

Date: 12/20/12

Title: Coordination of Outpatient Rehabilitative Care for patients with Traumatic Brain Injury (TBI) and their Families

Clinical Question:

- | | | |
|---|-----------------------------|---|
| P | <i>(Population/Problem)</i> | Among children who have sustained a traumatic brain injury (TBI) who have been discharged from an inpatient rehabilitation unit |
| I | <i>(Intervention)</i> | does participation in a coordinated multi-disciplinary* program for outpatient rehabilitation |
| C | <i>(Comparison)</i> | versus a non-formalized multi-disciplinary* approach |
| O | <i>(Outcome)</i> | affect quality of life, caregiver satisfaction, and/or functional performance skills*? |

*Definitions for terms marked with * may be found in the Supporting Information section.*

Target Population for the Recommendation:

Inclusion: Children (ages 3 and above), adolescents, and young adults up to 21 years of age, who have: sustained a TBI, been discharged from an inpatient rehabilitation unit and transitioned to the community for post-discharge rehabilitation services

Exclusion: Patients with acquired brain injuries (ABI) (congenital brain injuries, brain tumors, stroke, encephalitis, hypoxia, or a mixed ABI population)

Recommendations: (See *Dimensions for Judging the Strength of the Recommendation*)

1. It is recommended that children who have sustained a TBI and have been discharged from an inpatient rehabilitation setting, receive a coordinated multi-disciplinary approach to rehabilitative care to improve functional performance (Kim 2010 [1a]; Cicerone et al., 2008 [2b]; Altman et al., 2010 [4b]; Commission on Accreditation of Rehabilitation Facilities (CARF), 2012 [5a]).

Note: While there is a lack of pediatric-focused evidence for children with TBI, there are pediatric clinical guidelines that specify the need for a coordinated multi-disciplinary rehabilitation approach with children. The 2012 Commission on Accreditation of Rehabilitation Facilities International Standards Manual for Pediatric Specialty Programs [5a] states that accredited programs should be: multi-disciplinary, coordinated and functional-performance-driven. Additionally, the National Institutes of Health incorporates the pediatric component in its consensus document focused on rehabilitation for the TBI population: "Specialized, interdisciplinary, and comprehensive treatment programs are necessary to address the particular medical, rehabilitation, social, family and educational needs of young and school-aged children with TBI" (National Institutes of Health, 1999 [5a]).
2. There is insufficient evidence and a lack of consensus to make a recommendation that the impact of a coordinated multi-disciplinary rehabilitation approach improves quality of life or caregiver satisfaction (Cicerone et al., 2008 [2b]).

Note: One study involving a coordinated multi-disciplinary approach indicates a statistically increased effect on perceived quality of life, however, the volume of additional evidence in support of this outcome is lacking. There is no evidence regarding caregiver satisfaction with this approach (Cicerone et al., 2008 [2b]).

Discussion/Synthesis of Evidence Related to the Recommendation:

There is a moderate degree of evidence to support the use of coordinated multi-disciplinary rehabilitation for adults who have experienced a TBI, with a focus on performance skills related to community function (Kim & Colantonio, 2010 [1a]; Cicerone et al., 2008 [2b]; Altman et al., 2010 [4b]). While all of the studies address multi-disciplinary outpatient rehabilitation for the TBI population, they vary in their approaches to implementation, depending upon the facility's organization, structure and provision of services. Specific efforts for instituting a coordinated multi-disciplinary rehabilitation approach include: 1) a team of health care professionals with physician collaboration and two or more of the following disciplines: occupational therapy, physical therapy and/or speech therapy (Kim & Colantonio, 2010 [1a]; Cicerone et al., 2008 [2b]; Altman et al., 2010 [4b]) 2) regular team meetings (Cicerone et al., 2008 [2b]; Altman et al., 2010 [4b]) 3) sharing of assessment results among team members (Altman et al., 2010 [4b]) 4) case management services (Altman et al., 2010 [4b]) 5) development of performance-based goals in collaboration with the patient and family members (Altman et al., 2010 [4b]) and 6) incorporation of consistent contact with a psychologist and/or social worker (Cicerone et al., 2008 [2b]; Altman et al., 2010 [4b]). Coordinated multi-disciplinary formats offered both individualized and group centered services (Kim & Colantonio, 2010 [1a]; Cicerone et al., 2008 [2b]; Altman et al., 2010 [4b]).

