Traumatic brain injury

the challenge of community management

Improvements in both the retrieval of patients from accident scenes and neurosurgery have enabled many people to survive the immediate consequences of a traumatic brain injury. Survivors face the challenge of resuming a meaningful life for themselves and their family; their GP is often their most valuable resource.

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Traumatic brain injury is a condition that every GP can expect to see during his or her practice. It often strikes people in the prime of their lives and without warning. At the time of injury the victims are often carving out social, vocational and economic patterns that would typically last a lifetime; after the injury, these patterns have to change, often permanently (see the box on page 58).

The array of physical and cognitive sequelae of traumatic brain injuries is extensive. Thus we must tailor treatment programs to the specific person. Previously, traumatic brain injury was equated with stroke, and both were managed similarly; however, these conditions have very different prognoses and need different approaches. Continuity of care is one of the most important goals in managing a person with traumatic brain injury. This care may be intensive at times and, at the least, may require some contact for the rest of the patient's life. The GP is often the best person to provide this care.

What is traumatic brain injury?

Head injury is a nonspecific term used for any injury involving the scalp, skull or brain. Acquired brain injury can result from a number of causes, including trauma, hypoxia, infection, tumour, substance abuse, degenerative neurological disease and stroke. It can lead to physical, cognitive, psychosocial and sensory impairments, which may lead to restrictions in various areas of life.[1] In Australia the most common cause of acquired brain injury is stroke. Traumatic brain injury is acquired brain injury caused by a traumatic event, such as a blow to the head.[1]

How common is it?

Most studies on the incidence of traumatic brain injury are based on hospital data focusing on morbidity and mortality rather than disability. Information on long term effects is not readily available. Recent estimates by the Australian Institute of Health and Welfare give a range of 57 to 377 injuries per 100,000 population per year.[1]

IN SUMMARY

- **Continuity of care is one of the most important goals in managing a person with traumatic brain injury; GPs have a central role in managing these patients.**
- **Following a traumatic brain injury, cognitive and behavioural deficits are more common, and often more disabling, than physical defects.**
- **A patient's psychological and behavioural changes after a traumatic brain injury may alienate family and friends; family support, education and counselling are vital.**
- **Rehabilitation must be tailored to the individual and is as much a social as a medical process.**

Factors affecting lifestyle after a traumatic brain injury

- Unemployment and financial hardship
- Lack of transportation alternatives
- Intermittent medical problems
- Unavailability of recreational opportunities
- Difficulties in maintaining interpersonal relationships
- Loss of pre-injury roles with adults returning to the parental home
- Marital breakdown
- Loss of independence with the occasional need for a support worker
- Inadequate academic resources

The proportion of these people suffering adverse outcomes ranged from 3% with moderate disability or worse to 40% with residual difficulties on discharge from hospital.[1]

According to Lyle and colleagues, about 10,500 significant head injuries occur in New South Wales each year.[2] Although most of these injuries are mild and most people require little or no hospitalisation, about 10% of these people will die and about 10% will be substantially disabled.[2]

More than 60% of those suffering traumatic brain injury are aged 16 to 29 years. Two to three times as many men are injured than women, and typically they are young, are working class, have limited education, and may not have been in stable employment before injury.[3] Road accidents cause 70% of all traumatic brain injuries (Figure). Falls and assaults are the next most common causes.

How are patients assessed?

Assessing severity

It is vital to assess the severity of the traumatic brain injury as management strategies differ greatly during the acute and later stages of rehabilitation.

The most consistent effect of diffuse brain damage is altered consciousness. In the emergency room, it is useful to classify patients into those who can talk when they arrive and those who cannot. We then divide the talkers into those who have a period of amnesia after their injury and those who can remember everything clearly. For those who are unconscious on arrival, the depth and duration of coma provide the best guide to the severity of the diffuse damage.

The Glasgow Coma Scale

The Glasgow Coma Scale (GCS) provides a quick and easy tool to assess the severity of traumatic brain injury in the acute setting (Table 1). Devised by Jennett and Teasdale in Glasgow,[4] it gives a prognosis for survival but not for functional outcomes. The score comprises three components:

- eye opening
- motor response
- verbal response.

A mild traumatic brain injury is defined by a GCS of 12 or more out of a maximum of 15. Patients with scores of 9 to 11 have moderate injuries, and scores of 8 or less, severe head injuries.

