| Rehabilitation Guidelines | Traumatic Brain Injury | General |

Rehabilitation Guideline for the Management of Persons with Traumatic Brain Injury

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Humanity & Inclusion
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Advancing Medical Care and Rehabilitation Education Project
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** Since January 2018, Humanity & Inclusion is **Handicap International**'s new operating name*

Rehabilitation Guideline for the Management of Persons with Traumatic Brain Injury

| General Guideline |

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Foreword

In the framework of the "Advancing Medical Care and Rehabilitation Education" project in Vietnam, and with the guidance and support of the Ministry of Health, Humanity & Inclusion (previously known as Handicap International) and its partners contribute to the strengthening of medical and rehabilitation care for persons with disabilities due to brain lesion (i.e. stroke, traumatic brain injury, cerebral palsy and spina bifida and hydrocephalus).

In order to provide rehabilitation specialists (rehabilitation doctors, nurses, therapists...) with the tools they need to properly support persons with disabilities, the project, with the financial support of the United States Agency for International Development (USAID), has developed up-to-date and comprehensive "Rehabilitation Guidelines".

With the assistance of international experts and Vietnamese specialists, these guidelines have been developed based on the latest available scientific evidences or, where evidences are still lacking, internationally-recognized best-practices. The constant involvement and support received from Vietnamese medical and rehabilitation professionals in the development process ensured contextualization and ownership of these guidelines as they brought in not only their technical expertise but also their knowledge and experiences on the Vietnamese context and the local needs and resources.

Two types of documents have been developed. Besides the General Rehabilitation Guidelines, which provide wide-ranging recommendations on care provision and quality principles, more "Technical" Guidelines have also been produced for each of the targeted conditions. These technical guidelines are specific to one "type" of care (physiotherapy, occupational therapy, speech and language therapy; and for some conditions medical and nursing care as well). They provide rehabilitation professionals with more specific, detailed technical guidance, allowing them to better understand their specific role in the general rehabilitation approach and the provision of multi-disciplinary, person-centred and evidence-based care.

The result of this process is a comprehensive set of guidelines that we hope will be widely spread and support all rehabilitation actors in providing better and higher quality care to the people in need.

The present English version of the Rehabilitation Guidelines has been developed with valued support from the Vietnamese Ministry of Health. It is our hope that the Vietnamese version of the respective guidelines will be officially endorsed by the Ministry as national guidelines for rehabilitation care of persons with brain lesions.

On Behalf of Humanity & Inclusion,
Didier Demey
Country Director

Acknowledgments

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We also would like to extend our gratitude to the **United States Agency for International Development** (USAID) for their guidance and financial support, without which the present document could not have been produced.

Furthermore, Humanity & Inclusion would like to thank **David Lowen** for his support in developing these guidelines. His commitment towards strengthening medical and rehabilitation care in Vietnam is greatly appreciated.

Finally, we would like to acknowledge and thank all the **national experts and medical and rehabilitation professionals** who, through their participation to the guidelines development and review workshops have greatly contributed to the development of these guidelines. In particular, we would like to recognize the members of the Guidelines Development Committee:

Prof. Trần Trọng Hải, Prof. Cao Minh Châu, Prof. Hà Hoàng Kiệm, Associated Prof. Lương Tuấn Khanh, Associated Prof. Phạm Văn Minh, Associated Prof. Nguyễn Trọng Lưu, Dr. Đinh Quang Thanh, Dr. Nguyễn Đăng Khoa, Dr. Nguyễn Thị Kim Liên, Dr. Hà Chân Nhân, Lê Thanh Vân (MSc), Dr. Phạm Thị Cẩm Hưng, Dr. Ngân Thị Hồng Anh and Dr. Nguyễn Thanh Huyền.

List of Abbreviations

ABC	Airways, breathing and circulation
ADL	Activities of daily living
BP	Blood pressure
CAT	Computed axial tomography
FEES	Fibreoptic Endoscopic Evaluation of Swallowing
FIM	Functional independence measure
FPS	Faces pain scale
GCS	Glasgow coma scale
GP	General Practitioner
GUSS	Gugging Swallowing Screen
HR	Heart rate
ICF	International classification of functioning, disability and health
ICU	Intensive care unit
LOC	Loss of consciousness
MAS	Modified Ashworth scale
MASA	Mann Assessment of Swallowing Ability
MDT	Multidisciplinary team
MoH	Ministry of health
MRI	Magnetic resonance imaging
NGO	Non-governmental organisation
NRS	Numeric rating scale
OT	Occupational therapy / Occupational therapist
PDOC	Prolonged disorders of consciousness
PT	Physiotherapy / Physiotherapist
RR	Respiration rate
SLT	Speech and language therapy / Speech and language therapist
TBI	Traumatic brain injury
VAS	Visual analogue scale
VDS	Verbal descriptor scale
WHO	World health organisation

1. Introduction

1.1. The Need for Guidelines

There are high demands for traumatic brain injury (TBI) rehabilitation. Most TBI survivors are sent home from hospital and do not receive proper rehabilitation. Intensive care units (ICUs) become overloaded especially with those TBI survivors who persist in some of the prolonged disorder of consciousness states. Some of these may be discharged home due to lack of financial support.[1]

One of the objectives of the Ministry of Health (MoH) is to "Improve and develop the network of rehabilitation establishments, improve the quality of rehabilitation services; strengthen disability prevention, early detection and intervention, and improve the life quality of persons with disabilities so for persons with disabilities to be fully integrated and participate equally in the society, and to effectively contribute to development of the community where they live in." (MoH, 2014)

Guidance to realise the desired improvement of rehabilitation services is needed. Guidelines for rehabilitation care for main injuries and health conditions do exist in Vietnam and have been validated by the Ministry of Health in 2014. These are made of two main resource documents:

- "General Guidelines for Rehabilitation Care" describing the needs and procedures to be followed in regard to diagnosis, rehabilitation care and monitoring, and
- "Specialized Rehabilitation Procedures", a guide that provides technical description of available rehabilitation techniques as well as their fields of application, indications, contra-indications and expected outcomes.

Such guidelines exist also for 'TBI'. These MoH guidelines form a rather strong basis for the development of *state of the art* general and specific guidelines, based on new research findings and compatible with international evidence-based rehabilitation guidelines, and where opportune adapted to the Vietnamese context.

A broad group of national and international experts has contributed in the first semester of 2017 to the production of updated General and Specific guidelines for TBI.

The present **General Rehabilitation Guidelines for TBI** provide general recommendations and guidance on type of rehabilitation care to be provided as well as "cross-cutting" recommendations in regard of requirements for a system organization, multidisciplinary and comprehensive care, person-centred care, care pathway and referrals, family support and involvement, discharge and follow-up, community reintegration and social participation.

[1] *TBI guidelines workshop, Hanoi Feb 2017*

1.2. Who Are the Guidelines For

The guideline will be useful to any professional with an interest in TBI rehabilitation including doctors, neurologists, neurosurgeons, rehabilitation doctors, nurses, physiotherapists, occupational therapists, speech and language therapists, dieticians, orthotists, pharmacists, psychologists, specialists in public health, social workers, community workers and TBI survivors and their family and carers.

1.3. Aim of the Guideline

The guidelines are meant to be a resource guide for the rehabilitation management of those people in Vietnam who are affected by TBI. The guidelines are not prescriptive. They contain various ideas for management but, depending on the local situation, not all of the activities will have to be implemented. In some cases activities should be adjusted to local circumstances.

They are also intended to not only be a practical resource but an educational tool to assist all health staff and the public as to what is necessary for facilitating effective outcomes in TBI recovery. They may also act as an awareness tool for all staff as to roles and functions of those people who are concerned with TBI rehabilitation. They can be simplified in order to adapt to low level trained staff and for the TBI survivor and family themselves.

Finally, the guidelines can help to bridge the gaps between acute and rehabilitation services especially in terms of guiding referral and communication systems between the two sectors. They can also highlight the gaps and needs in the workforce for specific staff (e.g. fully qualified occupational therapists (OT) and speech and language therapists (SLT) as well as give target recommendations for the coming 5-10 years in how to improve the primary prevention and quality of rehabilitation, including secondary prevention, of TBI in Vietnam.

1.4. Statement of Intent

The guidelines are not intended to serve as a standard of medical care. Standards of care are determined on the basis of all clinical data available for an individual case and are subject to change as scientific knowledge and technology advance and patterns of care evolve. Adherence to the guidelines will not ensure a successful outcome in every case, the ultimate judgment regarding a particular clinical procedure or treatment plan must be made in light of the clinical data presented by the patient and diagnostic and treatment options available. However, it is advised that significant departures from these guidelines should be fully documented in the patient's case notes at the time the relevant decision is taken.

1.5. Levels of Evidence

The following recommendations were highlighted by the guideline development group as key clinical recommendations that should be prioritised for implementation in Vietnam. The grade attributed to a recommendation relates to the strength of the supporting evidence on which the recommendation is based. It does not reflect the clinical importance of the recommendation.

GRADE	
A	Body of evidence can be trusted to guide practice
B	Body of evidence can be trusted to guide practice in most situations
C	Body of evidence provides some support for recommendations but care should be taken in its application
D	Body of evidence is weak and recommendation must be applied with caution
GPP	Good Practice Point - Recommended best practice based on clinical experience and expert opinion

1.6. Monitoring and Service Delivery

Capacity to evaluate the quality of health care delivery is essential for informing clinical practice and improving patient outcomes. It is important and crucial to assess, monitor and evaluate key performance indicators and outcome measures in order to demonstrate effectiveness and efficiencies of TBI rehabilitation services.

Data collection should be:

- linked to recommendations in the guidelines and measure adherence to evidence-based care
- routine and ongoing
- linked to benchmarking and become part of an evidence-based quality improvement cycle

Data elements should reflect the essential aspects of rehabilitation care for TBI survivors and include measures of:

- Processes of care
- Functional change
- Participation in life activities and the community
- Quality of life
- Patient and family satisfaction

Essential aspects of rehabilitation care for TBI survivors:

- Early diagnosis
- Early intervention
- Assessment and management of the impairments

- Assessment of functional skills and maximising abilities (cognitive, motor, communication, self-care)
- Assessment and management of associated conditions
- Prescription and provision of appropriate assistive and adaptive technology

1.7. TBI Definition

TBI is an acute brain injury resulting from mechanical energy to the head from external physical forces. (New Zealand Guidelines Group, 2006)
Operational criteria for clinical identification include **one** or **more** of the following:

- Confusion or disorientation
- Loss of consciousness
- Post-traumatic amnesia
- Other neurological abnormalities, such as focal neurological signs, seizure and/or intracranial lesion.

These manifestations of TBI must not be due to drugs, alcohol or medications, caused by other injuries or treatment for other injuries (e.g., systemic injuries, facial injuries or intubation), or caused by other problems (e.g., psychological trauma, language barrier or co-existing medical conditions). (New Zealand Guidelines Group, 2006; *Scottish Intercollegiate Guidelines Network* [SIGN], 2013)

TBI can occur in the context of penetrating craniocerebral injuries but in this situation, focal neurological deficits are generally more important than any diffuse element.

1.8. TBI Epidemiology

The numbers of people with any form of TBI is difficult to ascertain due to a universal difficulty in coding of such conditions in hospitals. Many people with a mild TBI often don't seek medical attention. It is not currently possible to identify how many people, who visit an Emergency Department or general practitioner with an injury that is coded as a head injury, actually have a TBI (New Zealand Guidelines Group, 2006). Systematic review of the literature by the WHO Collaborating Centre Task Force on Mild Traumatic Brain Injury concluded that a 'true' population-based rate of mild TBI would be more than 600 cases per 100,000 per year (Cassidy JD et al, 2004). That amounts to more than 560.000 cases per year in Vietnam.

