal and external strategy usage to address prospective memory impairments, errorless learning for severe ABI, and computer-based training coupled with tai chi. It should be noted that the latter intervention has conflicting evidence.

Weak Evidence

Assistive technology and computer-based memory interventions also have a low level of evidence to address deficits in memory following ABI

Evidence Against

Remote computer-based treatment for memory has insufficient evidence to be recommended at any evidence level.

Visuoperceptual Deficits/ Neglect

Six documents were identified supporting interventions to address visuoperceptual deficits and neglect after ABI. Three interventions were supported by strong evidence, three by moderate evidence, and two by weak evidence. Three interventions had evidence suggesting they are not efficacious and are not recommended.

Strong Evidence

Neglect and visuoperceptual deficits are treatable with visual scanning training or use of forced limb activation, only when used in combination with visual scanning training. Forced limb activation alone is not supported. Gestural training, utilizing errorless learning, is recommended with a strong level of evidence to treat apraxia after a left hemisphere stroke.

Moderate Evidence

For visuoperceptual deficits and neglect only one intervention group had a moderate level of evidence. VR or computer-based interventions are recommended at a moderate level of evidence after right hemisphere stroke.

Weak Evidence

Visuoperceptual deficits can be addressed using assistive technology for visual scanning training and using visual organization training as an intervention.

Evidence Against

Prisms and eye-patching are not recommended as long-term compensatory strategies for neglect. Furthermore, the use of computerized visual field training alone to expand visual fields is not recommended.

Miscellaneous

Six documents were identified supporting interventions to address global cognitive functioning, activity of daily living (ADL) performance as related to cognition, fatigue, and self-awareness deficits after ABI. No interventions were supported by strong evidence, two were supported by moderate evidence, and four by weak evidence. Two interventions had evidence against their efficacy and are not recommended.

Strong Evidence: N/A

Moderate Evidence: N/A

Weak Evidence

Exercise programs incorporating client-directed goals show improvement in global cognitive functioning when used at least one year following ABI. Post-stroke fatigue can be addressed with sleep hygiene and energy conservation education. Cognitive strategy training is recommended for ADL retraining. Self-awareness, similar to executive functioning, has low-level recommendations for MST, task practice, and multi-modal feedback.

Evidence Against

Solely computer-based training without direct, skilled therapist involvement is not recommended to address attention, cognitive communication, memory, or visual field training for visuo-perceptual deficits.

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Appendix F: PowerPoint

CURRENT EVIDENCE IN COGNITIVE REHABILITATION AFTER ACQUIRED BRAIN INJURY

KELLY BREUER, OTS
ST. CATHERINE UNIVERSITY
7/19/2022

DEFINING THE EVIDENCE

- **Strong evidence:** based on at least 1 published guideline level A recommendation/practice standard with potential support from level B and C evidence from published guidelines and/or systematic reviews that directly address a cognitive rehabilitation intervention domain specifically considered for people with ABI
- **Moderate evidence:** based on at least 1 published guideline level B recommendation/practice guideline with potential support from level C evidence from published guidelines and/or systematic reviews that directly address a cognitive rehabilitation intervention domain specifically considered for people with ABI
- **Weak evidence:** based on at least 1 published guideline at level C recommendation/practice option or systematic reviews that directly address a cognitive rehabilitation intervention domain specifically considered for people with ABI

TYPES OF ARTICLES REVIEWED

- Documents published between 2014-2022
- Professional practice briefs, Systematic reviews, Published practice guidelines by various organizations (ACRM, ERAB, AHA, DoD/VA, etc.)
- 26 documents
- Patients included in the literature: Adults post-TBI or stroke
 - Varying lengths of time removed from injury

METACOGNITIVE STRATEGY TRAINING (MST) 2, 7, 10, 13, 14

- Cognitive Impairment(s): Attention, Executive Functioning
- For whom: Mild-moderate attentional deficits after ABI
- Level of Evidence: Strong
- Description: focuses on everyday activities and direct attention training with compensatory strategies
 - Time pressure management (TPM) – 3 step training for slow information processing
- Dosage:
 - TPM: 10 hours of training at least 3 months post stroke

INTERVENTION HIGHLIGHT: CO-OP



- Cognitive Orientation to Daily Performance: Goal, Plan, Do, Check
- How to use:
 - Instruct on strategies
 - Guided discovery
 - Worksheets
- When to use: component of MST
- Dosage: Goal is to generalize into internal compensatory strategy
 - 10 sessions is common

DUAL-TASK TRAINING 13, 14, 16

- Cognitive Impairment(s): Attention
- For whom: Adults with TBI
- Level of Evidence: Strong
- Description: must provide training on applicable tasks for daily life rather than hoping for generalization
- Dosage: not specified

MST; GOAL MANAGEMENT TRAINING (GMT)/PROBLEM SOLVING (PST)/TPM 2, 3, 7, 10, 11, 13, 14, 17, 19, 20, 22

- Cognitive Impairment(s): Executive Functioning
- For whom: Adults with problem-solving difficulties following mild-moderate TBI
- Level of Evidence: Strong

- Description: MST including GMT and 6-step PST
 - TPM, self-talk procedures, pause-prompt-probe
 - Focus on functional outcomes and patient is aware of need
- Dosage:
 - 3 months
 - PST: 12 sessions 2x/wk for 6 wks
 - GMT: 1 day every other week - 8, 2-hour sessions over 4 days

STRATEGIES TO IMPROVE CAPACITY 13, 19

- Cognitive Impairment(s): Executive Functioning
- For whom: Adults with TBI with impaired reasoning
- Level of Evidence: Strong

- Description: Strategic memory and reasoning training (SMART) for gist reasoning
- Dosage: SMART – small groups of 4-5 over 12 sessions (10 sessions of 1.5 hours/5 weeks and two 1.5 hour booster sessions over the next 3 weeks)

