



AOTA Critically Appraised Topics and Papers Series Traumatic Brain Injury

**A product of the American Occupational Therapy Association's
Evidence-Based Literature Review Project*

CRITICALLY APPRAISED TOPIC (CAT)

Focused Question #2

What is the evidence for the effect of interventions (published between 2000-2004) to enable persons with traumatic brain injury (TBI) to participate in areas of occupation (activities of daily living [ADL], instrumental activities of daily living [IADL], work, leisure, social participation, and education)?

Clinical Scenario:

Four hundred and fifty-four respondents with TBI and living in the community participated in a Canadian postcensus survey. The survey identified three post-injury handicaps: 66% reported the need for assistance with basic ADL or IADL, 75% reported that they were not working, and 90% reported being limited or dissatisfied with their social integration. Time post-injury was not associated with severity of handicap and the proportions found in this study are comparable to those reported elsewhere (Dawson & Chipman, 1995). In the Dawson and Chipman study, there was a great deal of unexplained variance for each of the three classes of handicap. Some of the variance was explained by physical and social environments, as well as by age, gender, and educational level. Little of the variance was explained by disability, indicating that community reintegration does not depend simply on remediating disability.

Occupational therapy to increase participation in occupational areas of ADL, IADL, work, leisure, social integration, and education involves interventions not only to reduce impairment-related disability, but also to reduce handicap through use of compensatory strategies and adaptation of environments. Occupational therapists are interested in knowing what evidence exists that occupational therapy increases participation in areas of occupation.

Summary of Key Findings:

Summary of Levels I, II, and III

Of the six Level I–III studies that examined the effectiveness of therapy to reduce handicap and improve participation in areas of occupation, five (Goranson, Graves, Allison, & LaFreniere, 2003; Hayden, Moreault, LeBlanc, & Plenger, 2000; Malec, 2001; Powell, Heslin, & Greenwood, 2002 [see also Hillier, 2003]; and Zhu, Poon, Chan, & Chan, 2001) examined multidisciplinary treatment that included occupational therapy and one (Trombly, Radomski, Trexel, & Burnett-Smith, 2002) directly examined occupational therapy. The key findings, with subfindings, follow.

- A multidisciplinary (2 members were occupational therapists) community-based outreach program (Powell, Heslin, & Greenwood, 2002 [see also Hillier, 2003]) offered from 2 to 6 hours per week for a mean of 28 weeks, resulting in significant improvement in self-care and self-organization for persons with moderate to severe TBI compared to a written informational home program alone. Some key aspects of the outreach program were:
 1. The goals were valued by the participant and carer
 2. Written contracts with specific interim goals to work on were used
- In a well-controlled Level I study (Zhu, Poon, Chan, & Chan, 2001), intensive rehabilitation resulted in a significant percentage of patients achieving “good” status at 2 months compared to patients in conventional therapy (half the time) . The advantage was lost by the fourth month when there was no longer a significant difference between groups. Intensive therapy was defined as:
 1. 2 1-hour sessions per day of sensorimotor treatment (physical therapy)
 2. 2 1-hour sessions per day of functional retraining (ADL & IADL; occupational therapy [OT])
 3. 1 2-hour session per week of psychosocial retraining (social skills, hearing, speech; speech therapy).
- A multidisciplinary rehabilitation program (including OT) resulted in significant improvement in home independence compared to the no-treatment group (Goranson, Graves, Allison, & LaFreniere, 2003). However, social integration and productive use of time did not differ significantly between groups. The interventions included:
 1. Remediation of cognitive impairments, including “attention process training”
 2. Teaching compensatory strategies
 3. Mutual goal setting
 4. Individual and group therapy
- A multidisciplinary program (including OT) to minimize handicap through manipulation of environments (graduated decrease of structure and increase of distractions) significantly improved independence in persons with TBI of various severities and times since onset (Hayden, Moreault, LeBlanc, & Plenger, 2000). In this treatment, participants engaged in individually chosen ADL and IADL tasks that challenged each person’s identified deficits (occupation-as-means).
- A comprehensive day treatment program (Malec, 2001) involving multiple disciplines, including OT, offers no support for occupational therapy because the certified occupational therapist and occupational therapy assistant were involved in transdisciplinary activities and did not conduct the interventions usually associated with occupational therapy, such as life skills training.
- Goal-specific (ADL and IADL) outpatient occupational therapy (Trombly, Radomski, Trexel & Burnett-Smith, 2002) administered to patients with TBI in three separate OT clinics in the United States resulted in achievement of 81% of 149 goals identified and significant improvement in the Canadian Occupational Performance Measure (COPM)-Performance and COPM-Satisfaction scores as compared to a no-treatment period. Improvement was maintained during the no-treatment period, but no further improvement was seen. Nonpracticed tasks did not improve either during treatment or during the no-treatment period. The effect of occupational therapy on goal achievement was strong ($r = .94$).

