

Module 1

Introduction to Traumatic Brain Injury

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Workshop overview

Aim

This session provides an overview of the nature of traumatic brain injury (TBI) and the impact it can have on a person's life as well as on the lives of their family. This includes looking at their whole situation, including their community and available services. By exploring this information, the session assists workers to enable individuals with a TBI to achieve and maintain their maximum potential within their family and community.

Rationale

People who have a disability arising from a TBI are often confronted with distinctly different challenges than people with similar impairments arising from other causes. In large part, this is due to the nature of the injury itself. In order to work effectively with people with a TBI, it is essential to have a broad understanding of the physical processes of injury and recovery, the possible impact on brain functions, and the outcomes that may result – for the individual, the family and society as a whole.

Lack of information is one problem; another is that people frequently have misinformation about head injury. This is partly due to media images that create misconceptions about the long-term effects of a head injury. In addition, recent research challenges former assumptions about recovery. Therefore, it is important to correct, wherever possible, these sorts of misconceptions in order to effectively meet the needs of people with a TBI.

Outcomes

At the end of this session, participants should be able to:

- 1 Define 'traumatic brain injury'.
- 2 Identify the epidemiology of this disability (eg. sex ratio, age distribution).
- 3 Describe the basic anatomy of the skull and brain.
- 4 Recognise how trauma impacts on the structures of the brain.
- 5 Recognise the process of recovery.
- 6 Define stages of rehabilitation.
- 7 Give examples of four broad categories of long-term impairments often seen after a traumatic brain injury, recognising the links between site and type of injury with possible resulting impairments of brain function.
- 8 Define common outcomes for a person with a TBI and their family.
- 9 Identify the types of services (nationally and locally) available to people with a TBI and their families.

Evaluation

Some presenters may wish to evaluate the effectiveness of their training. For example, if the modules are provided as part of a training day, the organisers may want to evaluate the success of the program and the usefulness of this approach to the provision of the training.

A generic evaluation form has been provided in **How do I use this resource?**

This form is an example of how you may want to evaluate your training. It can be modified before you print it out, to make it specific to your training.

The evaluation can be completed at the conclusion of each module or at the completion of the training program (eg. several modules). The form can be distributed and collected by the presenter/s on the day, or returned by mail/email for feedback to a designated person to collate the responses for later feedback, to assist planning or to provide a training report (eg. as a Quality Assurance project).

The use of the evaluation tool will be specific to the type of training organised.

Summary outline

approximately 2 hours

Content	Resources	Suggested Timing
Introduction	HO 1.1: Workshop outline, OH 1.1	5 minutes
Level of TBI Awareness (optional)	Questions from Training Needs Assessment "How To" section of DVD	15 minutes
Definitions and epidemiology	OH 1.2–OH 1.5	15 minutes
Anatomy of the brain and mechanisms of injury	OH 1.6–OH1.11	20 minutes
Recovery and rehabilitation	OH 1.12–OH 1.15	20 minutes
Impairments and outcomes	OH 1.16–OH 1.24	20 minutes
Local service networks	OH 1.25	20 minutes
Consumer perspective (optional)	Consumer presentation OR Consumer poem HO 1.2	20 minutes 5 minutes
Conclusion	HO 1.3 (a–i): Introduction to TBI References and Resources Contents Outcomes reviewed from introduction exercise Evaluation forms (if utilised)	10 minutes



Key strategies and concepts

This session introduces basic concepts that provide the groundwork for staff working in the field, in a non-technical, non-medical manner. Many of the points made in this session will be taken up in the subsequent modules in the program.

Due to the amount of material to be covered within a short time, it is recommended that this module be delivered as a lecture. The presenter can keep the session lively by encouraging discussion and asking participants questions. As adult learners with some practical experience of working with people with a TBI, they will have a lot to contribute. If the presenter is prepared to talk about their own experiences, and to ask participants to share theirs, these personal stories are often the best way to illustrate concepts, assist with clarification and generate greater interest.

Questions from the 'Training needs self-assessment' can be used as points for discussion, depending on time constraints and on how the presenter is running the workshop. This information is located on the "How To Use This Resource" section of the DVD.

