

**Community support,  
education and  
prevention services**

Community Support  
Team:

Family Support Services  
Child & Youth Services  
WIT Employment Program  
Individual Community Supports  
Peer and Group Training  
Public Education  
Injury Prevention  
Social Marketing Program  
Okanagan Conference on Brain  
Injury

Kelowna Office:  
#11, 368 Industrial Ave  
Kelowna, BC V1Y 7E8  
250.762.3233  
[cobisadmin@cobis.org](mailto:cobisadmin@cobis.org)

Vernon Office:  
C/o Vernon Jubilee Hospital  
2101-32<sup>nd</sup> Street  
Vernon, BC V1T 5L2  
250.306.2064



Kindly advise if there is a  
change of name or address,  
or to remove a name from  
our mailing list.

If you have any questions  
about COBIS or Gray  
Matters, please contact us at  
the above address.

what is  
**Functional**  
making  
it work

**2006  
Okanagan  
Conference  
on Brain Injury**  
Naramata BC May 4-6

**Guest Speakers**  
*Robert Voogt, Ph.D.*  
*Tim Feeney, Ph.D.*  
*Detective Constable Carolyn Matthews*

**The conference is an interactive event providing  
knowledge on a variety of topics, for practitioners,  
caregivers and supporters of people with acquired  
brain injury and their families.**

**Sponsored by:  
Central Okanagan Brain Injury Society**

For more information call:  
**250-762-3233**

or visit our website:  
**[www.cobis.org](http://www.cobis.org)**

**CARP Continuing Education Credits application submitted**

October 2005

# Gray Matters

A publication of COBIS – Information on acquired brain injury issues  
Education | Prevention | Incidence | Prevalence | Outcomes | Strategies

**In This Issue:**

**The Association  
Between Field Glasgow  
Coma Scale Score and  
Outcome in Patients  
Undergoing Paramedic  
Rapid Sequence  
Intubation**

Page 2

**Subjective Reports of  
Fatigue During Early  
Recovery From  
Traumatic Brain Injury**

Page 2

**Convergent Validity of  
Self-Awareness  
Measures and Their  
Association with  
Employment Outcome  
in Adults Following  
Acquired Brain Injury**

Page 2

**Post-Traumatic  
Headache**

Page 3

**Workers' Risk of  
Unemployment After  
Traumatic Brain  
Injury: A Normed  
Comparison**

Page 3

**Okanagan Conference  
on Brain Injury**

Page 4

**ACCORDING TO THE US CENTER FOR  
DISEASE CONTROL AND THE US  
NATIONAL INSTITUTE OF HEALTH:**

- **B**rain injury is an epidemic
- Brain Injury is the greatest killer and  
disabler of adults under the age of 44
- Brain injury kills more children under the  
age of 20 than all other causes combined
- Incidence of BI is estimated at  
200/100,000
- Prevalence of BI is estimated at 2% of the  
general population

... this does not include brain injury from causes such as:  
electrocution, surgery, cancer, encephalitis, meningitis,  
aneurysm, drugs, alcohol, stroke - these additional conditions  
are conservatively estimated at an incidence of 100/100,100

## "Brain Injury is an Epidemic"

**COGNITIVE APPRAISAL ACCURACY MODERATES THE RELATIONSHIP  
BETWEEN INJURY SEVERITY AND PSYCHOSOCIAL OUTCOMES IN  
TRAUMATIC BRAIN INJURY**

Kervick RB, Kaemingk KL.

**Objective:** Traumatic brain injury (TBI) frequently results in significant changes in physical, cognitive and emotional status. Outcomes after TBI may be related to accurate appraisal of these changes. This study examined the relationship between cognitive appraisal accuracy and psychosocial outcomes in TBI survivors. **Methods:** Participants were male and female TBI survivors (n = 103) who were at least 6 months post-injury and a family member of each survivor. Appraisal accuracy was assessed using self- and observer-report measures of perceived cognitive difficulties. Family members also completed a measure of psychosocial function. Hierarchical regression techniques were used to determine whether cognitive appraisal accuracy accounted for a significant proportion of variance in psychosocial outcomes. **Results:** Study findings indicated cognitive appraisal accuracy moderated the relationship between injury severity and aspects of psychosocial function. **Conclusions:** The results suggest that brain injury outcomes may be improved when an individual is able to accurately assess limitations.  
Brain Injury. 2005 Oct;19(11):881-9.

## THE ASSOCIATION BETWEEN FIELD GLASGOW COMA SCALE SCORE AND OUTCOME IN PATIENTS UNDERGOING PARAMEDIC RAPID SEQUENCE INTUBATION

Davis DP, Vadeboncoeur TF, Ochs M, Poste JC, Vilke GM, Hoyt DB. Department of Emergency Medicine, University of California San Diego (UCSD), San Diego, California.