DIRECT CORRECTIVE FEEDBACK 3, 13, 16, 19

- Cognitive Impairment(s): Executive Functioning
- For whom: Adults with TBI with impaired self awareness
- Level of Evidence: Strong

- Description: w/in multi-contextual awareness program. Best in combo with verbal and audio feedback (Direct feedback in context of awareness and client-specific goals)
- Dosage: not specified

COMMUNICATION PARTNERS 8, 13, 23

- Cognitive Impairment(s): Cognitive Communication
- For whom: Adults with moderate-severe TBI at least 6 months post injury or stroke
- Level of Evidence: Strong

- Description: teach use of positive questions, encourage discussion, and solve communication problems collaboratively
- Dosage:
 - 2.5-hour group/10 weeks with weekly 1-hour individual sessions
 - 17-hour program across 8 weeks with 6-month follow-up for post-training

FUNCTION-BASED GOALS 23

- Cognitive Impairment(s): Cognitive Communication
- For whom: Adults with moderate-severe TBI at least 6 months post injury
- Level of Evidence: Strong

- Description: outcome measures at level of participation in daily life – individualized goals. Recommended group communication rehab
- Dosage:
 - 8, 10, or 12 weeks for standardized group social skills training or conversation skills training

COGNITIVE-LINGUISTIC THERAPY 2

- Cognitive Impairment(s): Cognitive Communication
- For whom: Adults with L hemisphere stroke experiencing language deficits during acute and post-acute stages of therapy
- Level of Evidence: Strong

- Description: targeted reading and recall of information and oral metaphor interpretation
- Dosage: not specified

PRAGMATIC COMMUNICATION SKILLS/EMOTIONAL & FACIAL RECOGNITION 2, 7, 13

- Cognitive Impairment(s):** Cognitive Communication
- For whom:** Adults with social communication deficits after TBI
- Level of Evidence:** Strong
- Description:**
 - Pragmatic skills groups, practice, community generalization, WSTC
 - recognition errorless learning, WATER
- Dosage:** not specified

MEMORY STRATEGY TRAINING 2, 7, 16, 26

- Cognitive Impairment(s):** Memory
- For whom:** Adults with mild memory impairments after TBI or stroke
- Level of Evidence:** Strong
- Description:**
 - visual imagery, association, external supports, assistive tech (PDA, GPCR, PQRST, CHN)
 - N-back procedure
 - Specific memory training for visual-spatial (language-based) memory
- Dosage:**
 - CHN discontinuation for memory notebook: 100% accuracy on 3 consecutive role plays with no cueing on last two days
 - N-back procedure for WM: 60 min session: 20 - 30 min for feedback and discussion

INTERNAL COMPENSATORY STRATEGIES 5, 10, 11, 12, 13, 16, 17, 20, 22, 25, 26

- Cognitive Impairment(s):** Memory
- For whom:** Adults with mild-severe TBI with some intact executive functioning skills
- Level of Evidence:** Strong
- Description:** Instructional/metacognitive strategies: visualization, visual imagery, repeated practice, retrieval practice, PQRST, self-cueing, self-generalization, self-talk
- Dosage:**
 - Either group or individual format. Varied dosage. 12 wk group for internal compensatory strategies specified
 - Visual imagery: 1 hour, 1-2x/wk for 6 weeks

ENVIRONMENTAL SUPPORTS AND REMINDERS 2, 7, 10, 13, 16, 17, 25, 26

- Cognitive Impairment(s):** Memory
- For whom:** Adults with amnesia or severe memory impairment after TBI/ ABI
- Level of Evidence:** Strong
- Dosage:**
 - PDA: 7-8 hours over 8-9 session (8 weeks)
 - Discontinuation of memory notebook after 100% accuracy on all areas for 3 days
 - Errorless learning, spaced retrieval cue fading based on severity
- Description:** train patients and family
 - NeuroPage, smartphones, QR, PDA, notebooks, whiteboards
 - Specific prospective memory prompts
 - External compensations with direct application to function
 - Enriched environments to increase engagement
 - Orienteer book for severely impaired

INTERVENTION HIGHLIGHT: ASSISTIVE TECHNOLOGY

- Types of Assistive Tech:** smartphones, NeuroPage, PDA, micro-prompting devices, computer-based rehab
- Dosage:** varies by patient, setting, and intervention
- CPT code:** 97535 – self-care/ home management training
- How to apply:**
 - Placed Planner Note
 - Assess usage @ home, Placed by therapist in session, 2 time-limited, 1 global
 - Example: reminder to call therapist at 10:15 am and report weather
 - Education/training on smartphones for scheduling and reminders

GENERAL MEMORY BEST PRACTICE 6, 7, 13, 15

- Cognitive Impairment(s):** Memory
- For whom:** Adults with mild to severe memory impairment after TBI
- Level of Evidence:** Strong
- Description:**
 - Clearly defined goals
 - Activity analysis
 - Practice (distributed and sufficient)
 - Variations in effort
 - Constrained error teaching
- Dosage:**
 - Distributed practice (spaced retrieval): 1x/day for 30-minute sessions over 7 weeks

INTERVENTION HIGHLIGHT: ERRORLESS LEARNING

- Definition: used for acquisition of functional and relevant behaviors
 - Simple or multi-step tasks
- When to use: People with severe memory impairments after ABI
- How to use: Instruct to complete a task and ask patient to do so without delay
- Dosage: Grade from errorless learning to spaced retrieval and chaining

VISUAL SCANNING TRAINING 2, 7, 8, 11, 22

- Cognitive Impairment(s): Visuospatial deficits/ Hemispatial neglect
- Description: lighthouse strategy, computer-based reading, scanning, tracking
- For whom: Adults with L visual neglect after R-hemisphere stroke
- Level of Evidence: Strong
- Dosage:
 - Computerized visual scanning training: 30 min sessions in which pt is shown 20 sequences of 20 digits