Road traffic injuries are estimated to be the eighth leading cause of death globally (approximately 1.24 million people die every year on the world's roads), with an impact similar to that caused by many communicable diseases, such as malaria (WHO, 2013). According to the WHO road traffic

injuries in Vietnam (4.1%) are the fourth leading cause of death annually, killing more than 21.000 people in 2012. (WHO, 2015)

Traumatic brain injury is one of the main causes of brain death in the intensive care units and the main reasons for Severe TBI are road traffic accidents (motorbike accidents) and falls from height. (Rzheutskaya, 2012).

According to Peden et al road traffic injuries in Vietnam are now the leading cause of fatal and non-fatal injuries. Motorcycles account for approximately 95% of the total number of vehicles in Vietnam and so motorcycle users in Vietnam are most vulnerable to road traffic injuries. According to the World Health Organization, traumatic brain injury (TBI) is the main cause of fatal and non-fatal injury for motorcycle users in Vietnam. No hospital-based or community epidemiological data on TBI in motorcycle users are available in Vietnam. However, it is likely that the burden caused by TBI to the country is significant, given the very low use of motorcycle helmets and the dominance of motorcycles as the main form of transport (Peden M, Scurfield R, Sleet D, Mohan D, Hyder AA, Jarawan E, Mathers C, 2004).

Therefore, the establishment of a national road traffic accident register providing information on the road traffic related injuries would support determination of the incidence and prevalence TBI in Vietnam. It would also enable outcomes to be monitored and evaluated on a population level and increase possibilities for adequate preventive measures.

1.9. Primary Prevention of TBI

Mandatory motorcycle helmet use is regarded as the single most effective approach for the prevention of TBI among motorcycle users in both developed and developing countries]. Wearing a helmet reduces the incidence, severity and mortality rates of TBI in motorcycle accidents, ranging from 20% to 45% reduction of fatal and serious head injury (Servadei F, Begliomini C, Gardini E, Giustini M, Taggi F, Kraus J. 2003). Although the use of helmets in Vietnam has steadily increased over the last decade, not all helmets are of good quality and not all wearers use the helmet correctly.

2. Pathways and Principles of Rehabilitation

2.1. Introduction

WHO describes rehabilitation as "a set of measures that assist individuals who experience, or are likely to experience, disability [resulting from impairment, regardless of when it occurred (congenital, early or late)] to achieve and maintain optimal functioning in interaction with their environments". "Rehabilitation measures target body functions and structures, activities and participation, environmental factors, and personal factors." (WHO, 2011)

Rehabilitation can include a variety of activities in various sectors. In the health sector, rehabilitation addresses chronic, or long-term, conditions and impairments with the goal of reversing or limiting their impact. Services may include speech therapy, physiotherapy, occupational therapy, the provision of assistive devices, and special surgeries to correct deformities and other types of impairment.

Despite improvements in mortality and morbidity, people with TBI need access to effective rehabilitation services. TBI rehabilitation is a multidimensional process, which is designed to facilitate restoration of, or adaptation to the loss of, physiological or psychological function when reversal of the underlying pathological process is incomplete. Rehabilitation aims to enhance functional activities and participation in society and thus improve quality of life.
The process of rehabilitation can be interrupted at any stage by previous disability, co-morbidities and complications of the TBI itself.

Key aspects of rehabilitation care include:

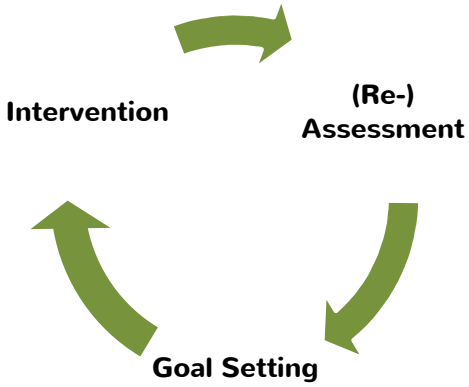
- Multidisciplinary screening and assessment
- Identification of functional difficulties and their measurement
- Treatment planning through goal setting
- Delivery of interventions which may either effect change or support the person in managing persisting change
- Evaluation of effectiveness of the intervention
- Reporting

2.2. Rehabilitation Cycle

The conventional approach to rehabilitation is a cyclical process:

2.2.1. Assessment

- The patient is assessed and needs are identified and quantified;



2.2.2. Goal setting

- On the basis of the assessment the goals for rehabilitation of the patient are defined. These can be short term, medium term and long term goals;
- A plan to reach these goals is formulated

2.2.3. Intervention

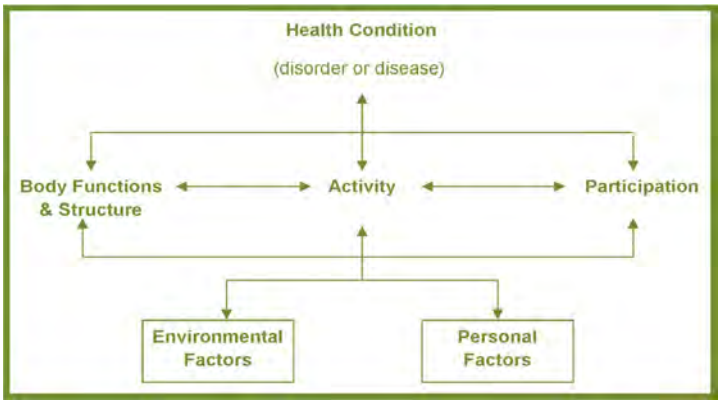
- Giving relevant treatment in order to achieve the goals;

2.2.4. Re-Assessment

- Progress is assessed as to whether the intervention has been effective in order to achieve the agreed goals. If not, then goals and consequent intervention can be revisited.

2.3. ICF

Rehabilitation can be summarised in the ICF (International Classification of Functioning, Disability and Health) model developed by WHO (2001). The ICF conceptualises a person's level of functioning as a dynamic interaction between her or his health condition, environmental factors, and personal factors. It is a biopsychosocial model, based on an integration of the social and medical models of disability. All components of disability are important and any one may



WHO (2001). ICF Model

interact with another. Environmental factors must be taken into consideration as they affect everything and may need to be changed.

2.4. Person Centred and Family Centred Care

Best practice service delivery when working with TBI survivors and their families is to adopt person-centred and family-centred approaches.

Treatment and care should take into account individual needs and preferences. Patients should have the opportunity to make informed decisions about their care and treatment, in partnership with their healthcare professionals. If the patient agrees, families and carers should have the opportunity to be involved in decisions about treatment and care. Families and carers should also be given the information and support they need (NICE, 2014)

A person-centred approach should underpin the goal setting process. Treatment goals are more likely to be achieved if patients are involved in setting them. Moreover, there is also evidence that this goal setting process has positive therapeutic value in encouraging the patients to reach their goals. (Hurn et al, 2006)

Person-centred practice places the individual in the centre and emphasises building partnerships with TBI survivors and their families in which they are valued members of the rehabilitation team. It emphasises four aspects:

- Each individual is unique
- Each individual is an expert in their own lives
- Partnerships are key
- There is a focus on an individual's strengths

Person centred practice situates power and control with the person and their family. It tailors supports to achieve the person's goals and future and aims for social inclusion, valued roles, and community participation.

Family-centred practice adopts a similar philosophy to person-centred practice and goes further to recognise that families and carers are pivotal decision makers when working with TBI survivors. Family-centred practice is made up of a set of values, attitudes, and approaches to services for TBI survivors and their families. The family works with service providers to make informed decisions about the services and supports the TBI survivor and family receive. In a family-centred approach, the strengths and needs of all family members and carers are considered. The family defines the priorities of the intervention and services. It is based on the premises that families know the TBI survivor best, that optimal recovery outcomes occur within a supportive family and community environment and that each family is unique. Service provides support and respect each family's capacity and resources. Family capacity includes the knowledge and skills the family requires to support the TBI survivor's needs and well-being.

Capacity is the amount of physical, emotional and spiritual energy necessary to support the TBI survivor, and it directly influences the sense of competency a family member experiences when caring for a TBI survivor.

Recommendation -
> Rehabilitation services should adopt the philosophies of person-centred and family-centred practice

2.5. Gender Equality in Health

Gender equality in health means that women and men, across the life-course and in all their diversity, have the same conditions and opportunities to realize their full rights and potential to be healthy, contribute to health development and benefit from the results. (WHO, 2015)

It is recommended to disaggregate data and conduct gender analyses to identify sex and gender-based differences in health risks and opportunities and to design appropriate health interventions.

Addressing gender inequality improves access to and benefits from health services. It is recommended to develop gender-responsive health programs which are appropriately implemented and are beneficial for men and women. It will assist TBI prevention and care initiatives meet its strategic objectives and targets to reduce inequalities in health and in making a difference to the lives of women and men by improving the quality of services provided in relation to the prevention, diagnosis and treatment of TBI and improve patient outcomes.

2.6. Organization of Rehabilitation Services

The main issues in planning services for TBI patients are:

- Organization of hospital care (National, Provincial, District, Rehabilitation and Commune Health Centre)
- Deciding hospital or home based care
- Discharge and post-discharge services (including an organized referral system)
- Ongoing rehabilitation and follow up (including specific needs of younger people). (Scottish Intercollegiate Guidelines Network [SIGN], 2008)

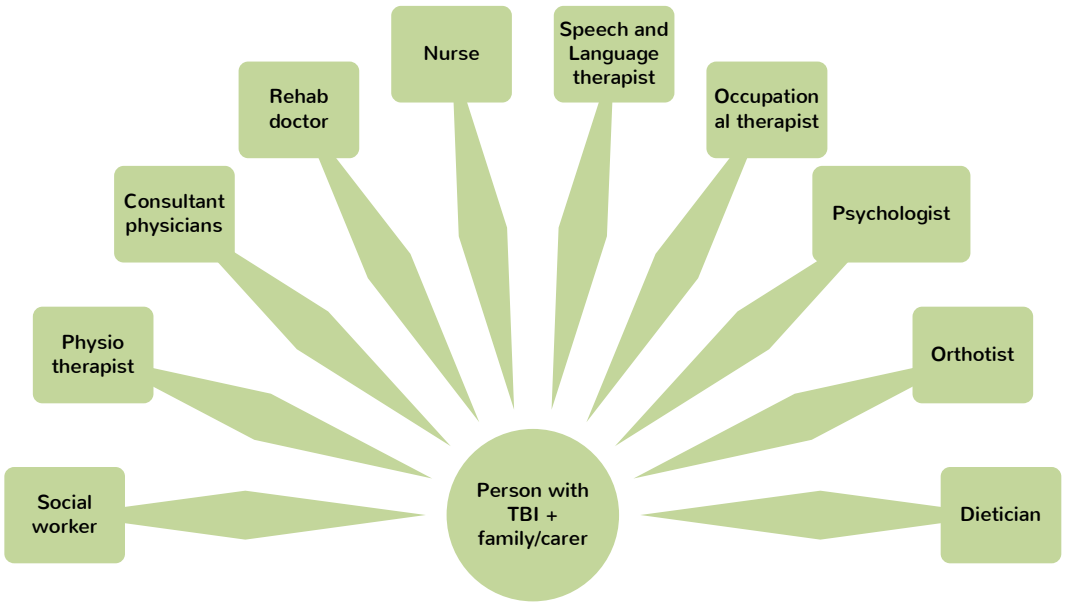
Rehabilitation occurs in both the acute setting; i.e. person with a TBI is admitted to a hospital either directly (self-referral) or via a referral from a Commune Health centre and in a Home /community rehabilitation setting. Examples of a community setting can be a Provincial and Rehabilitation Hospital, an NGO or private clinic.