The scope of the workshop makes it well suited to a shared presentation, with sections allocated to different presenters with the relevant expertise. There is enough flexibility to run the whole workshop, or to focus on particular issues as determined by the expertise of the presenter(s), participant interest and time constraints.

Presenter(s) will need to draw upon their own expertise to meet the workshop objectives. The following outline and overheads can be used primarily for structuring the presentation of information. The overheads are presented in handout 1.3.

This session includes a timeslot for a presentation by a person with a TBI. This can be an effective way of bringing the facts and figures to life. It might be helpful if they divide their story up into sections, eg. start with their life immediately before the injury, then the injury itself, being in hospital and the recovery process, and where things are now. People with TBIs who are involved in schools education are trained to provide a structured format for telling their story within a specific time frame.

If the involvement of a consumer is not practical then the *Living with a Brain Injury* poem by Bernard can be distributed. Key points from the poem can be highlighted for discussion/general comment.

Key articles and resources that were used as the basis for this presentation are listed in the References and Resources section, handout 1.3.

Workshop outline

Resources	Content
HO 1.1 and OH 1.1: Workshop outline	Introduction (5 minutes) Welcome participants and check that everyone is present. Introduce yourself and ask participants to introduce themselves. Show OH 1.1 and distribute HO 1.1 to explain the purpose and focus of the workshop.
Level of TBI awareness	To assess levels of TBI awareness, use questions from the Training Needs Self Assessment in the DVD "How To Use This Resource" as points of discussion. This exercise can be additional to or replace the blank overhead exercise for participant expectations. It can fill the time gap if there is no consumer presentation at the end of the session.
OH 1.2: Definitions of brain injury	Define the term 'Traumatic Brain Injury' (20 minutes) Emphasise that this workshop focuses on traumatic brain injury , which is one type of acquired brain injury. Other 'acquired brain injuries' include: Anoxia/hypoxia: reduced flow or no flow of oxygen to the brain leading to tissue damage. Can be caused by failed hangings, near drowning, overdoses. Infection can include meningitis and encephalitis. Substance abuse refers to alcohol-related brain damage. Alcohol acts as a toxin and long-term misuse can cause damage to brain tissue. Degenerative neurological diseases can include Huntingtons, Parkinsons, and Alzheimers. (Optional) Explain how traumatic brain injury differs from intellectual disability or psychiatric illness.

Workshop outline continued

Resources	Content
OH 1.3: Estimating the numbers	The epidemiology of TBI and ABI Epidemiology rates are taken from FORTUNE, N. & WEN, X. (1999), <i>The definition, incidence and prevalence of acquired brain injury in Australia</i> , Australian Institute of Health and Welfare, Canberra. Incidence refers to the number of new cases in a year Prevalence refers to the total number of cases present in the community (Optional) Presenter may wish to supplement this information with local statistics. Population distribution Peak incidence (15–25 yrs) age group comprises 40% of survivors of TBI but only 15% of the Australian population. The male:female ratio is 3:1. A second peak is observed after 75 years. But there are different causes. Main cause for the young age group is road crashes. Main cause for the elderly is falls. (Optional) Discussion: What factors contribute to the skewed distribution, eg. why is it young men? Briefly discuss risk-taking behaviours, peer pressure, increasing number of female drivers, speed, alcohol, etc. If medically stable, people with TBI can expect to live a normal lifespan. Consider implications of a growing population of young people with TBI who have normal life expectancies.
OH 1.4: Sex and age breakdown	

Workshop outline continued

Resources	Content
OH 1.5: Causes of TBI in Australia	Common causes of brain injury In severe TBI: <ul style="list-style-type: none">• 64% caused by road accidents, including drivers, passengers, pedestrians, motorbike riders and cyclists• 36% relate to all other causes, including assaults, falls, sport and recreation, gunshot and other. Data from Tate, R., McDonald, S., & Lulham, J. M. (1998). Incidence of hospital-treated traumatic brain injury in an Australian community. <i>Australian and New Zealand Journal of Public Health</i> , 22 (4), 419–423.
OH 1.6: The skull	Basic anatomy of the skull and brain (20 minutes) (Optional) Demonstration models of a skull and brain are very useful for passing around amongst participants in addition to overheads. The skull <ul style="list-style-type: none">• Hard, bony box protecting the brain, tight fit, with cerebrospinal fluid surrounding and further protecting the brain• Bony ridges on inner surface of skull can cause damage – lacerations/contusions around the frontal/temporal lobes and contra-coup pathology for the occipital lobe.• Exit hole (foramen magna) where brain and spinal cord meet – ‘Coning’ refers to the brain being pressed down into this hole from swelling. This is life threatening as the basic functions (eg breathing) are controlled by the brain stem, situated at the base of the brain and near the exit hole.