Following an extensive literature search, three articles met the inclusion criteria (Kim & Colantonio, 2010 [1a]; Cicerone et al., 2008 [2b]; Altman et al., 2010 [4b]). All study subjects had a diagnosis of TBI and participant ages ranged from 18-65 years of age (Kim & Colantonio, 2010 [1a]; Cicerone et al., 2008 [2b]; Altman et al., 2010 [4b]). Length of time since injury varied among participants (Kim & Colantonio, 2010 [1a]; Cicerone et al., 2008 [2b]; Altman et al., 2010 [4b]). Studies covered a range of TBI severity, from mild to severe (Kim & Colantonio, 2010 [1a]; Cicerone et al., 2008 [2b]; Altman et al., 2010 [4b]).

One systematic review (Kim & Colantonio, 2010 [1a]) focused on coordinated multi-disciplinary care with functional performance in a community setting as the main outcome. In this analysis, five of the ten studies focused specifically on multi-disciplinary rehabilitation as the approach to outpatient care (Kim & Colantonio, 2010 [1a]). All five studies were quantitative in nature and four utilized the Community Integration Questionnaire (CIQ) as an outcome measure for functional performance skills (Kim & Colantonio, 2010 [1a]). Two of the four studies using the CIQ tool resulted in significantly better results (Kim & Colantonio, 2010 [1a]). One study showed improved clinically significant scores, however, the study results were not considered statistically significant (Kim & Colantonio, 2010 [1a]). The fourth study utilizing the CIQ resulted in no statistical significance (Kim & Colantonio, 2010 [1a]). The fifth study incorporated the Brain Injury Community Rehabilitation Outcome—39 (BICRO-39) to measure functional performance skills, resulting in significantly improved total scores and subscale scores (self-organization and psychological well-being) for the intervention group (Kim & Colantonio, 2010 [1a]).

Two additional studies addressed the effectiveness of coordinated outpatient multi-disciplinary rehabilitation that were quantitative in format (Cicerone et al., 2008 [2b]; Altman et al., 2010 [4b]). The following relevant outcome measures were used in these two studies: CIQ full scale and three subscales (Home, Social and Productivity) (Cicerone et. al., 2008 [2b]), Perceived Quality of Life Scale (PQOL) (Cicerone et. al., 2008 [2b]) for measuring life satisfaction and quality of life; and the Mayo-Portland Adaptability Inventory (MPAI-4) (Altman et. al., 2010 [4b]) full inventory and three subscales 1) sensory, motor and cognitive abilities, 2) social and emotional adjustment, 3) money management, development of social contacts, and initiation. Due to the adult nature of the study content, patient satisfaction was examined versus caregiver satisfaction. Relevant secondary outcomes examined included: overall perceived self-efficacy and the social, cognitive and emotional components of self-efficacy (Cicerone et. al, 2008 [2b]).

The Cicerone et al. study (2008 [2b]) investigated two approaches to rehabilitation for this population: 1) a coordinated multi-disciplinary model a “standard” model, the model being examined in this document and 2) an “Intensive Cognitive Rehabilitation Program” (ICRP) which incorporates a coordinated multi-disciplinary team that provides therapy interventions, individualized and group formats, in addition to “...the integration of cognitive, interpersonal, and functional interventions”. Analysis included examination of main effect for treatment regardless of type. Significant treatment effects are revealed in eleven outcome areas overall. Of those, five are considered relevant to the purpose of this document: 1) community productivity, 2) perceived quality of life, 3) perceived self-efficacy, 4) cognitive self-efficacy,

and 5) emotional self-efficacy. The study goes on to indicate that, when a coordinated multi-disciplinary approach incorporates a more intensive cognitive focus as described in the ICRP group, unique gains are made in the areas of: community integration, community socialization, perceived quality of life, and perceived emotional self-efficacy (Cicerone et al., 2008 [2b]).