2.7. Multidisciplinary Approach

A central aspect of TBI recovery is through a well-coordinated team approach. This can be achieved by a specialised multidisciplinary team of health professionals [A].

This team involves the use of integrated medical, nursing and allied health skills and can involve social, educational and vocational services to provide individual assessment, treatment, regular review, discharge planning and follow up. As a team the following are necessary:

- Regular multidisciplinary meetings and case conferences to encourage coordination and updates of information
- Ensuring documentation about specific care of the TBI survivor is clear and accessible to all of the team
- Specific liaison with other professionals, teaching staff, the TBI survivor and family/carer
- Setting and meeting appropriate goals
- Supporting the TBI survivor and family/carer by encouraging their involvement in all aspects of care
- Liaison with other healthcare professionals through networks and specific training in the management of TBI



Multidisciplinary team approaches utilise the skills and experience of individuals from different disciplines, with each discipline approaching the patient from their own perspective in separate, individual consultations.

An interdisciplinary team approach integrates separate discipline approaches into a single consultation. That is, the patient-history taking, assessment, diagnosis, intervention and short- and long-term management goals are conducted by the team, together with the patient, at the

one time. The patient is intimately involved in any discussions regarding their condition or prognosis and the plans about their care. (Jessup, 2007)

2.8. The Concept of TBI Rehabilitation

The concept of TBI rehabilitation is a "process of active change by which a person who has become disabled acquires the knowledge and skills needed for optimal physical, psychological and social functioning." The British Society of Rehabilitation Medicine describe the rehabilitation service as: "the use of all means to minimise the impact of disabling conditions and to assist disabled people to achieve their desired level of autonomy and participation in society." (British Society of Rehabilitation Medicine [BSRM], 2003)

This means an extra challenge to the Vietnamese society. Most TBI survivors are adolescents and young adults. If they are to achieve a desired level of autonomy and participation extra attention has to be paid to e.g. vocational training.

Rehabilitation starts as soon as possible, even in the acute stages of intensive care in hospital. Interventions at this stage focus on reducing impairment and preventing secondary complications such as contractures, malnutrition, pressure sores and pneumonia.

Rehabilitation in TBI is complex. The aim of physical rehabilitation is to aid the recovery of normal functioning as far as possible, and to provide compensatory strategies to minimise the negative impact of the symptoms that persist (ie, to increase independence through the facilitation of motor control and skills).

Rehabilitation for people with clinically significant TBI may differ from rehabilitation in general due to the influence of executive deficits on the rehabilitation process.

Executive deficits refer to limitations associated with primarily frontal lobe damage, which influences attention and concentration, initiation and goal direction, judgement and perception, learning and memory, speed of information processing and communication and other cognitive skills, such as planning and organisation.

They will also have cognitive and physical fatigue plus may be confused about their own lack of ability, unawareness of deficits, active denial of the effects of the injury or some combination of these. They also may be restless, distractible and disorganised. Their mood may be exaggerated with ready laughter or tears, and they may be swift to argue and difficult to reason with.

There are five principles that unite the implementation of rehabilitation strategies across therapies (Medical, Social, Cognitive and Psychological) (Vogenthaler, 1987):

- They should begin as early after the injury as is feasible. Research has shown that doing so enhances eventual outcome.

- Services should be provided in a holistic manner.
- Services should be provided in an interdisciplinary manner.
- Various therapies must focus on both the micro deficits and the macro deficits simultaneously. While it is important to remediate specific cognitive problems within a laboratory/treatment setting, it is equally important to focus on the client's own real-world circumstances, (e.g. daily living activities).
- The design and implementation of the various therapeutic regimens should be a comprehensive, systematic, interdisciplinary evaluation process.

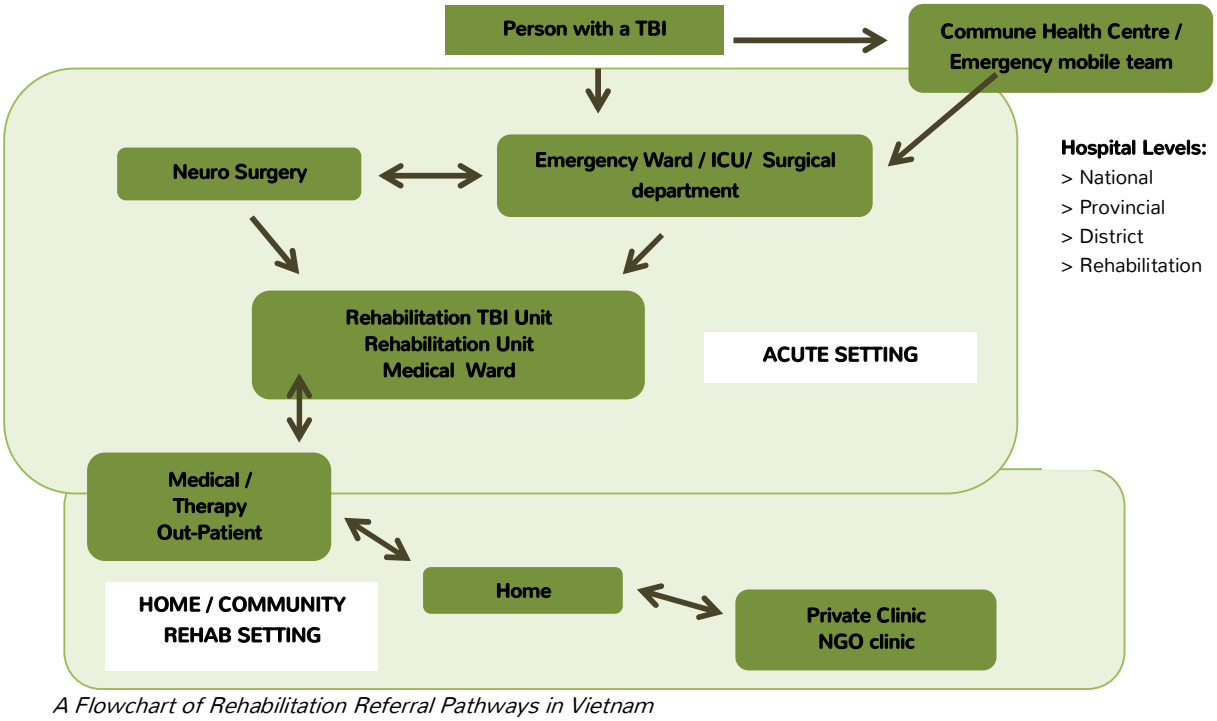
As the person starts to recover, intensive residential rehabilitation may be required to make the successful transition between a residential environment and home.

Neurological recovery following TBI can occur over an extended period of many months or years. Fundamental to rehabilitation services is the appreciation that different people need different input at different stages in their recovery, and that sometimes lifelong support may be required. They will also recover at different rates. Some may need hospitalization for many months.
The carers of people with significant TBI may also require support over long periods of time.

2.9. Referral Pathways

2.9.1. The Acute Setting

The referral pathway for TBI survivors is similar to that of the Stroke survivor:



A Flowchart of Rehabilitation Referral Pathways in Vietnam

2.9.2 Referral to a Hospital Emergency Department

Community health services, e.g. general practitioners (GPs), should refer patients who have sustained a head injury to a hospital emergency department, if any of the following are present (NICE, 2014; SIGN, 2008) [B]:

- Glasgow Coma Scale (GCS) < 15 on initial assessment
- Any loss of consciousness as a result of the injury
- Any focal neurological deficit since the injury
- Any suspicion of a skull fracture or penetrating head injury since the injury
- Amnesia for events before or after the injury
- Persistent headache since the injury
- Any vomiting episodes since the injury
- Any seizure since the injury
- Any previous brain surgery
- A high-energy head injury
- Any history of bleeding or clotting disorders
- Current anticoagulant therapy such as warfarin
- Current drug or alcohol intoxication

2.9.3 The Emergency Department

(I) Screening and Assessment

There are four important reasons for undertaking an Emergency Department assessment (New Zealand Guidelines Group, 2006) [A]:

1. Identifying actual or potential hypotension and/or hypoxia, which if untreated will magnify TBI effects.
2. Identifying acute complications of TBI that may require intervention, particularly bleeding inside the skull and/or brain.
3. Identifying other injuries that may require urgent management, including injuries to the cervical spine.
4. Estimating the severity of any injury to the brain that has implications for subsequent management and follow-up.

Regarding number 3. At the initial stage it is unsure if there is any involvement of the cervical spine hence it is necessary to attempt full cervical spine immobilisation for patients who have sustained a head injury and present with any of the following risk factors unless other factors prevent this:

- GCS[2] < 15 on initial assessment by the healthcare professional.
- Neck pain or tenderness.
- Focal neurological deficit.

[2] *Glasgow Coma Scale (GCS)* http://www.strokecenter.org/wp-content/uploads/2011/08/glasgow_coma.pdf

- Paraesthesia in the extremities.
- Any other clinical suspicion of cervical spine injury.

A trained member of staff should assess all patients presenting to an emergency department with a head injury within a maximum of 15 minutes of arrival at hospital.
Part of this assessment should establish whether they are high risk or low risk for clinically important brain injury and/or cervical spine injury.

Regarding number 4. Estimating the severity of any injury to the brain that has implications for subsequent management and follow-up.

The most commonly used criterion for classifying severity has been the Glasgow Coma Scale (GCS) score. This is usually used for assessment when a person with suspected TBI presents to an Emergency Department or general practitioner[C]. It can be defined as mild, moderate or severe according to the GCS score.

Another useful indicator of the severity of a TBI is post-traumatic amnesia (PTA), as it is strongly related to outcomes. Also used is the duration of loss of consciousness (LOC).

Severity of Injury	GCS Score	Duration of PTA	Duration of LOC
Mild	13-15	< 1 hour	< 30 minutes
Moderate	9-12	30 minutes – 24 hours	1 – 24 hours
Severe	3-8	> 1 day	> 24 hours

Levels of TBI severity (Rao et al, 2000)

In people with a Glasgow Coma Scale score of 8 or less, there should be early involvement of an anaesthetist, emergency physician or critical care physician to provide appropriate airway management and assist with resuscitation

All medical and nursing staff involved in the care of patients with a head injury should be trained and competent in the use and recording of the GCS.

The GCS should not be used in isolation and other parameters should be considered along with it, such as:

- Pupil size and reactivity
- Limb movements
- Respiratory rate and oxygen saturation
- Heart rate
- Blood pressure
- Temperature
- Unusual behaviour or temperament or speech impairment.

Family members and friends should be used as a source of information (SIGN, 2008).

If there is deterioration (NICE, 2014) - Any of the following examples of neurological deterioration should prompt urgent reappraisal by the supervising doctor[GPP]:

- Development of agitation or abnormal behaviour.
- A sustained (that is, for at least 30 minutes) drop of 1 point in GCS score (greater weight should be given to a drop of 1 point in the motor response score of the GCS).
- Any drop of 3 or more points in the eye-opening or verbal response scores of the GCS, or 2 or more points in the motor response score.
- Development of severe or increasing headache or persisting vomiting.
- New or evolving neurological symptoms or signs such as pupil inequality or asymmetry of limb or facial movement.

(II) Initial Treatment

Initially airways, breathing and circulation (ABC) should be stabilised before attention to other injuries[GPP]. The primary investigation of choice for the detection of clinically significant acute complications of traumatic brain injury is CT imaging of the head. For clinicians in rural centres with limited access to CT, it can be difficult to weigh up the pros and cons of transfer for a CT scan, when the risks of a complication of TBI are fairly low versus the very real difficulties of managing such a complication at a distance from a neurosurgical centre. In some situations, observation for 24 hours rather than CT scan is a reasonable compromise. (New Zealand Guidelines Group, 2006) [A].