Duration of post-traumatic amnesia

After the patient has recovered, the best guide to the severity of diffuse brain damage and cognitive deficits is the duration of post-traumatic amnesia. This can be assessed by interviewing the patient and is feasible months after injury, even if there are no records of early management. This is particularly valuable to GPs who inherit patients some time after an injury.

The GP should ask patients how long it was before they 'came to' after the accident – that is, when these patients first made sense of their surroundings. It is important to confirm that patients are not reporting what their relatives told them about the accident, but what they themselves remember. Relatives usually equate awareness with the patient beginning to talk, but talking usually occurs

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STONE

Figure. Road accidents cause about 70% of all traumatic brain injuries.

before the start of continuous memory for day-to-day events. There is no need to seek an accurate figure for post-traumatic amnesia; what matters is whether it lasted minutes, hours, days or weeks (Table 2). The duration of post-traumatic amnesia correlates well with late outcomes and the interval before patients return to work.[3]

Assessing eventual function

The Glasgow Outcome Scale (GOS), developed by Jennett and Bond, is widely used to predict eventual function;[5] however, it is intended to provide only broad categories of morbidity. It does not evaluate the often subtle, long term cognitive impairment that can occur in this scale's best category of 'good recovery'. There are many other rating scales, but all have similar problems.

After a traumatic brain injury, a combination of cognitive, behavioural and physical deficits is often found (see the box on page 60), which may lead to a greater degree of social disability than would be expected from isolated deficits. Cognitive and behavioural deficits are more common than physical defects and often the most disabling, dominating the clinical picture and contributing to social obstacles. Yet these deficits may not be evident immediately, unless the GP asks family and friends to compare the patient's present overall behaviour with that before injury. Although some patients make a full recovery, many never return fully to their pre-injury state.

Neuropsychological assessment

A neuropsychological assessment provides substantial information on the extent and severity of the deficits after a traumatic brain injury. All patients with moderate or severe brain injury, measured by post-traumatic amnesia lasting more than two to three days, should have at least one neuropsychological assessment. Strategies can be developed using this information to compensate for the deficits and maximise independence.

Table 1. Assessing conscious level: the Glasgow Coma Scale

Examiner's test	Patient's response	Assigned score
Eye opening (E)		
Spontaneous	Opens eyes on own	4
Speech	Opens eyes when asked in a loud voice	3
Pain	Opens eyes upon pressure	2
Pain	Does not open eyes	1
Best motor response (M)		
Commands	Follows simple commands	6
Pain	Pulls examiner's hand away on pressure (localisation)	5
Pain	Pulls a body part away upon pressure (withdrawal)	4
Pain	Flexes body inappropriately to pain – decorticate posturing (abnormal flexion)	3
Pain	Body becomes rigid in extended posture upon pressure – decerebrate posturing (extension)	2
Pain	Has no motor response to pain	1
Verbal response: talking (V)		
Speech	Carries on a conversation correctly and tells examiner where he/she is, who he/she is plus the month and year	5
Speech	Seems confused or disorientated	4
Speech	Talks so examiner can understand words but makes no sense	3
Speech	Makes sounds that examiner cannot understand	2
Speech	Makes no noise	1

Coma score (E+M+V) = 3 to 15. A score of 12 or more indicates a mild traumatic brain injury; 9 to 11, a moderate injury; 8 or less, a severe injury.

Table 2. Assessing severity of traumatic brain injury

Duration of post-traumatic amnesia	Severity of brain injury
< 5 minutes	Very mild
5 – 60 minutes	Mild
1 – 7 days	Moderate
1 – 4 weeks	Severe
> 4 weeks	Very severe
> 6 months	Chronic

How are families and friends affected?

The patient's psychosocial and behavioural changes after the injury may alienate family and friends, who sometimes perceive patients as 'difficult strangers'. In particular, aggression, substance abuse or lack of empathy strains relationships. Families, employers and co-workers may see the patient as unmotivated and incompetent.

Ignorance and misperceptions about

Traumatic brain injury: deficits and defects

Health

Deviation from ideal body weight
Epilepsy
Hydrocephalus
Excessive cigarette, alcohol and recreational drug use

Physical function

Vision and hearing problems
Changes in posture
Alterations in sensation
Changes in ambulation
Changes in hand function
Changes in stamina

Cognitive function

Altered concentration
Altered memory
Reduced flexibility in thinking
Reduced planning and organisation skills
Affected language
Changes in abstract thinking
Reduced self-regulatory skills
Postconcussion syndrome

Behaviour

Emotional instability
Low frustration tolerance
Disinhibition
Anxiety states
Depression

the effects of traumatic brain injury abound; people often have negative stereotypes about those with disabilities. These beliefs contribute to conflicts in the home, workplace and community. Often patients are pressured to return early to work, study or household responsibilities, but since they may have reduced awareness of their cognitive deficits during this stage, they may fail or perform badly in these tasks.