FORCED LIMB ACTIVATION WITH VISUAL SCANNING 2, 7, 8, 11, 26

- Cognitive Impairment(s): Visuospatial deficits/ Hemispatial neglect
- Description: mirror therapy, contralateral limb activation, imagined, spatial reconditioning (spatio-motor or visuo-spatio-motor)
 - Short term use of prism for neglect
 - COMBINATION of therapies supported
- For whom: Adults with L neglect after R-hemisphere stroke
- Level of Evidence: Moderate-Strong
- Dosage:
 - Spatial reconditioning: 20 days of Box Sator. Case protocol w/ biofeedback

GESTURAL TRAINING WITH ERRORLESS LEARNING 2, 8

- Cognitive Impairment(s): Visuospatial deficits/ Hemispatial neglect
- Description: specific gestural or strategy training
 - Graded strategy training, gestural training w/ errorless learning
- For whom: Adults with apraxia after L hemisphere stroke
- Level of Evidence: Moderate-Strong
- Dosage: Not specified

INTERVENTIONS WITH MODERATE EVIDENCE

Impairment	Intervention
Attention w/ comorbid anxiety & depression post mild-moderate TBI	Cognitive Behavioral Therapy (CBT) – stress management, relaxation, meditation → improved divide attention
Attention for adults with ABI	Direct attention training for specific working memory impairments using computer-based interventions
Attention for adults with stroke	Anodal tDCS over left dorsolateral prefrontal cortex for language-based complex attention
Executive functioning for severe TBI and problem-solving deficits	Group-based interventions with MST and in combination with individual therapy
Executive functioning, memory, attention for ABI	Virtual Reality (VR)
Executive functioning for adults with severe TBI	Skill-specific training for functional tasks w/ errorless learning (no expectation of generalization to new learning)
Executive functioning for TBI	Formal problem-solving strategies with explicit feedback
Cognitive communication for severe TBI > 1 mo. Post injury	Assess, trained in alternative and augmentative communication aids by SLP/OT

INTERVENTIONS WITH MODERATE EVIDENCE

Impairment	Intervention
Cognitive communication for L stroke or aphasia after TBI	Group-based therapy with emotional perception training/ group interactive structured treatment for social competence
Memory for mild-moderate ABI impairment	Group interventions with internal and external strategy use targeting prospective memory and info recall in everyday tasks
Memory for severe ABI impairment	Errorless learning w/ limited transfer to novel tasks
Memory, attention for TBI	Computer based cognitive training and/or cb
Post-stroke fatigue	Graded activity training (strength/endurance)
Visuospatial/neglect after R stroke	VR/computer-based interventions

INTERVENTION HIGHLIGHT: VIRTUAL REALITY (VR)

- Description: to be used in combination with traditional therapy program
 - Attention, Executive Functioning, Memory
- Examples of use at CKRI: Access at most CKRI sites
 - 3 main "games"
 - Fruit ninja
 - Beat sober
 - Space pirate trainer
- Dosage: varied by research protocol

INTERVENTIONS WITH WEAK EVIDENCE

Impairment	Intervention
Attention and executive function after ABI	Computerized cognitive rehab (CogMed, THINKable) with involvement from therapist
Attention for TBI	Decreased environmental demands and task adaptations
Executive functioning for TBI	Short term executive plus (STEP) with attention process training (APT)
Global cognitive functioning/memory at least 1 year post ABI	Physical exercise program with client directed goals – activity, resistance, and aerobic training
Cognitive communication for moderate-severe TBI >/= 6 mo. Post injury	Rehearse communication skills in context relevant to patient
Cognitive communication after moderate-severe ABI	BrainHQ for improved memory, word fluency, QoL
Cognitive communication after L stroke or TBI	Computer-based interventions w/o therapist treatment

INTERVENTIONS WITH WEAK EVIDENCE

Impairment	Intervention
Prospective memory after ABI	Assistive tech (PDA, micro-prompting, NeuroPage)
Visual and verbal working memory after ABI	Computer-based cognitive interventions
Post-ABI fatigue	Sleep hygiene and energy conservation strategies
Visuo-perceptual/neglect after R stroke	Electronic tech for visual scanning training
Visuo-perceptual after R stroke during acute rehab	Systematic training of visuospatial deficits and visual organization skills
ADLs after ABI	Cognitive strategy training (CO-OP, MST, TPM, etc.) in inpatient and outpatient settings
Self-awareness after ABI	MST, external and multi-modal feedback, task practice, patient education, feedback in group context