Other functional areas that indicate significant increases from a coordinated multi-disciplinary rehabilitation approach include: sensory, motor and cognitive abilities, emotional and social adjustment, money management, and development of social contacts and initiation (Altman et al., 2010 [4b]).

When developing a multi-disciplinary rehabilitation program, the initial objective should be to coordinate services for the patient and family. However, as the above results demonstrate, additional factors to consider during the program development phase include the incorporation of: community integration interventions, cognitive-specific rehabilitation protocols, group therapy formats, and alternative treatment intensities.

Reference List: (Evidence Level in []; See [Table of Evidence Levels](#))

- Altman, I., Swick, S., Parrot, D. & Malec, J. (2010): Effectiveness of community-based rehabilitation after traumatic brain injury for 489 program completers compared with those precipitously discharged. *Archives of Physical Medicine and Rehabilitation*, 91: 1697-1704. doi: 10.1016/j.apmr.2010.08.001[4b].
- American Association of Occupational Therapy. (2008) Occupational therapy practice framework: Domain & process (2nd ed.) Author: *American Journal of Occupational Therapy*, 2nd Ed., [5a]
- Commission of Accreditation of Rehabilitation Facilities (2012). *International Standards Manual for Pediatric Specialty Programs*. Author: Tucson, AZ [5a]
- Cicerone, K., Mott, T., Azulay, J., Sharlow-Galella, M., Ellmo, W., Paradise, S. & Friel, J. (2008): A randomized controlled trial of holistic neuropsychologic rehabilitation after traumatic brain injury. *Archives of Physical Medicine and Rehabilitation*, 89: 2239-2249. doi: 10.1016/j.apmr.2008.06.017 [2b].
- Kim, H.; Colantonio, A. (2010): Effectiveness of rehabilitation in enhancing community integration after acute traumatic brain injury: A systematic review. *The American Journal of Occupational Therapy*, 64(5): 709-719. [1a].
- Law, M, Baptiste, S., Carswell, A, McColl, M., Polatajko, H & Pollock, N. (2000). *Canadian Occupational Performance Measure*, Canadian Association of Occupational Therapists Publications [5a].
- Malec, J. & Lezak, M. (2008). *Manual for the Mayo-Portland Adaptability Inventory (MPAI-4) for adults, children and adolescents*. Retrieved from Traumatic Brain Injury Model Systems website: <http://www.tbims.org/combi/mpai/manual.pdf> [5a].
- National Institutes of Health (1999). Rehabilitation of Persons with Traumatic Brain Injury; NIH Consensus Development Panel on Rehabilitation of Persons with Traumatic Brain Injury. *Journal of the American Medical Association*, 292(10): 974-983. Retrieved from: <http://consensus.nih.gov/1998/1998TraumaticBrainInjury109PDF.pdf> [5a].

IMPLEMENTATION

Applicability Issues:

The approach an institution takes to operationalize coordinated multi-disciplinary rehabilitative care in an outpatient setting will highly depend upon available resources and the current organizational systems in place. It is important to consider that patients and their families receive services at many different types of institutions with various intervention formats. This document is intended to highlight effective outpatient service characteristics, however, it is not expected that a coordinated, multi-disciplinary rehabilitation approach will be an available option for everyone. In order for an institution to offer coordinated multi-disciplinary services, a commitment must be made to implement the characteristics recommended. Additionally, functional outcomes need to be utilized that are valid, reliable, easy-to-implement in a

clinical setting, and be applicable to the population of focus. Additionally, the TBI literature is sparse in the areas of quality of life and caregiver satisfaction in relationship to the variables explored.

Relevant CCHMC Tools for Implementation:

None applicable

Outcome or Process Measures:

The Canadian Occupational Performance Measure (COPM) is a standardized, interview-based measurement tool that is considered both valid and reliable. Its purpose is to be utilized as an outcome measure that detects change over time in the various areas of functional performance skills (i.e. Self Care, Productivity and Leisure areas of function) (Law et al., 2000 [5a]). The validity and reliability of the COPM and its applicability to the pediatric population justify its use as the chosen assessment tool at Cincinnati Children's Hospital Medical Center (CCHMC). Other tools with similar levels of rigor that directly address community function should also be considered.