Workshop outline continued

Resources	Content
OH 1.7: The brain	The brain <ul style="list-style-type: none">• Comprises bundles of nerve cells and fibres, long pathways (usually cross over), the consistency of 'al dente' spaghetti or jelly;• Left and right hemispheres (control opposite side of body. Left side usually controls understanding of speech and production of speech). Different areas have different functions, lobes (frontal, temporal, parietal, occipital), brain stem, cranial nerves, cerebellum. <p>The brain is divided into areas that have special functions. Many of the things we do depend on several of these areas working together. To do this, the brain depends on networks of nerves that control the body's functions and activities.</p> <p>It should be noted that people often focus on exercise or physiotherapy for an arm or leg that doesn't work, and think the problems is with the limb, when the source of the difficulty is that messages are not being received/triggered in the brain.</p>
OH 1.8: (closed head injury) Deceleration	Mechanisms of injury (what happens to the skull and brain) The most common mechanisms of TBI are: <ul style="list-style-type: none">• acceleration/deceleration injuries (closed)
OH 1.9: Penetrating head injury	<ul style="list-style-type: none">• penetrating injuries

Workshop outline continued

Resources	Content
OH 1.10: Primary mechanisms of injury	<p>(Optional): The next two slides contain fairly technical information. Depending on the type of audience, you may choose not to present them.</p> <p>There are two types of damage from the injury: primary and secondary injuries:</p> <p>Primary injuries</p> <p>Contusions and lacerations</p> <ul style="list-style-type: none">• Occur frequently due to the bony ridges inside the skull and skull integrity• Inferior frontal and temporal contusions (bruises), lacerations of brain tissue, meninges (brain coverings) and blood vessels• Contra-coup Injury commonly caused by the brain moving inside the skull damaging frontal and occipital lobes. <p>Diffuse axonal injury (DAI)</p> <p>Acceleration/deceleration – twisting, stretching and shearing of fibres. Can't be seen on early CT scans, often shows up later as atrophy (areas of brain missing). DAI is the most important mechanism of primary brain damage; the prime cause of initial loss of consciousness and injury severity.</p> <p>Focal injury</p> <p>Penetrating head injury where brain around the injury is damaged. Remainder of the brain is not damaged unless from secondary complications.</p>

Workshop outline continued

Resources	Content
OH 1.11: Secondary mechanisms of injury	<p>Secondary injuries</p> <ul style="list-style-type: none">• Breakdown of cell products leading to damage in adjoining cells.• Haematomas (blood clots) as the result of intracranial bleeding are a common form of secondary injury.• Raised intracranial pressure that reduces blood flow to the brain. This can be caused by haematoma (see above) or oedema, which is the swelling of the blood tissue. The raised ICP can lead to a slowing of the blood flow to the brain, leading to hypoxic brain damage, that is damage to the brain due to insufficient oxygen.• Local infection, typically associated with skull fractures, that can lead to meningitis (inflammation of the meninges), cerebritis (inflammation of brain tissue) or an abscess.• Hydrocephalus, in which the ventricles become enlarged due to too much fluid or blocked drainage outlets.• Systemic failure such as reduced blood pressure, injury to the chest (pulmonary injury), or respiratory failure. <p>It should be noted that rapid retrieval and skilled early management can minimise secondary damage. This is especially important in preventing death and limiting disability, as well as preventing or minimising secondary injury. It is the reason for early retrieval work with ambulance and paramedical teams, minimising elapsed time from accident/injury to hospital.</p>