INTERVENTIONS WITH EVIDENCE AGAINST

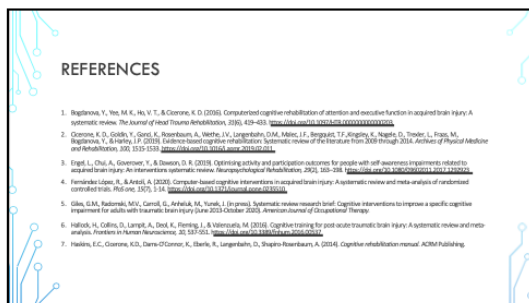
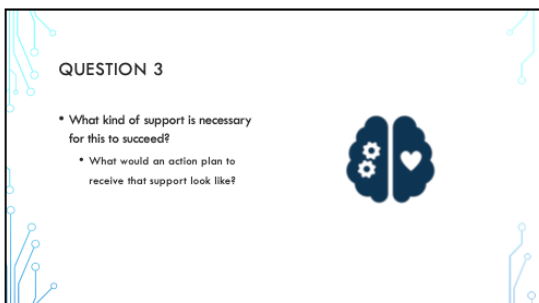
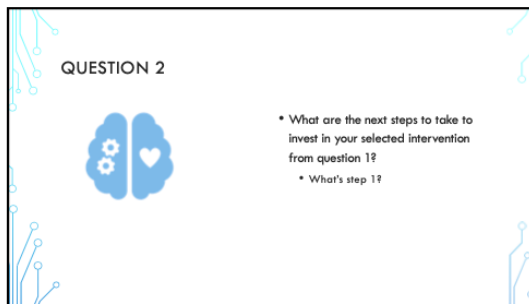
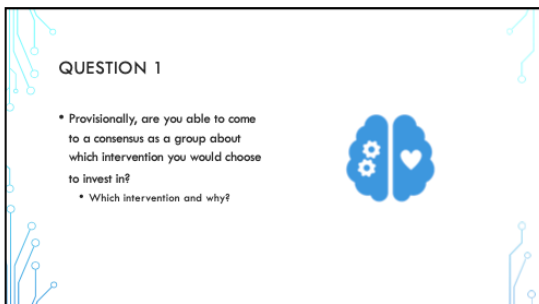
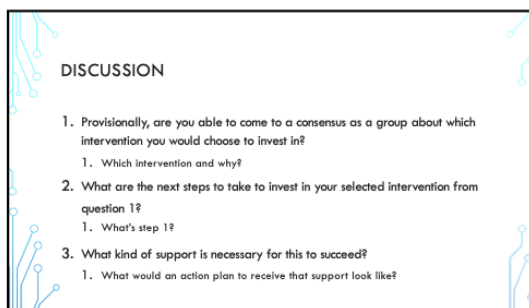
- Attention
 - Solely computerized attention tasks
 - Mindfulness-based meditation
 - Auditory alerting tones
 - Direct attention training
- Executive functioning/self-awareness
 - Error-based learning
- Memory
 - Restorative techniques (computer-based training)
 - Remote treatment

INTERVENTIONS WITH EVIDENCE AGAINST

- Visuo-perceptual deficits/Hemispatial neglect
 - Isolated microcomputer exercise
 - Computer-based training for visual fields
 - Prisms/eye patching
- Cognitive Communication
 - Sole use of computer-based interventions

SUMMARY

- Key interventions of interest
 - CO-OP model
 - Assistive Technology
 - Errorless learning
 - Virtual Reality
- Items with strongest level of evidence and applicability to CKRI
 - Metacognitive strategy training
 - Dual-task training
 - Virtual reality
 - Errorless learning



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Appendix G: Intervention Handouts

Errorless Learning

MODERATE-STRONG EVIDENCE FOR EXECUTIVE FUNCTIONING,
COGNITIVE-COMMUNICATION, & MEMORY

What is it: Used for acquisition of simple or multi-step functional behaviors. Most simply, it is introducing a task and having the patient complete it immediately after (following a checklist for ADL).

For whom and when in continuum: People with severe memory impairments after ABI

How is it implemented in the literature:

1. Introduce a novel task or novel information
2. Ask patient to complete task/repeat information immediately after being given stimulus
3. Grade up using spaced retrieval or forward/backward chaining techniques
4. Do not allow for guessing or trial and error learning



How might it be implemented at CKRI:

- Use during functional activity - toileting
 - Pt forgets to go to bathroom - incontinence
 - toilet training program with Alexa: Train what to do when time goes off: "when timer goes off, go to bathroom"
- Can apply instructions to intervention session schedule
- Faded cuing is more common in outpatient cognitive rehab

Key references to learn more about it:

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Dual-Task Training

STRONG EVIDENCE FOR ATTENTION

What is it: Addresses multi-tasking to improve divided attention, most commonly by asking patient to simultaneously complete a cognitive and motor task (i.e. walking and having a conversation)

For whom and when in continuum: Adults with attentional deficits after TBI

How is it implemented in the literature: To avoid effects of automatization, which is the improvement in a task due to practice rather than new skill acquisition, requires practice in functional tasks rather than hoping for generalization from non-functional tasks
- provide training on tasks that need to be formed in everyday life



How might it be implemented at CKRI:

- **Grading of task complexity**
 - Walking and talking
 - folding laundry and attending to auditory stimuli, picking out specific words
- **Tasks that target client-specific deficits** (neglect, sustained attention, working memory, etc.)
- **Consider Dual-Task Cost:** performance in individual tasks vs performance when combined

Key references to learn more about it:

1. Ontario Neurotrauma Foundation. (n.d.). Clinical practice guideline. SECTION 2: Assessment and Rehabilitation of Brain Injury Sequelae. Journal of Cognitive Functions. Retrieved from https://braininjuryguidelines.org/modtosevere/guideline-system-pages/topic/tx_onfdocs_onfdocuments%5Btopics%5D=29&tx_onfdocs_onfdocuments%5Baction%5D=show&tx_onfdocs_onfdocuments%5Bcontroller%5D=Topics&cHash=f7a080873eccb624cb410cdcd18d4a11
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CO-OP: Goal-Plan-Do-Check

STRONG EVIDENCE FOR MEMORY

What is it: Global cognitive strategy to achieve client-specific goals

For whom and when in continuum: Adults with mild memory impairments after TBI or stroke and as component of MST

How is it implemented in the literature: 14 days/45 min sessions

1. Client identifies motivating goals
2. Therapist teaches global cognitive strategy (GPDC)
 - a. identification of goals, planning of task, completing task, checking performance
3. Begin with worksheets to guide intervention. Goal is to fade cues and eventually internalize strategy.