Helping the person with traumatic brain injury return to maximum independence in the community is an extremely difficult task for family members. Family support, education and counselling are vital. The quality and availability of community services may be lacking, and cost issues may limit access. Familiarity with the locally available resources will help the GP in establishing a management plan involving family and friends.

What is the GP's role?

GPs have a central role in managing patients with traumatic brain injury. They are a major source of information and counselling for both patients and families, and they have a vital role in helping patients adjust to changes after the injury. GPs can inform their patients of the consumer organisations that may be helpful in each State and Territory (see the box on page 63). In addition, each State or Territory has rehabilitation services available; contact details for these can be obtained from local tertiary hospitals or area health departments.

GPs will usually have the difficult role of ensuring that the varied needs of the patient are met. Often the patient is unable to co-operate fully with treatment and no one patient will have the same problems and needs as another. The GP with little experience may be confused and frustrated when treating such patients. Having sufficient exposure with patients is the best way to obtain skill in establishing priorities. As mentioned previously, few patients will have physical defects; most problems are due to the cognitive and behavioural changes, and these are often the most difficult to manage.

Is drug therapy useful?

Drug therapy is sometimes useful for patients with traumatic brain injury, particularly if they have depression or anxiety. The newer antidepressants, such as the selective serotonin reuptake inhibitors, are used most often; however, as with all psychotropic medication, care must be taken to monitor the increased risk of seizures and the reduction in cognition that may occur in these patients. The dose may need to be reduced due to the greater sensitivity of people with cognitive deficits.

Mood stabilisers are used to help reduce the dyscontrol that those with executive dysfunction may exhibit. Carbamazepine (Carbium, Tegretol, Teril) is used most often, although sodium valporate (Epilim, Valpro) is also helpful. Again, the dosage may need to be reduced due to greater sensitivity of these patients. Patients' anticonvulsant serum levels may not need to be as high as the therapeutic levels required when treating epilepsy as the dose is titrated against effectiveness. Anticonvulsant medication is given to those with post-traumatic epilepsy. Phenytoin is not often used due to its sedative effect.

Although there are few specific treatments, the management of spasticity has recently improved with the introduction of botulinum nerve blocks and phenol motor blocks. These may decrease tone sufficiently for therapy, such as splinting, to be helpful in increasing function. Oral antispasmodics, such as baclofen (Clofen, Lioresal) and dantrolene (Dantrium), have been used but are not as effective as they are in patients with spinal cord injury. Intrathecal baclofen (Lioresal Intrathecal) via a computerised pump has shown promise.

What is the role of rehabilitation?

Rehabilitation is used to help patients improve function, either by hastening the restoration of function or ensuring that recovery is more thorough than it would have been without therapy. It also helps with the process of community reintegration. It must be tailored to the individual's specific problems and is as much a social as a medical process. Most regional health services have access to rehabilitation. The members of the rehabilitation team include:

- patients and their family
- GPs

- consultants in rehabilitation medicine
- allied health professionals: physiotherapists, occupational therapists, speech pathologists, social workers
- neuropsychologists
- vocational and clinical psychologists
- private and state vocational rehabilitation counsellors
- educators
- employers.

The major mistake in planning a rehabilitation program for these patients is to consider the problems due solely to the patient's injury. A major factor in success lies in the social support systems available. When there is no support, or it is inadequate or inappropriate, patients fare worse regardless of the degree or type of direct rehabilitation.

Living in the community requires basic skills: feeding, dressing, hygiene, transfers, mobility. The hospital rehabilitation team usually conducts training in the basic skills before a patient's discharge.

Vital for independence are advanced living skills, including domestic and household duties, communication skills (reading, writing, using the telephone), money and time management, driving, using public transport and social skills. The hospital rehabilitation service may start training an inpatient in advanced skills, but to be most effective, this training should continue when the person has returned to the community. Physiotherapists, speech therapists and occupational therapists may be involved primarily, but psychologists may have a role if cognitive and behavioural deficits need intervention. Retraining, reskilling, or downgrading to less onerous work may be needed. Specifically focused rehabilitation intervention may produce substantial functional gains even if several years after the injury.