Early intubation is standard for treating severe traumatic brain injury (TBI). Aeromedical crews and select paramedic agencies use rapid sequence intubation (RSI) to facilitate intubation after TBI, with Glasgow Coma Scale (GCS) score commonly used as a screening tool. To explore the association between paramedic GCS and outcome in patients with TBI undergoing prehospital RSI, paramedics prospectively enrolled adult major trauma victims with GCS 3-8 and clinical suspicion for head trauma to undergo succinylcholine-assisted intubation as part of the San Diego Paramedic RSI Trial. The following data were abstracted from paramedic debriefing interviews and the county trauma registry: demographics, mechanism, vital signs including GCS score, clinical evidence of aspiration before RSI, arrival laboratory values, hospital course, and outcome. Paramedic GCS calculations were confirmed during debriefing interviews. Patients were stratified by GCS score, with chi-square and receiver-operator-curve (ROC) analysis used to explore the relationship between GCS and hypoxia, head injury severity, aspiration, intensive care unit (ICU) length of stay, and outcome. Cohort analysis was used to explore potential reasons

for early extubation and discharge from the ICU in some patients. A total of 412 patients were included in this analysis. A total of 81 patients (20%) were extubated and discharged from the ICU in 48 h or less; these patients had higher pre-RSI oxygen saturation (SaO<sub>2</sub>) values and higher arrival serum ethanol levels. Paramedic and physician GCS calculations had high agreement ( $\kappa = 0.995$ ). A statistically significant relationship was observed between GCS score and Head Abbreviated Injury Score (AIS), survival, and pre-RSI SaO<sub>2</sub> values. However, ROC analysis revealed a limited ability of GCS to predict the presence of severe TBI, injury severity, desaturation, aspiration, ICU length of stay, or ultimate survival. **In conclusion**, paramedics seem to accurately calculate GCS values before prehospital RSI. Although a relationship between paramedic GCS and outcome exists, the ability to predict the severity of injury, airway-related complications, ICU length of stay, and overall survival is limited using this single variable. Other factors should be considered to screen TBI patients for prehospital RSI.

J Emerg Med. 2005 Nov;29(4):391-7.

## CONVERGENT VALIDITY OF SELF-AWARENESS MEASURES AND THEIR ASSOCIATION WITH EMPLOYMENT OUTCOME IN ADULTS FOLLOWING ACQUIRED BRAIN INJURY

Wise K, Ownsworth T, Fleming J. Division of Occupational Therapy, School of Health and Rehabilitation Sciences, University of Queensland, Brisbane, Australia.

**PRIMARY OBJECTIVE:** To examine the convergent validity of three measures of self-awareness and their correlation with employment status in 38 adults with acquired brain injury. **RESEARCH DESIGN:** A cross-sectional study examining correlations between standardized measures of self-awareness and employment outcome. **METHODS AND PROCEDURES:** Self-awareness was assessed using the Self-Awareness of Deficits Interview (SADI), the Self-Regulation Skills Interview (SRSI) and the Awareness Questionnaire (AQ). Employment outcome was classified using a five-point work status rating scale and work items from the Sydney Psychosocial Reintegration Scale (SPRS). **MAIN OUTCOMES AND RESULTS:** Significant correlations were found between the SADI total score and the AQ discrepancy score and between the total SADI score and the SRSI indices. The work status rating scale was significantly correlated with the SADI and SRSI scores but not the AQ. **CONCLUSIONS:** The findings support the convergent validity of the three measures of self-awareness and highlight the need to address self-awareness deficits in vocational rehabilitation. Brain Inj. 2005 Sep;19(10):765-75.

## SUBJECTIVE REPORTS OF FATIGUE DURING EARLY RECOVERY FROM TRAUMATIC BRAIN INJURY

Borgaro SR, Baker J, Wethe JV, Prigatano GP, Kwastnica C.

**OBJECTIVE:** To determine whether patients with traumatic brain injury (TBI) report higher levels of fatigue than do normal controls and to identify demographic and cognitive correlates of self-reported fatigue. **DESIGN:** Prospective study. **SETTING:** Inpatient neurorehabilitation unit in a medical center and neurological institute. **PARTICIPANTS:** Forty-seven neurorehabilitation inpatients with TBI. **MAIN OUTCOME MEASURES:** Barrow Neurological Institute (BNI) Fatigue Scale and BNI Screen for Higher Cerebral Functions. **RESULTS:** Patients reported significantly greater levels of fatigue compared to the levels reported by normal controls, although fatigue was found to be unrelated to injury severity, number of days from injury to assessment, cognitive impairment, and gender. Inspection of individual items revealed no significant differences between severe versus moderate versus mild TBI groups. However, being able to last the day without taking a nap (ie, item 10) was found to be the most sensitive item associated with fatigue in the TBI group. **CONCLUSIONS:** Results of this study suggest the need to integrate activities and interventions to increase endurance in patients with TBI during early rehabilitation. Accommodating regular rest breaks and increasing restful sleep should be a focus of inpatient neurorehabilitation units.

J Head Trauma Rehabil. 2005 Sep-

## POST-TRAUMATIC HEADACHE

Nathan Zasler, MD

### Introduction:

Headache and neck pain are the most common physical complaints following concussion (mild brain injury) and are experienced early after injury by up to 70 percent of persons with these types of injuries. Headache also occurs after more severe brain injury but not as often. Though post-traumatic headaches (also termed PTHA) may be quite persistent, they have not been found to relate to the severity of injury.