How might it be implemented at CKRI:

- Variations available via worksheets: Problem-solving training and time pressure management
- Process of problem-solving approach:
 - Identify the problem (goal)
 - select key variables affecting the goal
 - Identify logical pros and cons with alternate solutions
 - make and apply choice
 - follow with feedback on performance
- Grade complexity/fade cuing and structure based on client progression

\$650+gst

Key references to learn more about it:

1. Cicerone, K. D., Goldin, Y., Ganci, K., Rosenbaum, A., Wethe, J.V., Langenbahn, D.M., Malec, J.F., Bergquist, T.F., Kingsley, K., Nagele, D., Trexler, L., Fraas, M., Bogdanova, Y., & Harley, J.P. (2019). Evidence-based cognitive rehabilitation: Systematic review of the literature from 2009 through 2014. *Archives of Physical Medicine and Rehabilitation*, 100, 1515-1533. <https://doi.org/10.1016/j.apmr.2019.02.011>
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Micro-Prompting

WEAK EVIDENCE FOR MEMORY

What is it: Provides support for sequencing of complex tasks and aims to decrease the amount of support someone with ABI needs to complete tasks like self-cares

For whom and when in continuum: Adults with ABI with prospective memory and organization impairments

How is it implemented in the literature:

1. Supported for improving memory for sequencing and organizing janitorial, food preparation, and hand washing tasks.
2. Cognitive orthosis for assisting activities in the home (COACH) shown to be effective for hand washing sequencing
3. GUIDE effective for prosthetic limb donning and morning ADL performance
4. Decreased prompting to perform morning routine than usual care – 15 trials over 3 weeks



- **How might it be implemented at CKRI:**
- **Boardmaker:** visual/written supports that can be downloaded to client
 - CKRI access; usually for peds
- **Android:** Google home app
 - Routines with google assistant
 - Start any time with command; location based routines
 - "Hey Google" bedtime routine
- **Reminders app on IOS**
 - tags, date, time, location, and messages-based reminders
 - subtask capability
 - can rank priority or associate with image
 - compatible with Siri

Key references to learn more about it:

- Jamieson, M., Cullen, B., McGee-Lennon, M., Brewster, S., & Evans, J. J. (2014). The efficacy of cognitive prosthetic technology for people with memory impairments: a systematic review and meta-analysis. *Neuropsychological Rehabilitation*, 24(3-4), 419-444. <https://doi.org/10.1080/09602011.2013.825632>
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Virtual Reality

MODERATE EVIDENCE FOR EXECUTIVE FUNCTIONING, MEMORY, & ATTENTION

What is it: Use of computer-generated simulations to simulate the completion of functional tasks/activities

For whom and when in continuum: Adults with mild to moderate TBI or stroke or neglect after R stroke

How is it implemented in the literature:

1. Executive functioning and problem-solving: 12, 20-25 minute sessions
2. Cognitive Flexibility: 24, 1 hour sessions over 8 weeks



How might it be implemented at CKRI:

- 3 popular VR games
 - **Fruit Ninja:** Executive functioning (planning), attention
 - **Beat Saber:** Attention, Executive functioning (organization), neglect
 - **Space Pirate Trainer:** Attention, Executive functioning, neglect
- Dosage dependent on patient goals, motivation, and therapist's clinical reasoning
- Consider contraindication w/ TBI
 - nausea

Key references to learn more about it:

1. Giles, G.M., Radomski, M.V., Carroll, G., Anheluk, M., Yunek, J. (in press). Systematic review research brief: Cognitive interventions to improve a specific cognitive impairment for adults with traumatic brain injury (June 2013-October 2020). *American Journal of Occupational Therapy*.
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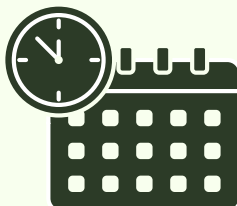
Cognitive Assistive Technology

KELLY BREUER, OTS
ST. CATHERINE UNIVERSITY



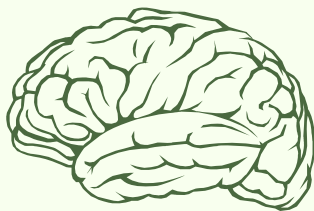
Implementation Ideas

- Planted Planner Notes
 - Assesses usage @ home
 - Planted by therapist in session
 - 2 time-based, 1 global
 - Example: reminder to call therapist at 10:15 am and report weather
- Education/training on smartphones for scheduling and reminders



Billing

- **CPT Code: 97535:** self-cares/ home management training
- **Dosage:** Varies by patient, setting, and intervention



01 Micro-prompting devices:

- Provide step-by-step instructions for present, complex activities
- No phone apps
- Devices are expensive
- Can introduce for specific functional tasks using alternative reminders

02 NeuroPage

- Prospective memory
- Smartphone-friendly
- Time-based reminders for tasks
- Outside company - associated cost

03 Computer-based rehab – NOT recommended for use without direct therapist involvement

- CogMedQM
 - Personalized training
 - \$1,500
- RehaCom
 - 20 therapy modules of increasing difficulty
 - self-generated difficulty based on pt performance

Tech Options:

- Smartphones:
 - Digital assistants - Siri/Alexa
 - Calendar
 - Reminders
- NeuroPage
- PDA
- Micro-prompting: multi-modal and time-specific
- Computer-based rehab - moderate evidence
 - CogMedQM - working memory
 - RehaCom - attention, memory, ADL, etc.

Appendix H: Focus Group Questions

1. Describe what main cognitive rehabilitation interventions you currently use in practice.

- Why have you chosen these? What informs that choice?

2. What are facilitators and barriers you see to implementing new evidence into practice?

- Or staying updated on new evidence
- How much time do you have vs how much do you need?
- Create a picture of the solution
 - What version of this could you advocate for?