Minimum documented neurological observations should be:

- Glasgow Coma Scale score
- Pupil size and reactivity
- Limb movements
- Respiratory rate
- Heart rate
- Blood pressure
- Temperature.

Observations should be performed and recorded every 15 minutes, or more frequently in some cases, until the person has achieved a Glasgow Coma Scale score of 15 on two consecutive occasions.

Early rehabilitative intervention in clinically significant TBI improves outcomes. Therefore, rehabilitation should start as soon as possible (New Zealand Guidelines Group, 2006) [A].

See also the Rehabilitation Risk Assessment (Annex 1).

Many of the symptoms of TBI overlap with other conditions e.g. physical, psychological and psychiatric. It is important to attribute symptoms correctly to TBI or other medical conditions and to identify and treat comorbid conditions in order to develop an effective TBI rehabilitation plan.

When TBI is sustained in childhood, neuropsychological and other assessments may need to be repeated several times as the child matures to adulthood.

The following will not be covered in these guidelines:

- Imaging criteria
- Medical intervention at this sub-acute level i.e. in the Emergency Department including intubation and ventilation
- Referral to and intervention at Neuro-Surgery level
- Paediatric TBI intervention at the sub-acute level

For further information, refer to relevant medical literature.

2.9.4 The Acute Unit/ Rehabilitation Unit

After the Emergency Department there are different types of residential service to which people with TBI may be referred for rehabilitation:

- Hospital inpatient rehabilitation
- A secure facility to help the patient not harm themselves or others
- A residential facility replicating a typical environment: ie a need for 24-hour environmental manipulation that promotes rehabilitation, such as an ordered household; ie, support for executive dysfunction issues with managed lighting, noise, visitors and communication, support to complete everyday tasks and establish and maintain a routine and supported reduction of assistance towards independence
- A need for preparation for independent living, including gradual support to take over all the tasks for independence
- A requirement for services that are not normally available in a typical environment (eg, percutaneous endoscopic gastrostomy feeding, wheelchair access, meals prepared, ongoing assistance with everyday activities)

2.9.5 Discharge from Hospital

- "Patients presenting with head injury will preferably not be discharged until they have achieved GCS equal to 15, or normal consciousness in infants and young children as assessed by the paediatric version of the GCS.
- All patients with any degree of head injury should only be transferred to their home if there are appropriate support structures for their safe transfer and subsequent care and it is certain that there is somebody suitable at home to supervise the patient. Discharge patients with no carer at home only if suitable supervision arrangements have been organised, or when the risk of late complications is deemed negligible.
- People with any degree of suspected traumatic brain injury with no carer at home should be discharged only when there is negligible risk of late complications, or when suitable supervision arrangements have been organised.

- All people discharged from hospital after a TBI should have had their general practitioner notified either before or at the point of discharge, with details of any residual impairments and details of the planned follow-up.
- Before discharge is considered for people who have had a clinically significant TBI, an assessment of the need for immediate inpatient or outpatient rehabilitation must be undertaken. People who require post-acute inpatient care should be transferred to a specialist rehabilitation unit as soon as they are medically stable and able to participate in rehabilitation. " (New Zealand Guidelines Group, 2006)

- Hospital services should have a protocol, locally negotiated, to ensure that before discharge occurs:
    - Patients and carers are prepared, and have been fully involved in planning discharge
    - General practitioners, primary healthcare teams and social services departments (adult services) are all informed before, or at the time of discharge
    - All equipment and support services necessary for a safe discharge are in place[c]
    - Any continuing specialist treatment required will be provided without delay by an Appropriate coordinated, specialist multidisciplinary service
    - Patients and carers are given information about and offered contact with appropriate statutory and voluntary agencies.
    - Patients being discharged who remain dependent in some personal activities (eg dressing, toileting) should have access to, where appropriate, a transition package of: pre-discharge visits (e.g. at weekends), individual training and education for their carers, telephone counselling support for 3 months.
- Before discharge of a patient who remains dependent in some activities, the patient's home environment should be assessed and optimised, usually by a home visit by an occupational therapist.
- Hospitals should have clear systems in place to ensure that:
    - Patients and their families are involved in planning for discharge and carers receive training in care, for example, moving, handling and dressing
    - Patients and carers feel adequately prepared and supported to carry out care
    - Appropriate agencies (including local doctors, local Provincial Hospitals) are informed before discharge and an agreed health and social care plan is in place,
    - Essential equipment has been delivered (including wheelchairs if needed), and patients know who to contact if difficulties arise.
- Carers of patients unable to transfer independently should receive training in moving and handling and the use of any equipment provided until they are demonstrably able to transfer and position the patient safely in the home environment.
- All patients should continue to have access to rehabilitation services after leaving hospital, and should know how to contact them.
- Family/Carers of TBI survivors should be provided with:
    - A named point of contact for TBI information
    - Written information about the patient's diagnosis and management plan

- Sufficient practical training to enable them to provide safe care.

- Health and social service organisations should provide a single point of access to all services for support and advice run by and/or for disabled people.

2.9.6 Home/Community Rehabilitation Setting (Post Discharge Medical and Rehabilitation Follow –Up)

Apart from a medical follow up TBI survivors will need ongoing rehabilitation therapy for discharge from the acute setting.

After transfer of care from hospital, TBI survivors should be followed up within 72 hours by the MDT for assessment of patient-identified needs and the development of shared management (including treatment) plans (NICE, 2014).

Advice on how and where to access rehabilitation services needs to be explained and given to the TBI survivor and family/carer prior to discharge (see information pack under discharge from acute care). If possible a specific rehabilitation setting should be informed about the imminent discharge to assist with follow up of the TBI survivor.

Post-acute setting discharge therapy should be provided by a qualified rehabilitation therapist in either of 2 settings:

(I) Centre based therapy

- Centre based therapy can be in a local hospital (e.g. Rehabilitation Hospital, Rehabilitation Unit) therapy out-patient department or community facility (e.g. Private clinic or local NGO clinic).
- Therapy is either residential or as an out-patient service depending on access (e.g. financial, geography) and availability of service.
- Rehabilitation may be provided by a qualified team of therapists. Encouragement is for the TBI survivor to be pro-active in rehabilitation in order to maximise recovery and function. Participation involving the TBI survivor and family/carer is essential to ensure that exercises can be continued at home and that functional strategies to facilitate independence in the home and community can be maximised.

(II) Home based Therapy

- Home therapy enables a more targeted therapy to the TBI survivor in terms of highlighting and solving practical and functional problems the TBI survivor and their family/carer may have within the home and community setting.
- Home based strategies can be worked out both using what local resources may be available and what adaptations to the home are required.
- If available a low level trained community worker / Rehabilitation Assistant could also accompany the therapist in order to help continue and monitor any exercises which can be performed when the therapist is not able to directly attend to the TBI survivor.

2.9.7 When there is no access to rehabilitation services

Due to transport, geography and personal reasons, both centre-based and formal home based rehabilitation may not be realistic, therefore it is vital that an individualized home exercise programme (with written information/drawings) relating to the TBI survivor's physical, functional, cognitive and speech impairments be given prior to discharge from the acute hospital as well as advice on return to social and community activities.

These can be followed up by low level trained community workers who can monitor and refer in case any secondary complications are identified.

3. The Rehabilitation Cycle

3.1 Screening and Assessment

In the above chapter 2.8 the importance of an adequate screening and assessment process has been underscored. Early referral to an emergency department is therefore essential.

Assessments of the physical functioning of people with TBI should include assessment for the following (New Zealand Guidelines Group, 2006):

- Motor deficits:
  - Muscle weakness and paralysis
  - Abnormal muscle tone (spasticity)
  - Deficits in joint range of motion
  - Ataxia/reduced coordination
- Sensory deficits:
  - Visual/hearing loss
- Symptoms, e.g., headache, fatigue, pain
- Dysphagia
- Seizures
- Functional mobility:
  - Changing and maintaining body position
  - Carrying, moving and handling objects
  - Walking and moving (including, but not limited to, crawling, climbing, running,
  - Jumping and swimming)
  - Mobilising with the aid of assistive technology
- Mental status and communication

3.2 Goal Setting

The MDT should:

- After their respective assessment of the TBI survivor, have rehabilitation goals set. These must:
  - Be meaningful and relevant to the TBI survivor
  - Focus on activity and participation
  - Be challenging to the TBI survivor but achievable
  - Include both short-term and long-term elements.
- Ensure that goal-setting meetings:
  - Are timetabled into the working week
  - Involve the TBI survivor and, where appropriate, their family or carer in the discussion.

- Ensure that during goal-setting meetings, TBI survivors are provided with:
    - An explanation of the goal-setting process
    - The information they need in a format that is accessible to them
    - The support they need to make decisions and take an active part in setting goals.
- Give the MDT copies of their agreed goals for rehabilitation after each goal-setting meeting (NICE, 2014).

An example of goal setting templates can be found in Annex 2.

3.3 Management and Prevention Strategies

3.3.1 Mild TBI

Apart from having a GCS score of 13-15 a traumatic brain injury (TBI) can be classified as mild if loss of consciousness and/or confusion and disorientation is shorter than 30 minutes. (See figures on page {21})

While MRI and CAT scans are often normal, the individual has cognitive problems such as headache, difficulty thinking, memory problems, attention deficits, mood swings and frustration. These injuries are commonly overlooked.

Even though this type of TBI is called "mild", the effect on the family and the injured person can be devastating.

Common symptoms of Mild TBI include:

- Fatigue
- Headaches
- Visual disturbances
- Memory loss
- Poor attention/concentration
- Sleep disturbances
- Dizziness/loss of balance
- Irritability-emotional disturbances
- Feelings of depression
- Seizures
- Nausea
- Loss of smell
- Sensitivity to light and sounds
- Mood changes
- Getting lost or confused
- Slowness in thinking

Important to note:

- There is no evidence that uncomplicated symptoms should be treated differently in the Mild TBI population than from the general population who have such symptoms. All patients should be offered reassurance about the nature of their symptoms and advice on gradual return to normal activities[B].
- Referral for cognitive behavioural therapy following Mild TBI may be considered in patients with persistent symptoms who fail to respond to reassurance and encouragement from a general practitioner after three months (SIGN, 2013).
- Screening tools for cognitive function can be used.
- Education and advice to the TBI survivor and to family/carer about observing any changes if they occur once home (eg changes in behaviour/conscious levels).
- A discharge leaflet could be given to look out for such symptoms and what to do. [3]

Note: Some of these symptoms may not be present or noticed at the time of injury. They may be delayed days or weeks before they appear. The symptoms are often subtle and are often missed by the injured person, family and doctors.

3.3.2 Moderate and Severe TBI

(I) Prolonged Disorders of Consciousness

Following severe brain injury, many TBI survivors can progress through varying stages of consciousness including stages of coma, Vegetative State (VS), PTA as they emerge into a state of full awareness. Some will remain in a vegetative state and can be described as prolonged disorders of consciousness (PDOC), which persist for more than 4 weeks.

TBI survivors should be transferred and managed by units specializing in PDOC. The survivor should be examined by at least two doctors who are expert in assessing disorders of consciousness. They should take into account the views of the medical staff, other clinical staff including clinical neuropsychologists, occupational therapists and physiotherapists, carers and relatives about the patient's reactions and responses (Royal College of Physicians, 2013).

(II) Coma

This is not obeying commands, not speaking and not eye opening (that is, GCS 8 or less) (NICE, 2014).