Workshop outline continued

Resources	Content
OH 1.12: Recovery process (Optional OH 1.13: Glasgow Coma Scale) (Optional OH 1.14: Post-traumatic amnesia)	Recovery and rehabilitation (20 minutes) Recovery <ul style="list-style-type: none">• Memory lost for events prior to injury is retrograde amnesia.• Duration of coma (measured on the Glasgow Coma Scale).• Post-traumatic amnesia (PTA) is the period following awakening from coma during which the person is not orientated to time, place, person, and is unable to learn, and may display disinhibition, irritable or agitated behaviour. Duration of PTA is measured until continuous memory is restored. Not everyone experiences loss of consciousness (LOC). A TBI is considered severe if PTA is > than 24 hours, very severe if PTA lasts for 1–4 weeks, and extremely severe if more than 28 days. <p>People who have suffered even a mild TBI will have a period of at least a few minutes for which they have no memory and may be dazed and confused. It should be emphasised that the time factor for individual stages of recovery is variable based on each individual injury (initial severity, primary injury, cellular damage, secondary injuries).</p> Further comments <p>Depth of coma probably reflects the degree of diffuse axonal injury. Severity of injury as measured by duration of PTA is the best predictor of long-term outcome.</p> <p>It is possible to predict length of PTA in the early stages after injury from PTA assessment measurements. (Tate RL, Perdices M, Pfaff A, Jurjevic L. (2001). Predicting duration of posttraumatic amnesia (PTA) from early PTA measurements. <i>Journal of Head Trauma Rehabilitation</i>. 16: 525–542)</p>

Workshop outline continued

Resources	Content
OH 1.15: Rehabilitation	<p>As people emerge from coma and PTA and become more lucid, they also make rapid recovery of functioning more generally, including physical recovery, language and functional abilities. The most rapid recovery is in the first 6–9 months post-injury, but after two years most of the natural recovery has plateaued. After this time, the person can still make improvement, but this will be through a process of adjustment, making optimum use of intact abilities or developing strategies to compensate for remaining disabilities.</p> <p>(Optional): As a point of interest, you may wish to talk about how the media often depicts brain injury and the emergence from coma (sleeping beauty wakes, everything is the same or even better – eg. the Sandra Bullock movie <i>While You Were Sleeping</i>, Harrison Ford movie <i>Regarding Henry</i>).</p> <p>Stages of rehabilitation</p> <p>Note that rehabilitation does not cause recovery, but helps the person make the most of recovery that occurs spontaneously. Most rehabilitation is an active learning process.</p> <p>Stage 1: The acute stage involves initial management to ensure the person is medically stable in ICU and high-dependency wards. After this, acute rehabilitation normally occurs within hospital with a strong focus on physical recovery and regaining independent living skills.</p> <p>Stage 2: Community re-settlement involves managing the transition from hospital back home. This includes return to work or study, finding alternatives where this is not possible and relearning skills for community living.</p> <p>Stage 3: Social rehabilitation is the long-term rehabilitation aimed at maintaining and enhancing the level of participation in community life that people with TBI can achieve over their lifespan (community integration).</p> <p>(Optional): Facilitators can identify local services that would fit into the three phases of rehabilitation.</p>

Workshop outline continued

Resources	Content
OH 1.16: Four categories	Impairments and outcomes <i>(20 minutes)</i> Four broad categories of long term impairments often seen after TBI <p>People after TBI may experience impairments in one or more of the following four areas.</p>
OH 1.17: Motor-sensory impairments	Motor sensory impairments <p>Most people make a good physical recovery after TBI with only 25% experiencing permanent, long-term physical impairments.</p> <p>Paralysis or decreased range of movement may be more prominent on a particular side of the body (left or right-sided weakness). Damage to the cerebellar region of the brain may result in poor motor coordination (difficulties heel/toe exercise) and tremor.</p> <p>Visual impairments are one of the most common motor-sensory impairments after TBI and often associated with changes in smell and taste. Sensory changes also occur after TBI and this can be of concern for safety, eg. unable to feel heat so can get burns from hot water in shower.</p> <p>42% of a series of 103 patients followed up in Melbourne still reported visual difficulties at five years post-injury (Olver et al. 1996).</p>
OH 1.18: Incidence of impairments	<p>However, only 3% of 175 people with TBI needed a wheelchair for mobility at two years post-TBI (Ponsford et al. 1995).</p>
OH 1.19: Communication	Communication <p>A range of communication impairments have been reported after TBI.</p> <p>Aphasia refers to the disruption in one or more of the communication skills including understanding speech, speaking, remembering names, reading, writing, and so on. Rates of aphasia ranging between 2–30% have been reported after TBI (McDonald et al. 1999).</p> <p>Dysarthria refers to communication problems following damage to the brain stem, which can result in physical problems in the production of speech, swallowing difficulties and drool control.</p> <p>Some degree of dysarthria could be found in up to 34% of people with severe TBI at five years post-injury (Olver et al. 1996).</p> <p>People with TBI can also experience impairments in social or pragmatic communication. This can result in poor ability to take turns, maintain eye contact, difficulty coming up with topics of conversation, overly familiar, disinhibited remarks, standing too close etc.</p>