3. What areas or interventions would you want to learn more about to support your practice?

4. Where could practice be improved?

5. What is the best way to deliver best practices to staff to ensure use of the guide?

- Barriers? What are potential overrides of these barriers

Appendix I: Survey

Survey sent via Google Forms

Follow-up OTD Project Survey

The following questions relate to the process and products of the doctoral capstone project completed here for CKRI about cognitive rehabilitation best practices after acquired brain injury. Please answer as honestly as you can to inform possible future OTD projects. Select one answer per question that best reflects your opinion.

Process Questions

These questions pertain to the process of our time together. Recall that we met at least twice throughout this experience about the evidence, current practices at CKRI, and your desires to expand your practice. We also communicated in the following ways: via email, occasionally in person, or via TEAMS.

1. To what extent do you believe that these cognitive rehabilitation recommendations are supported by the evidence?

Mark only one oval.

- Not at all supported
 A little supported
 Supported
 Very supported

2. Please explain your answer.

3. How effective do you feel the process of this OTD project was?

Mark only one oval.

- Not at all effective
 A little effective
 Effective
 Very effective

4. Thinking into the future, if another OTD student came, what about this process should stay the same and what should be done differently?

Outcome Questions

These questions pertain to the outcomes of the OTD project. Recall that the deliverables included a presentation, evidence summary, evidence table, and intervention-specific handouts.

5. How helpful do you anticipate the handouts will be in supporting your practice?

Mark only one oval.

- Not at all helpful
 A little helpful
 Helpful
 Very helpful

6. Please explain your answer.

7. To what degree do you feel you received adequate support/ resources to use in practice?

Mark only one oval.

- Not enough resources/support at all
 A few helpful resources/support
 Enough helpful resources/support
 More than enough resources/support

8. What additional supports would you need to support the success of this project?

Thank you for your time and participation in my project this summer! All you do is greatly appreciated!

Appendix J: RMP Presentation

Research meets practice presentation slides.

**CURRENT EVIDENCE IN
COGNITIVE REHABILITATION
AFTER ACQUIRED BRAIN INJURY**

KELLY BREUER, OTS
ST. CATHERINE UNIVERSITY
7/19/2022

1

DEFINING THE EVIDENCE

- **Strong evidence:** based on at least 1 published guideline level A recommendation/practice standard with potential support from levels B and C evidence from published guidelines and/or systematic reviews that directly addresses a cognitive rehabilitation intervention domain specifically considered for people with ABI
- **Moderate evidence:** based on at least 1 published guideline level B recommendation/practice guideline with potential support from level C evidence from published guidelines and/or systematic reviews that directly addresses a cognitive rehabilitation intervention domain specifically considered for people with ABI
- **Weak evidence:** based on at least 1 published guideline at level C recommendation/practice option or systematic reviews that directly addresses a cognitive rehabilitation intervention domain specifically considered for people with ABI

2

TYPES OF ARTICLES REVIEWED

- Documents published between 2014-2022
- Professional practice briefs, Systematic reviews, Published practice guidelines by various organizations (ACRM, ERABI, AHA, DoD/VA, etc.)
- 26 documents
- Patients included in the literature: Adults post-TBI or stroke
 - Varying lengths of time removed from injury

3

METACOGNITIVE STRATEGY TRAINING (MST) 2, 7, 10, 13, 14

- Cognitive Impairment(s): Attention, Executive Functioning
- For who?: Mild-moderate attentional deficits after ABI
- Level of Evidence: Strong
- Description: focuses on everyday activities and direct attention training with compensatory strategies
 - Time pressure management (TPM) – 3 step training for slow information processing
- Dosage:
 - TPM: 10 hours of training at least 3 months post stroke

4

INTERVENTION HIGHLIGHT: CO-OP

- Cognitive Orientation to Daily Performance: Goal, Plan, Do, Check
- How to use:
 - Instruct on strategies
 - Guided discovery
 - Worksheets
- When to use: component of MST
- Dosage: Goal is to generalize into internal compensatory strategy
 - 10 sessions is common

5

DUAL-TASK TRAINING 13, 14, 16

- Cognitive Impairment(s): Attention
- For who?: Adults with TBI
- Level of Evidence: Strong
- Description: must provide training on applicable tasks for daily life rather than hoping for generalization
- Dosage: not specified

6

MST; GOAL MANAGEMENT TRAINING (GMT)/PROBLEM SOLVING (PST)/TPM 2, 3, 7, 10, 11, 13, 16, 17, 19, 20, 22

- Cognitive Impairment(s): Executive Functioning
- For who?: Adults with problem-solving difficulties following mild-moderate TBI
- Level of Evidence: Strong
- Description: MST including GMT and 6-step PST
 - TPM: self-talk procedures, pause-prompt-praise
 - Focus on functional outcomes and patient is aware of need
- Dosage:
 - 3 months
 - PST: 12 sessions: 2x/wk for 6 wks
 - GMT: 1 day every other week - 8, 2-hour sessions over 4 days

7

STRATEGIES TO IMPROVE CAPACITY 13, 19

- Cognitive Impairment(s): Executive Functioning
- For who?: Adults with TBI with impaired reasoning
- Level of Evidence: Strong
- Description: Strategic memory and reasoning training (SMART) for gist reasoning
- Dosage: SMART – small groups of 4-5 over 12 sessions (10 sessions of 1.5 hours/5 weeks and two 1.5 hour booster sessions over the next 3 weeks)

8

DIRECT CORRECTIVE FEEDBACK 3, 13, 16, 19

- Cognitive Impairment(s): Executive Functioning
- For who?: Adults with TBI with impaired self awareness
- Level of Evidence: Strong
- Description: w/in multi-contextual awareness program. Best in combo with verbal and audio feedback (Direct feedback in context of awareness and client-specific goals)
- Dosage: not specified