Therapy

Designed to:

- Maintain good hygiene
- Maintain hydration and Nutrition
- Establish and maintain a clear airway
- Prevent chest infection

[3] *Example Pamphlet- Mild Head Injury RMH:* *https://www.thermh.org.au/sites/default/files/media/documents/brochure/TRM01.03.pdf*

- Provide appropriate therapeutic positioning and regular turning

> Maintain Good Hygiene

- To prevent infection and skin breakdown (including pressure sores) which can lead to a deterioration in condition and hinder recovery
- Need to manage incontinence issues
- Keep the TBI survivor clean

For further information, refer to relevant medical and nursing literature.

> Maintain Hydration and Nutrition

- All TBI survivors should have their hydration and nutrition status closely monitored using validated assessment tools or measures. Appropriate fluid supplementation should be used to treat or prevent dehydration
- All TBI survivors should be screened for malnutrition
- Patients, who are at risk of malnutrition, including those with dysphagia, should be referred to a dietician for assessment and ongoing management.
- TBI survivors in a coma should:
    - Receive tube feeding with a nasogastric tube within 24 hours of admission
    - Be considered for a nasal bridle tube or gastrostomy if they are unable to tolerate a nasogastric tube

For further information, refer to relevant nursing literature.

> Prevent Chest Infection

- To prevent deterioration in health and possible death
- Therapeutic positioning and changes every 2 hours to facilitate air entry into all areas of lungs
- Suctioning (if necessary) to help clear sputum and airway

> Provide Appropriate Therapeutic Positioning and Regular Turning

- To promote and facilitate optimal recovery by:
    - Normalising muscle tone
    - Providing appropriate sensory information
    - Preventing complications such as pressure sores, contractures, pain and respiratory problems
- Positional changes in lying should occur every 2 hours
- Specific equipment may be required :
    - Firm mattress (a soft mattress makes facilitating active movement difficult)
    - Pillows and foam rolls to help maintain the required therapeutic positions
- Care with handling
- Treat the survivor as if they can hear every conversation

Examples of Therapeutic Positioning are available.[4]

Note: regularly monitor vital signs (esp. BP/RR/HR) and assess tolerance to each position.

For further information, refer to relevant medical and nursing literature.

(III) Persistent Vegetative State (PVS)

This is a disorder of consciousness in which patients with severe brain damage are in a state of partial arousal rather than true awareness. After four weeks in a vegetative state (VS), the patient is classified as in a persistent vegetative state. This diagnosis is classified as a permanent vegetative state one year after a traumatic injury.

Diagnosis of VS can only be made a minimum of 1 month after injury and requires the presence of all the following (SIGN, 2013):

- No evidence of awareness of self or environment and an inability to interact with others
- No evidence of sustained, reproducible, purposeful, or voluntary behavioural responses to visual, auditory, tactile or noxious stimuli
- No evidence of language comprehension or expression
- Intermittent wakefulness manifested by the presence of sleep-wake cycles
- Sufficiently preserved hypothalamic and brain stem autonomic functions to permit survival with nursing and medical care
- Bowel and bladder incontinence
- Variably preserved cranial nerve reflexes and spinal nerve reflexes

It has been proposed that the issue of permanence of the VS may be raised when a patient has remained in the VS > 12 months after a traumatic brain injury and > 3 months after a brain injury of non-traumatic cause (e.g. cerebral anoxia).

After this point, recovery of consciousness can be considered highly improbable but not impossible.

Therapy

Individuals in a 'vegetative state' may make a recovery over a prolonged period of time, so it is important not to allow serious complications to set in. Therefore therapy is to help maintain (see Coma - above).

(IV) Post Traumatic Amnesia (PTA)

- A state of confusion that occurs immediately following a traumatic brain injury in which the injured person is disoriented and unable to remember events that occur after the injury.

[4] *https://www.chss.org.uk/documents/2013/08/f16_stroke_positioning_chart.pdf*

- The person may be unable to state his or her name, where he or she is, and what time it is.
- While PTA lasts, new events cannot be stored in the memory
- Perception of their environment can be distorted and patients can lack awareness of their condition and need to be hospitalised. This can result in further patient confusion or fear. Such confusion and disorientation can result in restlessness, agitation, physical and verbal aggression and patients often wander (Snow and Ponsford, 2013)
- When continuous memory returns, PTA is considered to have resolved.
- Studies show that the longer PTA time the more intelligent impairment and the less chance of returning to work (SIGN, 2013; New Zealand Guidelines Group, 2006; NICE, 2014)

PTA Screening

- Westmead Post Traumatic Amnesia Scale [5]
- This is usually performed by OTs

Therapy

- TBI survivors in PTA are given little therapy during PTA to minimise the risk of agitation, but there are reasons to believe that therapy received at this time could actually improve a patient's functionality and help to reduce their hospital stay (ISCRR, 2017).
- Therapy is designed to help to keep a TBI survivor mobile and safe.
- The best method of managing PTA is to adhere to behavioural management principles where staff create an environment that minimises agitation. Noisy and over-stimulating environments tend to agitate patients who are in PTA hence creating a quiet, safe and secure environment is important. It is recommended patients have their own room and spend much time there to become familiar with their environment. TBI survivors in this state who can walk should be allowed to wander with supervision on the ward. Having consistent staff, photos of family and an orientation board will also promote familiarity with their environment (Gershon Spitz, 2014).
- Visitor numbers should be limited and visitors should be encouraged to stay with the patient for short periods.
- Patients in PTA are often fatigued and need to sleep more, which should be encouraged
- Reassurance is given to family/carers and information booklets can be given out to family/carers at this time.

3.3.3 Post emergency setting (Hospital and Community)

Once out of the emergency department the following strategies should be addressed as part of the rehabilitation of the medically stable TBI survivor. These can be done at hospital or at community level (NICE, 2014; SIGN, 2013):

- Gait, Balance and Mobility

[5] http://psy.mq.edu.au/GCS/WestmeadPTAScale(2009).pdf *Note: The Westmead scale is comparable with the MOPTAS (Modified Oxford post-traumatic amnesia scale*

- Spasticity and Muscle Tone
- Physical Therapeutic Interventions
- Continence problems
- Cognitive Rehabilitation
- Rehabilitation of Behavioural and Emotional Disorders
- Depression and anxiety
- Visuospatial Functioning
- Communication and Swallowing
- Sexual Dysfunction
- Pain Management
- Vocational Rehabilitation

(I) Gait Balance and Mobility

Test: Berg Balance Scale [6] , Tinetti Scale [7]

Sitting Balance and Seating

- People with traumatic brain injury who are unable to maintain their own sitting balance should have provision of an appropriate wheelchair and suitable supportive seating package, with regular review of the seating system as their needs change[C].
- Age-appropriate supportive seating and wheelchairs should be provided for children and young people[C].
- People with complex postural needs should be referred to a specialist interdisciplinary team which includes expertise in specialist seating[C].

Walking (Gait)

- People with mobility problems should be considered for appropriate walking or standing aids[C].
- Gait re-education can be given using treadmill training with partial bodyweight support, work in parallel bars[B].
- Strength training can help improve motor control and therefore help with gait and function
- Walking and exercise training and help with cardiac fitness (New Zealand Guidelines Group, 2006)
- Aids and Orthoses: orthoses such as ankle-foot orthoses or hand splints may help some people to maintain normal posture and stability during functional movements. People with mobility problems should be considered for appropriate walking or standing aids to improve stability, which may include ankle-foot orthoses[C].
- Care must be taken when fitting orthoses to avoid pressure areas, especially where deformity exists or sensation is impaired.
- If an orthosis is supplied it should be individually fitted

[6] http://www.strokecenter.org/wp-content/uploads/2011/08/berg.pdf

[7] http://hdcs.fullerton.edu/csa/Research/documents/TinettiPOMA.pdf

- Robot technology may become available on a broader scale.

(II) Spasticity and Muscle Tone

Test: Modified Ashworth Scale (MAS) [8]

In TBI spasticity has similar pathophysiology to that found in certain diseases which cause the upper motor neurone syndrome, such as stroke.

- Spasticity may be exacerbated by various stimuli (such as a full bladder, pressure areas) which need to be managed appropriately
- Control of pain and review of posture and seating are vital first considerations in spasticity management
- Casts, splints and passive stretching may be considered in cases where contracture and deformity are progressive[B]
- Botulinum Toxin should be used in a multidisciplinary setting with PT/OT/Orthotics input where appropriate[B]
- Neurobloc injection
- Oral medication[D]
- Prevention of spasticity is essential. This can be achieved by encouraging normal movement and function, reducing pain and discomfort, reducing fear and care when handling the TBI survivor[GPP].

Managing Contractures

- Contracture is a shortening of soft tissues that results in reduced joint range of motion (ROM) due to impairments (e.g. weakness or spasticity) and poor sustained positioning. Particularly common is loss of shoulder external rotation, elbow extension, forearm supination, wrist and finger extension and thumb abduction, ankle dorsiflexion and hip internal rotation.
- People with severe weakness are particularly at risk of developing contractures as any joint or muscle not moved or lengthened regularly is at risk of soft tissue complications which eventually will limit movement and may cause pain.
- Although it is considered that soft tissues must be lengthened to prevent contracture, the most appropriate intervention to prevent or manage contracture is currently unclear with expert opinion divided.
- To ensure that range of motion is maintained, muscles at risk of shortening should be monitored.
- Conventional therapy (eg stretching, encouraging mobility, muscle strengthening) should be provided for TBI survivors at risk of or who have developed contracture.

The physiotherapist plays an important role in the prevention and management of contractures.

[8] https://www.sralab.org/sites/default/files/2017-06/Modified%20Ashworth%20Scale%20Instructions.pdf

Myositis Ossificans

- Prevention of this is of utmost importance i.e. care with not over-stretching joints especially if passive movements are given.
- If present rest is needed and care with handling the joint involved.

(III) Physical Therapeutic Interventions

- Activities of Daily Living (ADL)
- Upper Limb Function

ADL

Test : Barthel Index [9] and Functional Independence Measure (FIM) [10]

- All daily living tasks should be practised in the most realistic and appropriate environment, with the opportunity to practise skills outside therapy sessions[C].
- An individual treatment program aimed at maximizing independence in the areas of self-maintenance, productivity and leisure should be developed and implemented[C].
- Family and carers should be involved in establishing the most appropriate routines for activities of daily living for people with traumatic brain injury, which take account of their lifestyles and choices[C].
- All people with traumatic brain injury who have difficulties in activities of daily living should be assessed by an occupational therapist, nurse or other health care practitioner with expertise in brain injury and experience in this area[C].
- Services should recognise that the provision of 'care' for some people with traumatic brain injury may mean the supervision and practice of community living skills, rather than hands-on physical care[C].
- Exercise programs should be given to improve function. They should be aimed at using function[C].

Facilitating Upper Limb Function

- Commonly recovery of upper limb activity is greatest in the first 6 months after injury.
- Practice of upper limb activity should be encouraged in particular a focus on functional and task specific training activities
- Other types of intervention can be as follows :
    - Repetitive task training such as reaching, grasping, pointing, moving and manipulating objects in functional tasks. [B]
    - Mental practice may be considered as an adjunct to normal practice to improve upper limb function
    - People with difficulty using their upper limb(s) should be given the opportunity to undertake as much practice of upper limb activity as possible, especially functional and purposeful tasks

[9] http://www.strokecenter.org/wp-content/uploads/2011/08/barthel.pdf

[10] https://www.strokengine.ca/pdf/FIMappendixD.pdf *Note: A specific training is needed before one can apply FIM.*

- Splinting
  - ✓ For TBI survivors (just like those after stroke) at risk of or who have developed contractures and are undergoing comprehensive rehabilitation, the routine use of splints or prolonged positioning of muscles in a lengthened position is not recommended. But wrist and hand splints should be considered in people at risk eg those with immobile hands due to weakness, high muscle tone.
  - ✓ Where wrist and hand splints are used, they should be assessed and fitted by appropriately trained healthcare professionals and a review plan should be established.
  - ✓ When giving a splint it is vital to teach the TBI survivor and family/carer how to put the splint on, how to take it off and how to care for the splint. Close monitoring for signs of redness and skin breakdown should also be taught.
- Robot therapy, virtual reality, electrical stimulation, bracing.