SUPPORTING INFORMATION

Background/Purpose of BEST Development:

At CCHMC we provide specific outpatient rehabilitative care for the TBI population in two different settings, each facility providing a different approach. One site provides care in a coordinated multi-disciplinary environment; the other in a less formalized manner. The goal of this BEST is to examine and report the most effective model of intervention for patients with TBI and their families.

Definitions:

Functional performance skills: "observable, concrete, goal-directed actions clients use to engage in daily life occupations" (American Occupational Therapy Association, 2008 [5a]). This includes skills necessary for functioning in a community environment.

Coordinated multi-disciplinary rehabilitation: a program comprised of multiple health care professionals who are regularly collaborating with one another, as well as the patient and family, to ensure consistent, goal-directed care is provided (Altman et al., 2010, [4b])

Non-formalized multi-disciplinary rehabilitation: services involving various disciplines while lacking a collaborative, coordinated approach to care

Search Strategy:

Databases: PubMed, EBSCO, Medline, Ovid, Cochrane

Search Terms: traumatic brain injury, brain injury, multidisciplinary, interdisciplinary, intradisciplinary, neurorehabilitative disorder, neurorehabilitation, outpatient rehabilitation, neurorehabilitation program, transition from hospital to home, discharge, rehabilitation, outpatient, outpatient therapy, community re-entry, community re-integration, milieu based rehabilitation, comprehensive rehabilitation, holistic rehabilitation, cooperative health care Activities of Daily Living, occupational therapy, comprehensive outpatient rehabilitation, paediatric, pediatric, child, childhood, preschool, toddler, health care management, continuity of care, case management, family, caregiver, quality of life, satisfaction, outcomes

Limits, Filters, Search Dates: 1/1/2005 to 8/1/2012

Date Search Done: 1/10/2012 to 8/1/2012

Relevant CCHMC Evidence-Based Documents:

None were found

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Conflicts of Interest were declared for each team member:

- No financial or intellectual conflicts of interest were found.
- No external funding was received for development of this BEST.
- The following conflicts of interest were disclosed:

Note: Full tables of the [LEGEND evidence evaluation system](#) are available in separate documents:

- [Table of Evidence Levels of Individual Studies by Domain, Study Design, & Quality](#) (*abbreviated table below*)
- [Grading a Body of Evidence to Answer a Clinical Question](#)
- [Judging the Strength of a Recommendation](#) (*dimensions table below*)

Table of Evidence Levels: (*see note above*)

Quality level	Definition
1a [†] or 1b [†]	Systematic review, meta-analysis, or meta-synthesis of multiple studies
2a or 2b	Best study design for domain
3a or 3b	Fair study design for domain
4a or 4b	Weak study design for domain
5a or 5b	General review, expert opinion, case report, consensus report, or guideline
5	Local Consensus

[†]a = good quality study; b = lesser quality study

Table of Language and Definitions for Recommendation Strength: (see note above)