9

COMMUNICATION PARTNERS 8, 13, 23

- Cognitive Impairment(s): Cognitive Communication
- For who?: Adults with moderate-severe TBI at least 6 months post injury or stroke
- Level of Evidence: Strong
- Description: teach use of positive questions, encourage discussion, and solve communication problems collaboratively
- Dosage:
 - 2.5-hour group/10 weeks with weekly 1-hour individual sessions
 - 17-hour program across 8 weeks with 6-month follow-up for post training

10

FUNCTION-BASED GOALS 23

- Cognitive Impairment(s): Cognitive Communication
- For who?: Adults with moderate-severe TBI at least 6 months post injury
- Level of Evidence: Strong
- Description: outcome measures at level of participation in daily life – individualized goals. Recommended group communication rehab
- Dosage:
 - 8, 10, or 12 weeks for standardized group social skills training or conversational skills training

11

COGNITIVE-LINGUISTIC THERAPY 2

- Cognitive Impairment(s): Cognitive Communication
- For who?: Adults with L hemisphere stroke experiencing language deficits during acute and post-acute stages of therapy
- Level of Evidence: Strong
- Description: targeted reading and recall of information and oral metaphor interpretation
- Dosage: not specified

12

PRAGMATIC COMMUNICATION SKILLS/EMOTIONAL & FACIAL RECOGNITION 2,7,13

- Cognitive Impairment(s): Cognitive Communication
- For who?: Adults with social communication deficits after TBI
- Level of Evidence: Strong
- Description:
 - Pragmatic skills: groups, practice, community generalization, WSTC
 - recognition: errorless learning, WATER
 - Dosage: not specified

13

MEMORY STRATEGY TRAINING 2,7,16,26

- Cognitive Impairment(s): Memory
- For who?: Adults with mild memory impairments after TBI or stroke
- Level of Evidence: Strong
- Description:
 - visual imagery, association, external supports, assistive tech (PDA, GPCR, PQRST, CNN)
 - N-back procedure
 - Specific memory training for visual-spatial (language-base) memory
- Dosage:
 - CNN discontinuation for memory notebooks: 100% accuracy on 3 consecutive role plays with no cueing on last two days
 - N-back procedure for WM: 60 min sessions 20 - 30 min for feedback and discussion

14

INTERNAL COMPENSATORY STRATEGIES 5,10,11,12,13,16,17,20,22,25,26

- Cognitive Impairment(s): Memory
- For who?: Adults with mild-severe TBI with some intact executive functioning skills
- Level of Evidence: Strong
- Description: instructional/metacognitive strategies: visualization, visual imagery, repeated practice, retrieval practice, PQRST, self-cueing, self-generalization, self-talk
- Dosage:
 - Either group or individual format. Varied dosage. 12 wk group for internal compensatory strategies specified
 - Visual Imagery: 1 hour, 1-2x/wk for 6 months

15

ENVIRONMENTAL SUPPORTS AND REMINDERS 2,7,10,13,16,17,25,26

- Cognitive Impairment(s): Memory
- For who?: Adults with amnesia or severe memory impairment after TBI/ ABI
- Level of Evidence: Strong
- Dosage:
 - PDA: 7-8 hours over 8-9 session (8 weeks)
 - Discontinuation of memory notebook after 100% accuracy on all areas for 3 days
 - Errorless learning, spaced retrieval: cue fading based on severity
- Description: train patients and family
 - NeuroPage, smartphones, SIRI, PDA, notebooks, whiteboards
 - Specific prospective memory prompts
 - External compensations with direct application to function
 - Enriched environments to increase engagement
 - Orientation book for severely impaired

16

INTERVENTION HIGHLIGHT: ASSISTIVE TECHNOLOGY

- Types of Assistive Tech: smartphones, NeuroPage, PDA, micro-prompting devices, computer-based rehab
- Dosage: varies by patient, setting, and intervention
- CPT code: 97535 – self-cares/ home management training
- How to apply:
 - Planted Planner Notes
 - Assesses usage @ home, Planted by therapist in session, 2 time-based, 1 global
 - Example: reminder to call therapist at 10:15 am and report weather
 - Education/training on smartphones for scheduling and reminders

17

GENERAL MEMORY BEST PRACTICE 6,7,13,15

- Cognitive Impairment(s): Memory
- For who?: Adults with mild to severe memory impairment after TBI
- Level of Evidence: Strong
- Description:
 - Clearly defined goals
 - Activity analysis
 - Practice (distributed and sufficient)
 - Variations in stimuli
 - Constrained error teaching
- Dosage:
 - Distributed practice (spaced retrieval): 1x/day for 30-minute sessions over 7 weeks

18

INTERVENTION HIGHLIGHT: ERRORLESS LEARNING

- Definition: used for acquisition of functional and relevant behaviors
 - Simple or multi-step tasks
- When to use: People with severe memory impairments after ABI
- How to use: instruct to complete a task and ask patient to do so without delay
- Dosage: Grade from errorless learning to spaced retrieval and chaining

19

INTERVENTIONS WITH MODERATE EVIDENCE

Impairment	Intervention
Attention w/ comorbid anxiety & depression post mild-moderate TBI	Cognitive Behavioral Therapy (CBT) – stress management, relaxation, meditation → improved divide attention
Attention for adults with ABI	Direct attention training for specific working memory impairments using computer-based interventions
Attention for adults with stroke	Anodal tDCS over left dorsolateral prefrontal cortex for language-based complex attention
Executive functioning for severe TBI and problem-solving deficits	Group-based interventions with MST and in combination with individual therapy
Executive functioning, memory, attention for ABI	Virtual Reality (VR)
Executive functioning for adults with severe TBI	Skill-specific training for functional tasks w/ errorless learning (no expectation of generalization to new learning)
Executive functioning for TBI	Formal problem-solving strategies with explicit feedback
Cognitive communication for severe TBI >= 6 mo. Post injury	Assessed, trained in alternative and augmentive communication aids by SLP/OT