Community reintegration demands creativity and innovation. Planning should consider the potential for functional improvement. Patients with traumatic brain injury need a broad range of community services to support this recovery.

Behavioural management is often needed to increase independence and reduce maladaptive social behaviour; however, such a resource is not always available due to cost and time factors. The GP may find that simple environmental changes reduce the need for formal therapy. For example, try to maximise function within several relatively structured or familiar environments. Suggest activities that are neither overwhelming nor boring. Frequent rest periods and ensuring that tasks are within the patient's fluctuating capabilities during the day will help. The aim of therapy is to reduce agitation, irritability, combative outbursts, lethargy and abnormal or foul language.

When can the patient return to work?

Returning to work remains the leading indicator of recovery after a traumatic brain injury. Patients strive primarily to work, often at the cost of personal relationships, family life, and leisure activities. Many can return to their premorbid vocational and social responsibilities with positive self-esteem and improved social skills. Return to gainful employment with traditional rehabilitation varies from 12 to 100%, depending on the severity of deficits.

Job retention is a major issue; 75% of those suffering a traumatic brain injury will lose their jobs in the first 90 days. About half of these complain of reduced satisfaction with their jobs or of being given work that is beneath their abilities. However, many of those who return to their former jobs find they can no longer cope with their previous responsibilities. Motor and sensory limitations and physical endurance may be insufficient for work requirements. Driving a car will usually need serious consideration before being undertaken, and may be impossible for some. Post-traumatic epilepsy and the use of anticonvulsant medication can restrict day-to-day work and leisure activities. Cognitive and behavioural deficits also need to be considered before returning to work, and may need to be assessed by a vocational provider experienced in traumatic brain injury.

Australian brain injury organisations

ACT
Head Injury Council of Australia
Phone: (02) 6290 2253
National Brain Injury Foundation Inc
Phone: (02) 6282 2880

New South Wales
Brain Injury Association (NSW) Inc
Phone: (02) 9749 5366
Toll free: 1800 802 840

Northern Territory
Brain Injury Association of Northern Territory
Phone: (08) 8981 8913

Queensland
Brain Injury Association of Queensland Inc
Phone: (07) 3367 1049
Toll free: 1800 673 074
Headway Gold Coast Inc
Phone: (07) 5531 1551

Tasmania
Brain Injury Association of Tasmania Inc
Phone: (03) 6273 6973 (Hobart)
Phone: (03) 6331 7894 (Launceston)

South Australia
Brain Injury Network of SA
Phone: (08) 8354 1933

Victoria
Headway Victoria
Phone: (03) 9642 2411
Toll free: 1800 817 964

Western Australia
Headwest
Phone: (08) 9330 6370
Toll free: 1800 626 370

continued

Consultant's comment

This most important article draws attention to the large number of head injury patients who may make an apparently complete physical recovery but are left disabled, often permanently, by the psychological and cognitive deficits that can follow even seemingly minor head trauma. Most of these patients are young but have a normal life expectancy, leading to long term problems for themselves, their families and the community. The importance of the duration of post-traumatic amnesia is stressed, along with the various physical, cognitive and behavioural problems, often unique to each patient, that can follow.

Continued management may be needed for many years. This is usually best co-ordinated by the patient's GP, but needs to involve rehabilitation professionals, the patient's family and community services to varying degrees. The role of different therapies, including drug treatment in some cases, is well discussed. The lists of possible disabilities, treating professionals and brain injury organisations are useful for quick reference.

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Although this situation may seem distressing, we often underestimate the potential of those with traumatic brain injury. Prospects are better if a vocational rehabilitation provider, such as CRS Australia (Acquired Brain Impairment Services Unit in NSW, phone: 1800 624 824) or one of the many private providers, helps the patient from an early stage. This should be considered even if employment is not yet feasible. Increasing skill levels or retraining may expand work options before a return-to-work program is viable.

Conclusion

The rehabilitation of patients who have suffered a traumatic brain injury presents a unique challenge. Patients will present with a variety of deficits, but by considering the needs and wishes of each patient and his or her family, GPs should be able to overcome obstacles and plan consistently. Not all difficulties can be overcome, but with thought and creativity much can be accomplished. A team approach, flexible evaluation procedures, behaviourally-based training, education of all concerned and long term follow up will help. The rewards are well worth the challenges of the puzzle of traumatic brain injury. MT

References

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