(IV) Continence Problems

Full assessment of bladder and bowel function should be undertaken over a period of days following admission. The physical, cognitive and emotional function of the patient should be considered and the multidisciplinary team should be involved to plan an individualised approach

A plan for the rehabilitation of urinary incontinence should include[C]:

- A regular monitoring programme
- Strategies for alerting the carer(s) to the person's need to pass urine where there are communication problems
- A toileting regimen based on reinforcement in cases of cognitive impairment.

Following TBI, constipation is common due to immobility, use of medications with anticholinergic side effects, embarrassment from lack of privacy, and poor fluid and dietary intake. It may be further exacerbated by other coexisting neurological problems such as spinal injury. Constipation may cause discomfort and exacerbate spasticity.

An active bowel management regimen should be instituted to establish the person's normal pattern as soon as possible, with the support and help of the person's primary carer where appropriate. This should include (New Zeland Guidelines Group, 2006)[C]:

- Ensuring sufficient fluid intake
- The use of natural laxatives such as prunes, kiwifruit or simple bulk laxatives (if fluid intake is sufficient)
- Encouraging exercise and standing, where possible
- Avoiding medications which slow gut motility, such as codeine and tricyclic antidepressants
- Careful attention to ensure maximum privacy and comfort during defecation

- Supported sitting up for defecation on a toilet or commode at the earliest safe opportunity, and at a regular time each day.

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(V) Cognitive Rehabilitation

Test: The Rancho Los Amigos Scale (RLAS) (number 8 is commonly used in Vietnam)

The nature of cognitive deficits resulting from TBI depends, to some extent, on the severity and location of the injury. Cognitive deficits can include: difficulties in understanding and/or producing speech; difficulties with attention, memory and the ability to concentrate; difficulties with initiating and planning daily activities; and impairments in other cognitive tasks such as reasoning, judgement, initiation, planning, problem-solving and decision-making. Relatively minor impairments in areas such as prioritising and decision-making can have a profound effect on functioning.

Cognitive rehabilitation should include:

- In the acute phase, management in a structured and distraction-free environment and targeted programmes for those with executive difficulties[A]
- Attempts to improve attention and information-processing (executive functioning) skills[B]
- Teaching compensatory techniques eg compensatory memory strategies with a clear focus on improving everyday functioning rather than underlying memory impairment[C]
- The use of external memory aids[A]

Families and carers should be given information and ongoing support as required to help them to understand cognitive and behavioural problems, and guidance on how to interact appropriately with the person with traumatic brain injury and how to access services.

For further guidance on Cognitive Rehabilitation see: Occupational Therapy Guidelines for TBI.

(VI) Rehabilitation of Behavioural Problems

A person who has suffered a TBI may show psychosocial/behavioural effects from the injury. These may include outwardly detectable changes in behaviour and personality, such as irritability, agitation, impulsivity, disinhibition and verbal and/or physical aggression. They may also tend to wander. There may be changes in mood, with effects such as emotional lability, depression, anxiety and suicidality, and sexual difficulties. Changes in the person's relationships with other people may also occur, with the person being more egocentric and isolated.

These behavioural changes often cause negative responses from family and friends and other people, including employers, with whom the person with the TBI has contact, and this may impede the person's recovery.

Difficulties in this area of functioning were reported by families as hardest to cope with after TBI. These changes can lead to social isolation and people may need access to advocacy, and families may require ongoing support

TBI survivors and their families may need access to psychological assessment and interventions. The families may also need explanations on such behavioural issues and guidance as to appropriate intervention[C].

(VII) Depression and Anxiety

Depression and anxiety disorders are common following TBI, particularly depression.

Psychosis following TBI is also well recognised (New Zealand Guidelines Group, 2006).

Post-injury depression and other mood disorders, anxiety disorders, and other mental health disorders can negatively impact on the success of rehabilitation and the functioning and quality of life in both people with TBI and their carers.

In depressed people with TBI, depression-caused impairments in cognition and motivation will be additive to the impairments caused by the TBI, increasing the level of disability and reducing the effectiveness of rehabilitation.

It is therefore important that depression is identified and treated in people with TBI.

The main issues to be considered are:

- Whether the depression is severe enough to affect health or impede recovery
- Whether the depression is likely to respond better to antidepressant medication or other interventions
- Whether the antidepressant medication for the individual is safe and acceptable
- How to monitor the effectiveness of treatment
- How long to continue treatment.

Using an appropriate depression screening tool, for adults or children, should be a part of routine practice. Eg the hospital anxiety and depression score (HADS)[11] . Depression screening tools should not be used as the sole indication for initiation of treatment. Diagnosis should always involve clinical judgement by a specialist experienced in managing people with TBI.

(VIII) Visuospatial Functioning

- People with visual and/or hearing loss should be assessed and treated by a team with the appropriate experience or in conjunction with a specialist service[C]
- TBI survivors with any visual disturbance should be assessed by a team which includes[A]:
    - Ophthalmologists
    - Orthoptists where there are problems with eye movement/double vision
    - People with expertise in rehabilitation for the visually impaired.

[11] http://www.bgs.org.uk/pdfs/assessment/hads_mood.pdf

- All TBI survivors with persistent visual neglect or field defects should be offered specific re training strategies[A].

(IX) Communication and Swallowing

Test : GUSS scale (Gugging Swallowing Screen) [12] *and Mann Assessment of Swallowing Ability – MASA* [13]

Communication

- TBI survivor who has specific communication difficulties should be assessed by a speech-language therapist for suitability for speech-language therapy[B].
- Achievable goals should be identified and an appropriate treatment plan made with monitoring of progress[A].
- A communication rehabilitation programme should take into account the person's premorbid communication style and any cognitive deficits and include the family / carer in developing strategies for optimum communication[C].
- Communication aids including gesture drawing, communication charts and computerised systems should be used where appropriate[B].

Swallowing

(SIGN, 2014)

- Dysphagia is generally assessed by speech and language therapists using a combination of bedside and instrumental approaches. [C] The two most widely used instrumental assessments are videofluoroscopy and Fibreoptic Endoscopic Evaluation of Swallowing (FEES). Instrumental assessment allows diagnosis of pharyngeal stage swallowing problems including aspiration. It therefore allows more informed decision making about feeding and therapy, whilst helping to avoid the risk of silent aspiration, compared with bedside assessment alone.
- Managing dysphagia is important for the maintenance of nutrition and hydration as well as the prevention of complications, such as chest infection. Typical management of dysphagia post TBI incorporates compensatory techniques, restorative exercises and modification of the texture of the diet as appropriate.
- Compensatory techniques are designed to enable oral feeding despite the presence of swallowing impairments; for example, adopting a different posture or an alternative swallowing technique to increase the safety of the swallow.
- Restorative exercises are aimed at directly improving the swallow physiology; for example, exercises to improve the strength of the tongue to improve oral transit of food.
- Texture modification is undertaken where safe swallowing can only be achieved with specific food textures; for example, a minced-mashed consistency diet may help where oral preparation of food is impaired.

[12] https://www.donau-uni.ac.at/imperia/md/images/department/kmp/publikationen/guss_e.pdf

[13] http://www.htstherapy.com/portal/portaldocuments/MASA_Form.pdf

(X) Sexual Dysfunction Issues

- The opportunity to discuss issues relating to sexuality should be offered early after significant traumatic brain injury, to both the person and their partner. This should be initiated by the health professionals[C].
- Advice about sexuality should cover both physical aspects (eg, positioning, sensory deficits, erectile dysfunction, drugs) and psychological aspects (eg communication, fears, altered roles and sense of attractiveness) [C].
- Families/carers should be reassured that sexually inappropriate behaviour is not unusual in people who are in the early stages of recovery from a traumatic brain injury and that it should improve with time, and be provided with training in how to avoid inadvertently reinforcing the behaviour[C].
- If the sexually inappropriate behaviour is severe, dangerous or persistent, it will need to be addressed as part of the rehabilitation programme for the person[C].

(XI) Pain Management

Comprehensive assessment of pain in TBI survivors includes careful evaluation of not only the aetiology and related factors, but also the impact of pain on the individual's function and overall quality of life.

Pain is frequently under-diagnosed in TBI and is associated with poor outcomes. People with communication and cognitive deficits are often unable to describe their sensory symptoms. Practitioners should be alert to the possibility of pain in people who have difficulty communicating, and pay attention to non-verbal signs of pain[C]. A variety of tools is available to quantify pain intensity, eg numeric rating scales (NRS), verbal descriptor scale (VDS), faces pain scales (FPS), and visual analogue scale (VAS). One should choose the best applicable scale according to the communication and cognitive level of functioning of the TBI survivor.

All people should be assessed for pain on a regular basis and treated actively in accordance with their wishes. [B] Because treatment strategies targeted specifically to underlying mechanisms are likely to be most effective, a thorough health history, physical examination, and a review of pertinent laboratory or diagnostic tests are crucial for identifying the underlying aetiology and subsequent pathophysiology of pain. (Herr and Garrand, 2001)

Practitioners and carers should be educated (B) about:

- Hypersensitivity and neurogenic pain
- Appropriate handling (especially of the paretic upper limb during transfers)
- Cognitive/behavioural therapy
- Medication.

Pain management protocols should be in place, which include:

- Good handling, support and pain relief appropriate to the individual needs of the injured person[B]
- Regular review and adjustment to changing need[C]

- Medication (for further information, refer to relevant medical literature).

Acupuncture is a complementary therapy that is being increasingly used in the day-to-day management of pain (Wilkinson, 2007)

(XII) After discharge - Vocational Rehabilitation

Return to employment or an alternative occupation is a primary goal and a critical factor in the restoration of quality of life for TBI survivors. If they are unable to access, return to or remain in previous or alternative employment, there are major economic implications as well as far-reaching consequences for the individual and their family.

There is consistent strong evidence that vocational rehabilitation, such as supported employment, improves vocational outcomes for TBI survivors in securing sustainable employment or alternative occupations, and is cost-effective.

TBI survivors should be assessed for the need for vocational rehabilitation to assist their return to work, or for entering the workforce for those not previously employed, and vocational rehabilitation should be provided to those found to need it[A].

Standard vocational rehabilitation interventions such as cognitive training and behaviour modification should be monitored for effectiveness, and supported employment provided for those for whom the standard interventions are insufficiently effective. (New Zealand Guidelines Group, 2006)[A].

4. A summary of the Role of the Multi-Disciplinary Team

All health care practitioners working with people following a traumatic brain injury need to have had specialist training in the application of their disciplines to neurological conditions.

Teams should have clear, skilled leadership and efficient coordination.

Specific areas where expertise in assessment and management is required include:

- The process of social integration for an individual and their family
- The person's leisure, vocation and study needs
- The person's safety in their home or other environment
- The person's functioning in daily activities
- Sharing of information in an appropriate form, time and environment
- Family and social support
- Motor impairments, such as weakness, altered tone and lack of coordination in the limbs
- Problems with speech and swallowing
- Sexuality issues
- Sensory impairment, including visual problems such as reduced acuity,
- Loss of visual field and gaze palsies, hearing loss and loss of smell and taste
- Cognitive impairments, especially of memory, concentration, insight and/or orientation
- Cognitive and physical fatigue
- Emotional issues, mood disturbance and other psychological disturbance
- Language problems, particularly cognitive-communication disorder or aphasia
- Reduced control over bowels and bladder.

Good communication between healthcare professionals and people with a TBI, and their families/ carers, is essential (NICE, 2014).