The majority of headaches following cerebral (brain) injury, as well as cranial and cervical trauma do not require surgery. However complications such as subdural and epidural hematomas (blood collecting between the brain and the skull) may occur, particularly after severe head injury. These may cause headache and require surgical intervention. Clinical examination and diagnostic tests may be needed to determine the seriousness of the condition and the appropriateness of surgery.

### Sources of Head Pain

To better understand the injury, the doctor may ask questions about the mechanisms responsible for injury—for example types of restraints used and speed of the vehicles, if an auto accident. Any history of direct blows to the head or body or cervical whiplash is also important. Specifically, the doctor should inquire regarding clues to the presence of the 3 “Cs”:

- \* Cerebral (brain) injury;
- \* Cranial or cranial/adnexal trauma (damage to the head or structure in the head but outside the brain); and
- \* Cervical acceleration/deceleration (CAD) insult (also called whiplash injury).

### What Questions should be asked:

The headache symptom profile is one of the major tools doctors use to discover the cause of headache. Pre-injury personal and family history of headache may also be important. The questions physicians usually ask are represented in the mnemonic “COLDER”: Character, Onset, Location, Duration, Exacerbation, and Relief. Doctors will also want to know the frequency and severity of pain, types and magnitude of associated symptoms, presence of aura, degree of functional disability associated with headache episodes, as well as, the time of day that the headaches come on.

### The Physical Assessment:

Adequate physical examination is paramount to an appropriate diagnosis and should include inspection, palpation, (to physically touch and examine) auscultation, (to listen with a stethoscope) and percussion (to tap against the structure as with a finger). The neurologic exam should be a centerpiece of this assessment;

however, adequate examination of cranial and cervical structures including palpation of the head, neck and shoulders is often a crucial but often overlooked aspect of the exam.

### Major Headache Subtypes:

The major types of headaches seen following a trauma include:

- \* Subdural and epidural hematoma
- \* Musculoskeletal headache (e.g. myofascial referred pain, as well as, TMJ disorder related pain)
- \* Tension type headache
- \* Neuroma/neuralgic (nerve) headache
- \* Post-traumatic sympathetic nerve dysfunction (migraine-type headaches produced by injury to autonomic nerve in the neck)
- \* Neurovascular (migraine) headache
- \* Seizure disorder
- \* Other uncommon causes

### Pain Management Issues:

Doctors use a variety of techniques in treating chronic headache pain. These may include medications, various physical modalities, injection techniques, psychological therapies, behavioral medicine techniques (e.g. biofeedback), pain adaptation counseling, and pain cope support groups. Persons with chronic pain often develop emotional difficulties such as depression, anxiety, difficulty thinking, and sleep problems all of which may further increase the perception of pain and level of distress. Education of the patient with PTHA is crucial to optimizing treatment success and decreasing distress and poor adaptation to pain, particularly when chronic. Some crucial components of education are making sure the patient understands the disease process, the expectations of treatment, how to take prescribed medication and the potential detrimental effects of non-compliance and/or over-use (e.g. drug induced headache and more importantly, rebound headache).

### Conclusion:

Multiple studies, some completed only in the last three to five years, demonstrate that ongoing lawsuits have little to no effect on the persistence of headache complaints. Specifically, studies have shown that individuals still continue to report significant symptoms even after litigation has ended. Only a very small population will develop intractable or persistent post-traumatic headache. When properly treated, most PTHA is not permanent and/or “totally disabling.” Once the appropriate diagnosis is made, treatment should be instituted in a holistic fashion taking into consideration: -benefit/risk ratio of any particular intervention - practicality of the prescribed treatment—can the patient follow through?

Brain Injury Resource Foundation Oct 03/05

## WORKERS' RISK OF UNEMPLOYMENT AFTER TRAUMATIC BRAIN INJURY: A NORMED COMPARISON

Doctor JN, Castro J, Temkin NR, Fraser RT, Machamer JE, Dikmen SS.

We examined, among those persons working preinjury, the risk of unemployment 1 year after traumatic brain injury (TBI) relative to expected risk of unemployment for the sample under a validated risk-adjusted econometric model of employment in the U.S. population. Results indicate that 42% of TBI cases were unemployed versus 9% expected, relative risk (RR) = 4.5, 95% confidence interval (CI) (4.12, 4.95). The relative risk for unemployment was higher among males, those with higher education, persons with more severe injuries, and more impaired early neuropsychological or functional status. Difference in unemployment rates gave similar results for gender, severity of injury, and early neuropsychological and functional status. However, for education, the excess was smaller among those more highly educated, but the unemployment rate in the more highly educated in the general population was sufficiently small to yield a larger relative risk. In conclusion, after accounting for underlying risk of unemployment in the general population, unemployment is substantially higher after TBI for people who were employed when they were injured. The differential employment status varies depending on demographics, severity of brain injury, early functional outcome, and neurobehavioral indicators. For characteristics such as education, associated with rates of unemployment in the general population, different methods used to compare the rates may yield different results. (JINS, 2005, 11, 747-752.) J Int Neuropsychol Soc. 2005 Oct;11(6):747-752.