Language for Strength	Definition
It is strongly recommended that... It is strongly recommended that... not...	When the dimensions for judging the strength of the evidence are applied, there is high support that benefits clearly outweigh risks and burdens. (or visa-versa for negative recommendations)
It is recommended that... It is recommended that... not...	When the dimensions for judging the strength of the evidence are applied, there is moderate support that benefits are closely balanced with risks and burdens.
There is insufficient evidence and a lack of consensus to make a recommendation...	
<i>Given the dimensions below and that more answers to the left of the scales indicate support for a stronger recommendation, the recommendation statement above reflects the strength of the recommendation as judged by the development group. (Note that for negative recommendations, the left/right logic may be reversed for one or more dimensions.)</i>	
Rationale for judgment and selection of each dimension:	
1. Grade of the Body of Evidence	<input type="checkbox"/> High <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Low
<i>Rationale: The BESt is supported by the following levels of evidence to support the recommendation: 1a, 2b, 4b and 5a. Although the research population is adult focused, the pediatric component is supported via industry best practice standards for accredited rehabilitation facilities and the National Institute of Health.</i>	
2. Safety/Harm (Side Effects and Risks)	<input checked="" type="checkbox"/> Minimal <input type="checkbox"/> Moderate <input type="checkbox"/> Serious
<i>Rationale: The multi-disciplinary improvements that are being recommended can only increase the standard of care they are currently receiving.</i>	
3. Health benefit to patient	<input checked="" type="checkbox"/> Significant <input type="checkbox"/> Moderate <input type="checkbox"/> Minimal
<i>Rationale: The health benefits can be attributed not only to the patient but the caregivers as well. Based on the recommendation, their care will be more coordinated and refined.</i>	
4. Burden on patient to adhere to recommendation	<input checked="" type="checkbox"/> Low <input type="checkbox"/> Unable to determine <input type="checkbox"/> High
<i>Rationale: The responsibility of the recommended services falls on the health care practitioners to institute a multidisciplinary approach to rehabilitation in the outpatient setting. These are services that the family would have to pursue regardless; however, the system by which the services are offered would be integrated by the health care professionals, easing the burden on the patient/family.</i>	
5. Cost-effectiveness to healthcare system	<input type="checkbox"/> Cost-effective <input checked="" type="checkbox"/> Inconclusive <input type="checkbox"/> Not cost-effective
<i>Rationale: This is the biggest barrier to implementation of the recommendation, as coordinating services, re-structuring scheduling efforts and increasing communication can be a costly endeavor initially for an organization. It can be argued that, over time, costs would decrease due to decreased family questions, decreased duplicity of efforts/services, etc.</i>	
6. Directness of the evidence for this target population	<input type="checkbox"/> Directly relates <input type="checkbox"/> Some concern of directness <input checked="" type="checkbox"/> Indirectly relates
<i>Rationale: The main limitation in this area is the lack of pediatric-specific literature for traumatic brain injury in this area. There are, however, pediatric-specific rehabilitation industry standards cited and an NIH statement which support the evidence.</i>	
7. Impact on morbidity/mortality or quality of life	<input type="checkbox"/> High <input type="checkbox"/> Medium <input checked="" type="checkbox"/> Low
<i>Rationale: A significant increased effect on perceived quality of life is reflected in one study examined for the adult population (Cicerone 2008 [2b]). However, there is insufficient evidence to conclude with strong level of confidence that quality of life would be impacted.</i>	

Copies of this Best Evidence Statement (BESt) and related tools (if applicable, e.g., screening tools, algorithms, etc.) are available online and may be distributed by any organization for the global purpose of improving child health outcomes.

Website address: <http://www.cincinnatichildrens.org/service/i/anderson-center/evidence-based-care/bests/>

Examples of approved uses of the BESt include the following:

- Copies may be provided to anyone involved in the organization's process for developing and implementing evidence based care;
- Hyperlinks to the CCHMC website may be placed on the organization's website;
- The BESt may be adopted or adapted for use within the organization, provided that CCHMC receives appropriate attribution on all written or electronic documents; and
- Copies may be provided to patients and the clinicians who manage their care.

Notification of CCHMC at EBDInfo@cchmc.org for any BESt adopted, adapted, implemented, or hyperlinked by the organization is appreciated.

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This Best Evidence Statement has been reviewed against quality criteria by two independent reviewers from the CCHMC Evidence Collaboration. Conflict of interest declaration forms are filed with the CCHMC EBDM group.

Once the BEST has been in place for five years, the development team reconvenes to explore the continued validity of the guideline. This phase can be initiated at any point that evidence indicates a critical change is needed. CCHMC EBDM staff perform a quarterly search for new evidence in an horizon scanning process. If new evidence arises related to this BEST, authors are contacted to evaluate and revise, if necessary.

For more information about CCHMC Best Evidence Statements and the development process, contact the Evidence Collaboration at EBDMinfo@cchmc.org.

Note

This Best Evidence Statement addresses only key points of care for the target population; it is not intended to be a comprehensive practice guideline. These recommendations result from review of literature and practices current at the time of their formulation. This Best Evidence Statement does not preclude using care modalities proven efficacious in studies published subsequent to the current revision of this document. This document is not intended to impose standards of care preventing selective variances from the recommendations to meet the specific and unique requirements of individual patients. Adherence to this Statement is voluntary. The clinician in light of the individual circumstances presented by the patient must make the ultimate judgment regarding the priority of any specific procedure.