A core multidisciplinary rehabilitation team should comprise the following professionals with expertise in TBI rehabilitation:

- Physicians
- Nurses
- Physiotherapists
- Occupational therapists
- Speech and language therapists
- Clinical psychologists
- Social workers (NICE, 2014)
- Others include ; orthotists and dieticians

A central aspect of TBI recovery is through a well-coordinated team approach. This can be achieved by a specialised multidisciplinary team of health professionals. This team involves the use of integrated medical, nursing and allied health skills and can involve social, educational and vocational services to provide individual assessment, treatment, regular review, discharge planning and follow-up. As a team the following are necessary:

- Regular multidisciplinary meetings and case conferences to encourage coordination and updates of information
- Ensuring documentation about specific care of the TBI survivor is clear and accessible to all of the team
- Specific liaison with other professionals, teaching staff, the TBI survivor and family/carer
- Setting and meeting appropriate goals
- Supporting the TBI survivor and family/carer by encouraging their involvement in all aspects of care
- Liaison with other healthcare professionals through networks and specific training in the management of TBI

The following MDT descriptions are adapted from the SIGN guidelines on Stroke which can be used for TBI rehabilitation as well.

4.1. Physicians

As a member of the MDT for TBI survivors the rehabilitation doctors and other physicians (neurologists, neuro surgeon...) coordinate comprehensive medical care, assists TBI survivors and their families in making informed choices and readjustments and aims to prevent complications of TBI. The physicians are often involved in making sure the best available resources and services are made to those who have had a TBI. An inpatient team made up of those physicians from the various departments connected with the TBI care pathway (commonly in the Emergency Department, ICU, Neuro/Medical wards, Rehabilitation Units) need to work closely to coordinate the above as well as with the rest of the MDT team and, at the time of discharge of the patient, with relevant community services (Provincial hospitals, Rehabilitation hospitals, private and NGO clinics etc)

The role of the Physician

- Diagnosis and involvement in treatment planning
- Providing comprehensive medical care
- Providing information and advice to TBI survivor/family/carer
- Diagnosing and treating complications arising from TBI
- Leadership of the TBI team / TBI coordinator
- Service development
- Audit / Research
- Providing local clinical guidelines
- Translating up-to-date research into clinical practice

4.2. Nurse

Nurses perform comprehensive nursing assessments and help manage aspects of the TBI survivor care including observations, swallowing, mobility, continence, pressure care/skin integrity, pain control and prevention of complications. Nurses also provide 24 hour in-patient care, and assist coordination of care, support, discharge planning and education of patient/family/carer. Nurses can provide specialist TBI care in the acute, rehabilitation and community setting. Nursing is delivered within a context of multidisciplinary working enabling the sharing and integration of clinical practice. This is especially vital in a situation such as Vietnam where all the necessary MDT team are not currently available.

The role of the Nurse

- Comprehensive nursing assessment
- Patient observations
- Swallowing screen
- Pressure sore risk assessment and management of skin integrity
- Assist with mobility
- Ensure pain control
- 24-hour nursing care
- Participate in discharge planning
- Support and education to patients and family/carers.
- Bladder and bowel assessment and management of incontinence, including patient management strategies.
- Prevent secondary complications

4.3. Physiotherapist

Physiotherapy is a healthcare profession that works with people to identify and maximize their ability to move and function, and functional movement is a key part of what it means to be healthy (CSP-UK). The therapist focuses on 'enhancing maximum potential of movement aiming at preventing, curing, and rehabilitating a patient or victim so that his/her health and ability can be improved.

In TBI rehabilitation Physiotherapy involves the skilled use of physical interventions in order to restore functional movement, reduce impairment and activity limitations, and maximise quality of life after a TBI. They also assist in the treatment of respiratory and musculo-skeletal problems (eg shoulder pain), and the prevention and treatment of complications. Physiotherapists (PT) are generally involved in the care and rehabilitation of patients in all phases (acute and chronic) of TBI in a variety of settings including emergency wards, ICU, Rehabilitation Units, general and neuro medical wards, hospital out-patients, private clinics and in the client's own homes.

Physiotherapy management of TBI should continue until the person is able to maintain or progress function either independently or with assistance from others eg rehabilitation assistants, family members/ carers or fitness instructors.

The PT plans and implements treatment for individual patients, based on the assessment of their unique problems establishing and meeting relevant short and long term goals, which have been discussed, where appropriate, with patients, carers and other team members.

The PT works closely and intimately with the TBI survivor and has the ability to empathise and communicate with patients in the most challenging of circumstances.

The PT should aim to achieve an evidence based approach to TBI management through regular and updated training and should be involved in appropriate investigation, audit and research activity.

PTs and OTs need to be both skilled in the physical management of neurological deficits and experienced in the recognition and handling of associated cognitive and behavioural deficits which may impact on the ability of the injured person to engage and cooperate in therapy sessions, and the functional application of motor control (ie, their ability to carry over physical gains into daily activities).

In situations where there are no PTs available, it is recommended that the basic role of the PT is taken on jointly by the rest of the multidisciplinary team after they have received training, e.g. transfer training, mobility, muscle strengthening, functional exercises etc.

The role of the Physiotherapist

Assessment

Identifying current movement capabilities and movement potential in particular assessing :

- Respiratory function
- Muscle tone
- Muscle strength
- Body alignment and range of joint motion
- Functional movement status
- Sensation
- Visuospatial awareness
- Undesirable
- Compensatory activity
- Balance
- Mobility e.g. transfers, walking, stairs

Intervention

- Providing planned, staged rehabilitation to meet agreed goals
- Liaising and involving family/carers in rehabilitation
- Education of family/carers
- Clinical audit and research
- Translating up-to-date research into clinical practice
- Ensuring regular communication with other health professional in the provinces / community to assist with referral systems

NB: Further information can be seen in Physiotherapy Guideline for TBI.

4.4. Occupational Therapist

Formal Occupational Therapy (OT) is not present as a profession in Vietnam at the time of writing. There is no Occupational Training school and some people are calling themselves OTs having had some short term OT trainings on top of their usual profession as nurse or PT. All TBI survivors should have access to an OT with specific knowledge and expertise in neurological care.

OTs work with TBI survivors to optimise their participation and independence for all daily activities (including self-care such as washing, dressing and feeding, plus leisure and livelihood). This is achieved by either working directly to address recovery of function (including motor, cognitive or perceptual function) or by adapting the task or the environment. OTs work in both the acute and rehabilitation setting and their therapy treatment is based on an assessment of each patient's unique problems.

When there are no OTs, it is recommended that the above key elements of Occupational Therapy are taken on jointly by the rest of the multidisciplinary team.

The role of the occupational therapist

Assessment

- Using activity analysis, in which the components of an activity are identified along with the individual's limitations in carrying it out
- Assessing skills which impact on present activity (e.g. sensorimotor, cognitive, perceptual and psychosocial impairments)
- Assessing skills for the performance of self-care (e.g. washing, dressing, feeding), domestic (e.g. shopping, cooking, cleaning), work and leisure occupations
- Assessing social environment (e.g. family, friends, relationships)
- Assessment of physical environment (e.g. home and workplace)

Intervention

- Helping each patient achieve the highest level of independence possible
- Redeveloping physical, sensory, cognitive, and perceptual skills through activity and practice
- Promoting the use of purposeful, goal orientated activity
- Teaching new strategies to aid optimum level of function
- Advising on appropriate equipment and adaptations to enhance independent function
- Providing appropriate seating and advising on positioning
- Advising and facilitating transport and mobility issues such as driving
- Facilitating the transfer of care from acute stages through rehabilitation and discharge
- Liaising, working with, and referring to other professionals as part of a multidisciplinary team

- Educating the patient and carer in all relevant aspects of TBI care
- Liaising with support groups, and voluntary bodies

NB: Further information can be seen in Occupational Therapy Guideline for TBI.

4.5. Speech and Language Therapist

Speech and Language Therapy (SLT) is not an established profession at the time of writing. Some sporadic specialised trainings are currently being given to Doctors / Nurses and Physiotherapists.

Speech and Language Therapists are an integral part of the TBI care team. Their particular field of expertise lies in the vital assessment and management of swallowing problems (eg dysphagia) and with communication disorders that commonly occur following a TBI.

SLT should be involved in TBI management at all stages in the recovery process but the assessment and treatment of any swallowing problems should begin as soon as possible after the acute onset. They should liaise closely with all related healthcare professionals and the individual who has a TBI along with his/her family / main carers.

In situations where there are no SLT it is recommended that the basic role of a Speech and Language Therapist is taken on jointly by the rest of the Multidisciplinary team after they have received relevant training.

The role of the speech and language therapist

- Diagnosis of disorders of swallowing and communication
- Identify individualised care programmes
- Provide information to TBI survivors and family/carers about swallowing and communication strategies
- Detailed assessment of swallowing and communication using both formal and informal approaches to identify strengths and weaknesses, impact on the individual and family and psychosocial situation and general wellbeing
- Facilitate access to information regarding strategies and location for follow up treatment
- Refer to other professional support

4.6. Social Worker

Social Workers (SWs) provide support, counselling and information to TBI survivors and their families regarding options for optimising physical emotional social and spiritual wellbeing. They also can be responsible for organising community resources, providing low level therapy in the community and assisting with accessing social safety nets.

The social worker works closely with individual members of the multidisciplinary team and is especially aware of therapist's reports in thinking about the needs of the patient. Social workers become involved with patients at different stages of the rehabilitation process, depending on what problems the patient, carers and family may have. Some patients will need advice and information from the social worker early in their journey of care because of financial, relationship or housing problems. The social worker requires a wide knowledge of resources in the community so that he/she is able to advise the team and the patient about what is available for the patient on discharge. It is the social worker's role to advise the team about the timescale for implementing care packages and for discussing alternative forms of care if that is required.

If no Social Worker is available this role can be made by a trained community worker.

4.7. Clinical Psychologist

Emotional and personality changes and some degree of cognitive impairment are often present in many patients after a TBI. These problems can be a significant concern for relatives and a source of stress-related illness.

The Clinical Psychologist works with TBI survivors who have intellectual/cognitive impairments, difficulty with behaviour and daily functioning, interpersonal relationships and emotional problems. They also work with families/carers on adjusting and understanding the cognitive deficits of their relatives.

They can work in both the acute and rehabilitation setting.

4.8. Orthotist

The Orthotist works alongside the Physiotherapist/Occupational Therapist in assessing the TBI survivor if any particular orthotic device is needed. This device could be in the form of a splint to maintain/increase range of movement/ facilitate movement in a joint, assist with gait (e.g. an Ankle Foot Orthosis to enable foot clearance) and assist with functional movement (e.g.

attaching a spoon to enable independent feeding). Close monitoring of any device is essential in order to ensure proper fitting and comfort and that it is fulfilling its purpose.

Such orthotic devices can be either manufactured locally or be pre-made.

In Vietnam commonly an Orthotist is linked with a Rehabilitation Unit/ Hospital/ NGO/ private clinic and private manufacturer.

4.9. Dietician

Dieticians work with TBI survivors and their families/carers that need medical nutrition therapy including texture modifying diets and enteral (tube) feeding as well as those at risk or suffering mal-nutrition. They also provide education and counselling for risk factor modification and management of co-morbidities such as those with multifaceted dietetic needs (e.g. diabetes mellitus, hyperlipidaemia, hypertension and dysphagia).

If no formal dietician is available then the doctor or specifically trained nurse could take on this role.

5. Supporting and Monitoring the Implementation of the Guidelines in Hospitals

The development of a monitoring and evaluation committee which comprises staff from medical nursing and allied health professions within each health service is recommended. The committee can complete trimonthly (or as regularly as is achievable) reviews of set key performance indicators (KPIs).