The aspects of this program were:

1. Patients identified the problems they were having and identified the importance of each problem to them; the five most important, treatment-amenable problems became the goals
2. Compensatory strategies
3. Environmental adaptations

The common aspects of these programs include:

1. Self-selection of goals by patient and/or carer in collaboration with the therapists; valuing of goals to be worked on
2. Compensatory strategies
3. Environmental adaptation

Practice of targeted behaviors and tasks

Summary of Levels IV and V

Three Level V case studies examined the effects of particular interventions on one or a few patients. We cannot say from these uncontrolled studies that the intervention was the cause of the changes reported; however, they suggest interventions that can be experimented with on similar patients. Each paper described the treatments in detail. Careful observation of changes seen in the patient will guide continuation or discontinuation of the experimental treatment.

Gutman (2000), an occupational therapist, adapted a computer for use by a patient with hemiparesis in addition to TBI and other concurrent diagnoses. She taught the patient how to do use a computer for word processing and e-mail, and guided him to use the computer to reestablish social roles and to engage in meaningful productive activity, which he accomplished.

Walker (2002) tested a program that combined remediative and restorative interventions to enable a man, who was unable to accomplish IADL because of cognitive deficits of poor concentration, poor time management skills, and poor organizational skills, to improve participation. The program included task analysis, matching occupations to the patient's abilities, grading the complexity of the occupations, developing compensatory strategies, and helping the patient to apply the strategies in actual situations. After 4 months, the patient consistently used his strategies to independently complete IADL that were problematic before the therapy.

Kowalske, Plenger, Lusby, and Hayden (2000) described a program that focused on patient–environment interactions to improve participation in work. Treatment of three patients at different levels of severity was described. Treatment involved grading the environment (distraction/structure) from simulated environments in the clinic to actual work environments, teaching compensatory strategies, using adapted devices such as memory books, and practicing to overlearn skills. Each of the three patients returned to work, commensurate with their cognitive abilities.

Contributions of Qualitative Studies:

The Level V case studies were called qualitative; however, they did not use established qualitative methodology. No other qualitative study was included.

Bottom Line for Occupational Therapy Practice:

Treatments that we consider occupational therapy are being successfully used, studied, and reported by other disciplines. Occupational therapy research **must** establish the effectiveness of occupational therapy to reduce handicap and improve participation of people after TBI or the profession is in danger of being supplanted by others.

The interventions that were tested and found beneficial in the Level I–III studies reviewed here include establishment of goals valued by the patient; teaching compensatory strategies to overcome cognitive deficits; use of adapted devices to minimize the effect of cognitive deficits; treating the patient within environments that are graded to reduce structure and to increase distractions equal to real-life situations; use of occupations that challenge the patients' cognitive abilities, but that allow success; and practice in real-life environments. These treatments are occupational therapy. Therefore, occupational therapy practitioners who use them can assure their patients that these interventions have been tested and found successful in improving participation with some patients.

The experimental studies only named the type of intervention used and did not describe them in detail, but the case study writers described in detail the treatments they used. However, because of the weak research design, causality cannot be assumed for the case studies.

The intensity of therapy allowed patients with TBI to resume participation sooner than they would have had they gone through the conventional intensity of therapy. Although this advantage did not prevail beyond the first 3 months, we would expect that earlier achievement of tasks of valued roles would contribute to a patient's psychological well-being and continued motivation (this assumption needs to be tested) and therefore justify increased intensity in the early period following injury.

We do not know the ideal combination of interventions nor which are crucial to success. Further research is needed.

Review Process:

- Procedures for the selection and appraisal of articles:
- Titles of those studies retrieved by online database searches were reviewed
- Abstracts of those studies whose titles addressed the topic were retrieved and printed.
- Abstracts were read and those studies that did not address the question or did not meet inclusion criteria were deleted
- The remaining studies (N = 102) were retrieved either from the Boston University library system, interlibrary loan, online sources, or the Wilma West Library of the American Occupational Therapy Foundation
- Studies that were published before 2000 were eliminated (N = 47)

- Each study was read and those not meeting inclusion criteria were further deleted (N = 46)
- Each of the remaining studies was analyzed and the evidence table was completed. For this question, nine studies were analyzed.

Inclusion Criteria:

- | |
|--|
| <ul style="list-style-type: none"> • Published between 1990 and 2004 (overall criteria, but not for this question—see exclusion criteria) • Meta-analysis or systematic review • All levels of evidence, including case reports (Level V), were located, but only Levels I–III were reviewed if they provided adequate evidence. If not, then all levels were included to portray the best evidence available at this time • Participants were persons with traumatic brain injury • Participants were adults (> 18 years) • Written in English • At least one intervention must be current OT practice or could become OT practice. |
|--|

Exclusion Criteria:

- | |
|---|
| <ul style="list-style-type: none"> • Prediction or correlational studies • Longitudinal observational studies of natural history of recovery • Descriptions of programs or of treatments without testing effects • Written before 2000. |
|---|

Search Strategy

Categories	Key Search Terms
Patient/Client Population	Traumatic brain injury
Intervention	Occupational therapy, rehabilitation
Comparison	Critical reviews, meta-analyses, randomized control trial, randomized controlled study
Outcomes	Participation, activities of daily living, leisure, return to work, education (not children)

Databases and Sites Searched
PubMed (Medline)
OTSeeker.com
OTCATS.com
DARE (agatha.york.ac.uk/darehp.htm)

Cochrane Collaboration website
PsychINFO
CINAHL
Web of Science (Science Citation Index & Social Science Citation Index)

Quality Control/Peer Review Process:

Only the author reviewed the studies. The studies were read twice; they were reviewed further if a question arose.