Workshop outline continued

Resources	Content
OH 1.20: Cognitive impairments	<p>Cognition and behavioural/personality change</p> <p>A range of cognitive impairments have been reported after TBI.</p> <p>Attention</p> <p>Shorter span of attention, difficulties concentrating over time, poor attention to detail and distractible. Therefore, it may be difficult for someone to sit and watch a movie, or to attend to a conversation in a crowded, busy environment.</p> <p>Memory</p> <p>Memory problems can include difficulties in learning new information, forgetting information quickly, eg. appointments or future plans. Memory problems are the most commonly reported cognitive impairment after TBI.</p> <p>Other cognitive impairments can include:</p> <p>Thinking</p> <p>People may have difficulty with complex ideas, or be very rigid or perseverative in their approach (like having a piece of chewing gum on your finger and not being able to get rid of it).</p> <p>Planning and organising</p> <p>People may have a number of difficulties in this area – cooking a meal becomes a disaster because steps not done in order. Lack of self-monitoring, so hard to learn from mistakes.</p> <p>Reasoning</p> <p>People’s thinking may be very concrete. Difficulty with abstract concepts.</p>

Workshop outline continued

Resources	Content
OH 1.21: Psychosocial impairments	<p>Personality/behavioural changes</p> <p>A range of personality/behavioural changes have been reported after TBI. 60–80% of relatives will report changes of these types over periods up to 15 years post-injury. (Thomsen, 1984).</p> <p>Drive</p> <p>People appear as lethargic or inert. Everything seems to take enormous effort. Families often mistake this for laziness.</p> <p>Control</p> <p>People may be disinhibited or impulsive. Also, they may have problems with temper control.</p> <p>Emotion</p> <p>People may be unrealistically happy, or have flattened affect (e.g. not respond emotionally to either good or bad news), or maybe be labile, laughing or crying for no reason.</p> <p>Insight</p> <p>People may be unaware of their limitations or have unrealistic goals or expectations.</p> <p>Self-centredness</p> <p>People may become very self-centred and demanding, have difficulty empathising with other people's needs and points of view. Families often describe this as 'childlike' behaviour.</p>

Workshop outline continued

Resources	Content
OH 1.22: Life changes associated with TBI	Activities of daily living (ADLs) Most people with TBI have the ability to carry out ADLs. A study of 103 people with TBI in Melbourne (Olver et al. 1996) found that at five years post-injury: <ul style="list-style-type: none">• 81% independent in light domestic chores (e.g. meal preparation)• 72% in heavy domestic chores (eg gardening) and• 70% in shopping and banking. Work Rates of successful return to work vary considerably. For people with TBI with severe injuries, the Melbourne study found that only 40% of people were employed at five years post-injury (27 out of 68), (Olver et al. 1996). Leisure pursuits Many people either lose all their leisure activities or have to change activities. The Melbourne study found that at 5 years post-injury, 63% of people with TBI had had to make changes to the sort of leisure activities that they pursued, (Olver et al. 1996). Marriage or relationship A Sydney study found that at six years post-injury 55% of marriages had broken down, (Tate et al. 1989). In context of marriages, partners losing the sexual component of the relationship.