Key performance indicators should be specific and realistic given the context of each health service. KPI's related to staff to TBI survivor ratio, the number of interventions provided per person, the amount of MDT meetings held monthly and changes in FIM/Barthel scores could be potential KPI's used in evaluation.

In order to evaluate practice, teams should agree on a means of recording activities for analysis. This may be simple as ticking a box on a chart located at the nursing station to make recording of activities accessible and timely.

References

British Society of Rehabilitation Medicine [BSRM] (2003) *Rehabilitation following acquired brain injury: National Clinical Guidelines* https://www.headway.org.uk/media/3320/bsrm-rehabilitation-following-acquired-brain-injury.pdf

Cassidy JD, Carroll LJ, Peloso PM, et al. (2004) *Incidence, risk factors and prevention of mild traumatic brain injury: results of the WHO Collaborating Centre Task Force on Mild Traumatic Brain Injury. J Rehabil Med* 2004;43 S:28–60.

Gershon Spitz (2014) Post-*traumatic amnesia following traumatic brain injury*. Epworth HealthCare & Monash University

Herr KA, Garand L. (2001) *Assessment and measurement of pain in older adults*. Clin Geriatr Med. 2001 Aug; 17(3): 457–vi. Retrieved from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3097898/

Institute for safety, compensation and recovery research [ISCRR] *Treatment in post-traumatic amnesia* Retrieved from: http://www.iscrr.com.au/recovery-and-return-to-work/improving-acute-clinical-services/treatment-in-post-traumatic-amnesia

Jessup RL. (2007) *Interdisciplinary versus multidisciplinary care teams: do we understand the difference?* In: Australian Health Review. August 2007 Vol 31 No 3

MoH. (2014) *Decision to approve the National Action Plan on Rehabilitation Development Period 2014 – 2020.* Hanoi, October 2014

National Institute for Health and Care Institute [NICE] 2014. *Head injury: assessment and early management*. https://www.nice.org.uk/guidance/cg176

New Zealand Guidelines Group (2006) *Traumatic Brain Injury: Diagnosis, Acute Management and Rehabilitation* http://www.asha.org/articlesummary.aspx?id=8589961069

Peden M, Scurfield R, Sleet D, Mohan D, Hyder AA, Jarawan E, Mathers C (2004) *World report on road traffic injury prevention*. Geneva: WHO.

Rao V, Lyketsos C. (2000). Neuropsychiatric Sequelae of Traumatic Brain Injury. *Psychosomatics*. 41 (2): 95–103. PMID 10749946. doi:10.1176/appi.psy.41.2.95

Rzheutskaya RE (2012). *Characteristics of Hemodynamic Disorders in Patients with Severe Traumatic Brain Injury Critical Care Research and Practice* Volume 2012 http://dx.doi.org/10.1155/2012/606179

Royal College of Physicians (2013) *Prolonged Disorders of Consciousness - National Clinical Guideline*.

Scottish Intercollegiate Guidelines Network [SIGN] (2008) *Management of patients with stroke or TIA: assessment, investigation, immediate management and secondary prevention.* http://www.sign.ac.uk/sign-108-management-of-patients-with-stroke-or-tia-assessment-investigation-immediate-management-a.html

Scottish Intercollegiate Guidelines Network [SIGN] (2013) *Brain injury rehabilitation in adults.* http://www.sign.ac.uk/assets/sign130.pdf

Servadei F, Begliomini C, Gardini E, Giustini M, Taggi F, Kraus J (2003): *Effect of Italy's motorcycle helmet law on traumatic brain injuries. Inj Prev* 2003, 9: 257–260. 10.1136/ip.9.3.257

Snow, P. and Ponsford J, (2013) *Assessing and managing impairment of consciousness following TBI*, in *Traumatic brain injury: Rehabilitation for everyday adaptive living*, J. Ponsford, S. Sloan, and P. Snow, Editors. 2013, Psychology Press: East Sussex

Vogenthaler DR (2009) *An overview of head injury: Its consequences and rehabilitation*. http://dx.doi.org/10.3109/02699058709034450
Vogenthaler DR (1987) *A review of Acquired Brain Injury, its consequences, and its rehabilitation*.

WHO, World Bank. (2011) *World Report on Disability* http://www.who.int/disabilities/world_report/2011/report.pdf

WHO, (2013) *Global status report on road safety 2013. Supporting a decade of action.* http://www.who.int/violence_injury_prevention/road_safety_status/2013/en/

World Health Organization. (2015) Viet Nam: WHO statistical profile http://www.who.int/gho/countries/vnm.pdf?ua=1

WHO (2015) *Gender equality in health.* Fact sheet No 403 http://www.who.int/mediacentre/factsheets/fs403/en/

World Health Organization. (2009) *Strategy for Integrating Gender Analysis and Actions into the Work of WHO.* Geneva Switzerland: WHO; 2009. Available at: http://www.who.int/gender/documents/gender/9789241597708/en/

Wilkinson J & Faleiro R. (2007) *Acupuncture in Pain Management* https://academic.oup.com/bjaed/article/7/4/135/466586/Acupuncture-in-pain-management

Annexes

1. Rehabilitation Risk Assessment
2. Goal attainment scale (GAS)

Rehabilitation Risk Assessment

Definition of "medically stable": Vital signs are stable (GCS, HR, BP, SpO2, RR, temperature). The vital signs are highlighted in the below table. The figures in brackets are the normal values.

Absolute Contraindications	Relative Contraindications	Precautions
	(depending on your clinical assessment of the patient, very controlled gentle rehabilitation can be completed)	*(rehabilitation can be completed, paying attention to the below signs and symptoms and any worsening)*
▪ Acute MI ▪ Unstable angina ▪ Acute PE ▪ Acute pericarditis / endocarditis / myocarditis ▪ Uncompensated heart failure ▪ Serious arrhythmias ▪ Severe aortic stenosis ▪ Uncontrolled systemic hypertension ▪ Acute thrombophlebitis / DVT ▪ ICP bolt > 20mmHg (7-15mmHg) ▪ RR > 40 (12-20 per minute) ▪ Uncompensated ABGs (pH < 7.34 or > 7.46) (normal value: pH 7.35-7.45) ▪ Presence of IABP ▪ Medication necessitating continuous cardiac monitoring ▪ O_2 saturations < 85% on air or oxygen(97-99%) ▪ HR < 30–35 bpm and > 150–180 bpm (60-100) ▪ Resting BP : systolic < 90 or > 200mmHg o (90-120) ▪ diastolic > 110mmHg (60-80) ▪ Acute abdomen ▪ Electrolyte imbalance ▪ Encephalopathy (grade III or IV) ▪ Patient sedated ▪ Sengstaken-Blakemore tube ▪ Suspected or known dissecting aneurysm	▪ Pulmonary hypertension ▪ Brady / Tachyarrythmias ▪ Moderate valvular disease ▪ Temporary pacing ▪ Open abdomen ▪ Uncontrolled pain ▪ Inadequate sleep ▪ Encephalopathy (grade I or II) ▪ Respiratory weaning	▪ Blood glucose < 3.0 or > 6.0 mmol/L (4.4-6.1mmol/L) ▪ RR > 30 (12-20 per minute) ▪ Medications requiring cardiac monitoring ▪ Low Hb < 10g/dL (male:13-17.5g/dL female:12-16g/dL) ▪ WBC > 11.0 x 10^9/L (4-11*10^9/L) ▪ Platelets < 150 or > 450 x 10^9/L (150-450*10^9/L) ▪ Hyperthermia ▪ Lightheadedness / vertigo ▪ Acute infection with fever (37.7°C and ↑ WBC) ▪ Nausea, vomiting, headache, visual isturbances ▪ Drop in systolic BP > 20mmHg below pre-exercise level ▪ Rise in systolic BP to > 250mmHg or > 20mmHg above resting level ▪ Rise in diastolic BP to > 120mmHg ▪ Postural hypotension ▪ Femoral central venous catheter ▪ Albumin < 20 (36-50g/L) ▪ Poor ejection fraction ▪ Continuous diarrhea ▪ Patient non-compliance ▪ Weight of patient ▪ Non absorption of feed ▪ BMI<20 , >30

Adapted from F Oliver 1998, St Georges Guidelines 2003 and King's College Hospital NHS Trust Guidelines, UK, August 2005

MFC Patient Objectives/Goal Attainment Scaling Sheet (GAS)

Patient Name:..... Age.....
Hospital No:.....
Admission date:..... Date scored:.....
Keyworker:.....

Importance to patient: score little importance = 1 to 3 = very important.
Probability of achieving (professionals): score, doubtful = 1 to 3 = probable.
Goal attainment **baseline**: usually set at -1 (occasionally -2 if couldn't be worse)
Goal attainment score: 0 = achieves goal as expected. -1 = less than expected, (- 2 = much less than expected. +2 = much more than expected). +1 = more than expected.

PATIENT'S OBJECTIVES:

Level of patient involvement in goal setting:
0 = no involvement 1=minimal 2=moderate 3 = with guidance only

	Patient's stated objective:	Related measurable outcome: (0 = achievement)	Importance	Probability	-2	-1	0	+1	+2	**Variance if scoring anything other than 0: 1.Describe function at Baseline (-1 or -2) 2.Describe function if '0' is not reached or is exceeded.**
1		Date set:.....				Baseline:				
						Score:				
2		Date set:.....				Baseline:				
						Score:				
3		Date set:.....				Baseline:				
						Score:				

P.T.O if necessary

Results of GAS calculation	Baseline:	Achieved score:	Change score:	Date:

4		Date set:.............................	Imp	Prob		Baseline:				
						Score:				

NOTES ON COMPLETION:

- Ask the patient, with help from an SLT if communication is very difficult (or relatives for patients in minimally conscious states) what are their top objectives for the period of rehabilitation e.g. to achieve by discharge (ideally 3, 4 issues at most).
- Transfer these to the first column of the GAS form as the patient/relative expresses them.
- Share these with the rest of the treating team. The Team attempts to express the patient's Objectives in a SMART format, while still maintaining the original meaning. Sometimes a SMART objective will be only one small step towards their expressed objective if this is an unrealistic aim for the admission. SMART objectives are entered in the second column of the GAS form.
- The Team rates the probability of achieving the objective, from their perspective.
- The Team scores the baseline, usually -1 but when the problem is as bad as it could possibly be it would be scored -2. A brief description of baseline function is entered in the right hand column to justify this score.
- The reformatted Objectives are agreed with the patient (or relative) and they are asked to rate the importance of each to them on a scale of 1 to 3. If an Objective is rated particularly difficult to achieve by the Team or the patient is unhappy about the wording, then the reasons for this may be best discussed in more detail by the professional with most involvement.
- After a few weeks it may be helpful to review the objectives with the patient/relatives to see if their understanding of their situation has changed and if they would like to add to or modify their top objectives. This can often be a useful talking point in developing realistic expectations about rehabilitation and outcomes.
- At the final Goal Setting Meeting before discharge the team scores the level of achievement of each Objective. If the objective has not been reached as expected (i.e. scored other than at 0) a description of the situation (the variance) should be added to justify the score.
- GAS Calculation: Use the Excel GAS calculator. The importance; probability; baseline and achieved scores of each goal are entered into the Excel formula and the resulting baseline; achieved and change scores should be copied into the boxes at the bottom of the Objectives/GAS sheet. Attach a copy of the calculation sheet to the GAS goals.
- Feedback individuals' goal achievement at team meetings and produce cumulative data about the service annually or as required.

Disclaimer

Healthcare professionals are expected to take the present clinical guidelines fully into account when exercising their clinical judgment. However, the guidance does not override the responsibility of healthcare professionals to make decisions appropriate to the circumstances of each patient, in consultation with the patient and/or their guardian or carer.