Results of Search:

Summary of Study Designs of Articles Selected for Appraisal

Level of Evidence	Study Design/Methodology of Selected Articles	Number of Articles Selected
I	Systematic reviews, meta-analysis, randomized controlled trials	2
II	Two groups, nonrandomized studies (e.g., cohort, case-control)	1
III	One group, nonrandomized (e.g., before and after, pretest–posttest)	3
IV	Descriptive studies that include analysis of outcomes (single subject design, case series)	0
V	Case reports and expert opinion, which include narrative literature reviews and consensus statements	3
	Qualitative studies	0
		TOTAL = 9

Limitations of the Studies Appraised:

Levels I, II, and III

Level I
Ceiling and floor effects of the measuring instruments (Powell et al., 2002); dropouts due to researcher error (Powell et al., 2002); possible co-intervention bias (Powell et al., 2002).
Level II
Experimental and control groups drawn from different populations (Goranson et al., 2003)
Level III

Evaluators not blind to treatment status (Trombly et al., 2002; Hayden et al., 2000); lack of control groups (Hayden et al., 2000; Malec, 2001); failure to report sampling method and inclusion/exclusion criteria (Hayden et al., 2000); possible differences in personnel and procedures for a study whose data collection lasted 10 years (Malec, 2001); no statistical analysis reported (Malec, 2001).

Levels IV and V

No controls for intervening variables; no statistical analyses.

Articles Selected for Appraisal:

Goranson, T. E., Graves, R. E., Allison, D., & LaFreniere, R. (2003). Community integration following multidisciplinary rehabilitation for traumatic brain injury. *Brain Injury, 17*, 759–774.

Gutman, S. A. (2000). Using a computer as an environmental facilitator to promote post-head injury social role resumption: A case report. *Occupational Therapy in Mental Health, 15*, 71–89.

Hayden, M. E., Moreault, A. M., LeBlanc, J., & Plenger, P. M. (2000). Reducing level of handicap in traumatic brain injury: An environmentally based model of treatment. *Journal of Head Trauma Rehabilitation, 15*, 1000–1021.

Kowalske, K., Plenger, P. M., Lusby, B., & Hayden, M. E. (2000). Vocational reentry following TBI: An enablement model. *Journal of Head Trauma Rehabilitation, 15*, 989–999.

Malec, J. F. (2001). Impact of comprehensive day treatment on societal participation for persons with acquired brain injury. *Archives of Physical Medicine and Rehabilitation, 82*, 885–895.

Powell, J., Heslin, J., & Greenwood, R. (2002). Community based rehabilitation after severe traumatic brain injury: A randomized controlled trial. *Journal of Neurology, Neurosurgery, and Psychiatry, 72*, 193–202.

Trombly, C. A., Radomski, M. V., Trexel, C., & Burnett-Smith, S. E. (2002). Occupational therapy and achievement of self-identified goals by adults with acquired brain injury. Phase II. *American Journal of Occupational Therapy, 56*, 489–498.

Walker, J. P. (2002). Case study: Functional outcome: A case for mild traumatic brain injury. *Brain Injury, 16*, 611–625.

Zhu, X. L., Poon, W. S., Chan, C. H., & Chan, S. H. (2001). Does intensive rehabilitation improve the functional outcome of patients with traumatic brain injury? Interim result of a randomized controlled trial. *British Journal of Neurosurgery, 15*, 464–473.

Reference

Dawson, D. R., & Chipman, M. (1995). The disablement experienced by traumatically brain-injured adults living in the community. *Brain Injury*, 9, 339–353.

Hillier, S. (2003). Community-based rehabilitation improves function of patients with traumatic brain injury. *Australian Journal of Physiotherapy*, 49, 277.

This work is based on the evidence-based literature review completed in September 2005 by Catherine Trombly, ScD, OTR/L, FAOTA.

CAT format adapted from a template provided by Dr. Annie McCluskey and freely available for use on the OT-CATS website (<http://otcats.com>).

For more information about the Evidence-Based Literature Review Project, contact the American Occupational Therapy Association, 301-652-6611, x 2052.



Copyright 2007 American Occupational Therapy Association, Inc. All rights reserved.
For personal or educational use only. All other uses require permission from AOTA.
Contact: copyright@aota.org