20

INTERVENTIONS WITH MODERATE EVIDENCE

Impairment	Intervention
Cognitive communication for L stroke or aphasia after TBI	Group-based therapy with emotional perception training/ group interactive structured treatment for social competence
Memory for mild-moderate ABI impairment	Group interventions with internal and external strategy use targeting prospective memory and info recall in everyday tasks
Memory for severe ABI impairment	Errorless learning w/ limited transfer to novel tasks
Memory, attention for TBI	Computer based cognitive training and tai chi
Post-stroke fatigue	Graded activity training (strength/mindfulness)

21

INTERVENTION HIGHLIGHT: VIRTUAL REALITY (VR)

- Description: to be used in combination with traditional therapy program
 - Attention, Executive Functioning, Memory
- Examples of use at CKRI: Access at most CKRI sites
 - 3 main "games"
 - Fruit ninja
 - Beat saber
 - Space pirate trainer
- Dosage: varied by research protocol

22

INTERVENTIONS WITH WEAK EVIDENCE

Impairment	Intervention
Attention and executive function after ABI	Computerized cognitive rehab (CogMed, THINKable) with involvement from therapist
Attention for TBI	Decreased environmental demands and task adaptations
Executive functioning for TBI	Short term executive plus (STEP) with attention process training (APT)
Global cognitive functioning/memory at least 1 year post ABI	Physical exercise program with client directed goals – activity, resistance, and aerobic training
Cognitive communication for moderate-severe TBI >= 6 mo. Post injury	Rehearse communication skills in context relevant to patient
Cognitive communication after moderate-severe ABI	BrainHQ for improved memory, word fluency, QoL
Cognitive communication after L stroke or TBI	Computer-based interventions w/o therapist treatment

23

INTERVENTIONS WITH WEAK EVIDENCE

Impairment	Intervention
Prospective memory after ABI	Assistive tech (FDA, micro-prompting, NeuroPage)
Visual and verbal working memory after ABI	Computer-based cognitive interventions
ADLs after ABI	Cognitive strategy training (CO-OP, MST, TPM, etc) in inpatient and outpatient settings
Self-awareness after ABI	MST, external and multi-modal feedback, task practice, patient education, feedback in group context

24

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Appendix K: Poster

Title: Using a Knowledge-Translation Approach to Advance Evidence-Supported Cognitive Rehabilitation Practices in an Interdisciplinary Rehabilitation Setting

PRESENTER:
Kelly Breuer, OTS
 St. Catherine University
 Faculty Advisor: Stephanie de Sam Lazaro, OTD, MA, OTR/L
 Capstone Mentor: Mary Radomski, PhD, OTR/L, FAOTA

BACKGROUND

- A 17-year gap exists for new evidence to be implemented into rehabilitation practices¹
- The components of successful implementation of evidence-based practice include:^{1,2,3,4,6,7}
 - Stakeholder involvement throughout the development, implementation, and follow-up of new evidence
 - Provision of face-to-face interaction during the educational process
- At Courage Kenny Rehabilitation Institute (CKRI) specifically, barriers that exist to use of new evidence include a lack of protected time for literature exploration and resources for consistency of dissemination across the entire institute.

AIM

This project aimed to provide the materials and supports necessary for CKRI to develop, implement, and have follow-up for new evidence-based interventions in their cognitive rehabilitation practice for people with acquired brain injuries and thus improve patient outcomes.



- Identification of learning outcomes
- Interdisciplinary advisory group created, consisting of 5 CKRI therapists
- Literature review of 26 Level I evidence documents
- Creation of 4 deliverables to support dissemination of evidence
- Evidence Table available to CKRI therapists
- Presentation of intervention-specific handouts
- Advisory group presentation of evidence with facilitated discussion
- Survey on capstone process
- Research meets Practice presentation worth CEUs
- Evidence Summary
- Presentation of intervention-specific handouts provided for follow-up support

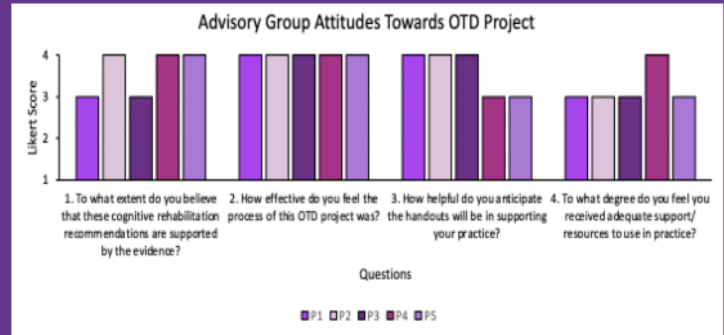
OUTCOMES

- 5 responses
- Average scores between 3 & 4 for all questions (agree - strongly agree)
- Overall, advisory team members thought interventions were supported by evidence, the OTD process was effective, the deliverables will support their practice, and they received adequate support

IMPLICATIONS

- Errorless learning, metacognitive strategy training, and VR have highest evidence and applicability to CKRI
- Need for consistent documentation practices across professions
- Emphasis on protected time to explore literature, support from leadership, and IT support for documentation

Therapists at CKRI found evidence recommendations to be *supported by the literature* and *helpful in supporting their practice*.



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Thematic Summary

- Need for common language: interprofessionally and in documentation
- Desire for protected time and IT support in implementation
- Invest in MST brand and errorless learning for moderate-severe ABI

- RECOMMENDATIONS**
- **Site:**
 - Survey with evidence description to gauge therapist interest across CKRI sites
 - Investment in MST brand (CO-OP) and training
 - Next Student: Patient care curriculum
 - **OT Profession:**
 - Advocating for OT's role in interdisciplinary team and cognitive rehabilitation

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A full reference list of all articles used in the scoping review and assessment of organizational priorities that informed the project is available upon request.