Workshop outline continued

Resources	Content
	Friendships <p>People with TBI can lose pre-injury friendships and have difficulties making new friendships. The Melbourne study found that at five years post-injury 50% of people with TBI reported that they had lost friends and become more socially isolated since the injury, (Olver et al. 1996).</p>
OH 1.23: Psychological reactions	Psychological reactions <p>People with TBI can experience a range of differing psychological reactions. This can include depression, anxiety, low self-esteem and thinking about suicide.</p> <p>Between 30–40% of people can experience periods of depression. Almost one in five people will attempt suicide after a TBI, (Simpson & Tate 2002).</p>
OH 1.24: Impact on families	Impact on family <p>The majority of people with a brain injury are discharged from the acute rehabilitation unit to return to their parents or partners. This often produces enormous changes and stress for the family unit as well as for individual family members. In the Sydney study, more than 90% of people returned home to their family, (Tate et al. 1989).</p> <p>Many families find it a rewarding experience to provide support for a family member with TBI. However in other cases it can be extremely stressful.</p> <p>Sources of stress may include family members experiencing:</p> <ul style="list-style-type: none">• having to give up work, financially worse off• increased level of conflict due to temper control problems• having to take on new roles if partner with TBI no longer able to play these roles (eg. financial managers, home maintenance, disciplinarian with children, etc.)• losing touch with their own social networks, becoming more socially isolated• grief or depression, mourning for the ‘person they knew before’ the TBI• post-traumatic stress if they witnessed or were involved in the accident that caused the injury.

Workshop outline continued

Resources	Content
OH 1.25: Service networks	<p>Services (20 minutes)</p> <p>This section highlights the involvement of a flexible and wide-ranging service network to meet specific individual and family needs. Involvement in this extensive network can improve outcomes for individuals, their families and community.</p> <p>Presenter note:</p> <p>People with TBI and their families can access a range of specialist and generic disability and mainstream services. This includes private (for profit) and non-government (not for profit) agencies; State and Commonwealth programs.</p> <p>Use OH 1.25 to illustrate the range of service types. Examples have been provided in each category. The presenter can make these examples more locally orientated prior to the workshop.</p> <p>If time permits, explore how these services can be used to support life changes after TBI. Alternatively, have participants name their agency and match the service type to the list. They could provide a summary of how their service works.</p> <p>Service networks can include:</p> <p>State peak brain injury consumer or advocacy organisations: Brain Injury Association of NSW; Carers Association of NSW.</p> <p>Rehabilitation services: Department of Health in each state; NSW BIRP; local/private hospital rehabilitation departments; private therapists.</p> <p>Vocational rehabilitaton: Commonwealth Rehabilitation Service (CRS); BTP Employment Solutions; Head 2 Work.</p> <p>Community support/case management: Home Care of NSW; NSW BIRP community case managers; private case management services; Community options programs.</p> <p>Avocational, day activity, community access, clubhouse programs: Headway – Adult Development Program; Liverpool Brain Injury Respite Program; North West Disability Services Inc (NWDS); Attendant Care Agencies (for individual paid worker support).</p> <p>Respite programs: Hunter Brain Injury Respite Options; Gemhill Cottage (NWDS).</p> <p>Support groups, Self-help groups: BIA of NSW support groups.</p>

Workshop outline continued

Resources	Content
	<p>Counselling services: Lifeline; private therapists; NSW BIRP therapists; Drug and Alcohol Counselling Services.</p> <p>Accommodation services: Aged care facilities (nursing homes); Wareemba Community Living Inc.</p> <p>Other services (eg. crisis, legal, financial etc): NSW Office of the Public Guardian; NSW Office of the Protective Commissioner; Centrelink; Commonwealth carer respite centres.</p>
HO 1.2	<p>Consumer presentation (Optional)</p> <p>Presenters can arrange for a person with a TBI to come and address the gathering, preferably someone with experience of this. They may need to help to structure their presentation, either through suggested headings, or doing the presentation in an interview format, to provide some consistency.</p> <p>Alternatively, the poem by Bernard (HO 1.2) can be distributed as a discussion starter. Ask the group to identify the range of sequelae Bernard mentions in his poem.</p> <p>Alternatively, open up the workshop for questions or discussion.</p>

Workshop outline continued

Resources	Content
HO 1.3: Summary Contacts, Resources and References	Evaluation and resources (<i>10 minutes</i>) Give out HO 1.3 (a–m) as a summary introduction to TBI and for participants' future use.
Evaluation forms	Ask them to complete the evaluation form (if utilised) Thank participants for their involvement!