

Department of  
**REHABILITATION MEDICINE**

# Acquired Brain Injury (ABI) Rehabilitation Programme



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# Overview of Acquired Brain Injury (ABI)

Acquired Brain Injury (ABI) refers to all types of injury to the brain that occurs after birth. It is not a result of childhood developmental issues or diseases related to ageing..

Types of ABI include:



Traumatic Brain Injury (TBI)



Brain tumours, including brain cancer



Hypoxic (Lack of oxygen)



Infections (e.g.: Meningitis)



Inflammation



Drugs/Toxins

Effects of ABI may be temporary or permanent. Changes can include:

- Impairment of physical abilities (e.g. reduced muscle strength, vision problems, hearing problems, poor balance)
- Impairment of intellectual abilities (e.g. poor attention and memory, confusion, problems with initiation and planning)
- Impairment of functional abilities (e.g. difficulty moving, swallowing or speaking)
- Changes in personality, drive and behaviour

However, you can usually recover completely from most minor or mild injuries.

# What is Brain Injury Rehabilitation?



Rehabilitation refers to the process that helps you to recover and improve function following a brain injury.

Rehabilitation is conducted by a multi-disciplinary team of specialised rehabilitation healthcare professionals.

It is usually conducted in acute hospitals or rehabilitation units for patients with moderate to severe degrees of ABI.

After the acute medical or surgical phase, your doctor may refer you to a **Rehabilitation Physician** for a **comprehensive assessment**.

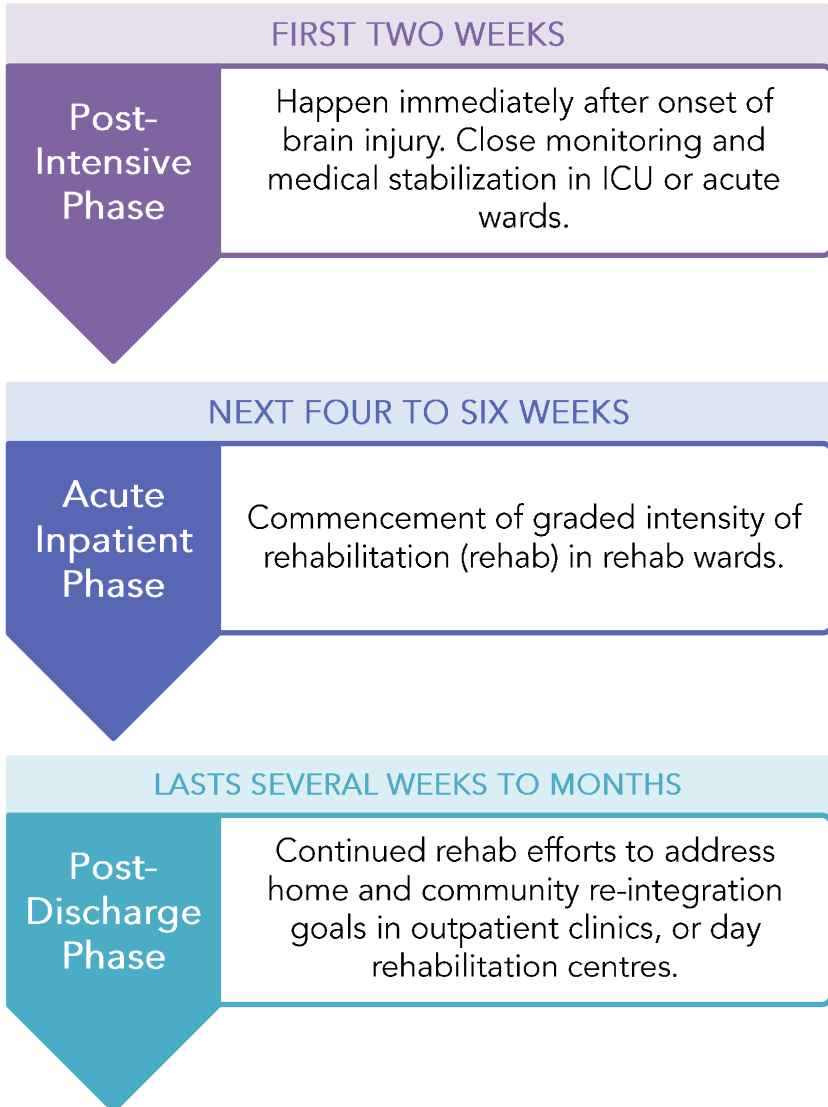
# What are the Goals of Rehabilitation?

- The goal of rehabilitation is to maximise recovery in the physical, cognitive, functional and social aspects of your life
- Rehabilitation is done in a comprehensive, coordinated, goal-oriented manner, within a realistic time frame and resources
- It consists of a consultant-led programme staffed by rehabilitation medicine specialist, rehabilitation allied health professionals, and nurses
- Rehabilitation aims to:
  - a) Reduce medical and/or surgical complications
  - b) Enhance natural (spontaneous) recovery through:
    - Application of proven techniques to aid brain plasticity (rewiring with increased use and stimulation)
    - These include upper and lower limbs exercises, gait training (walking), and specific treatments for dysphagia (swallowing deficits), aphasia (language deficits), cognitive deficits (attention, memory, higher order thinking), visual field deficits (partial vision loss, blurred vision, double vision) and neglect
  - c) Aid in recovery of motor, sensory, swallowing, communication and visual impairment
    - Through the prescription of robotic-aided therapies for walking and arm activity, computer-aided communication & cognitive therapies and selective use of medications



# Process of ABI Rehabilitation

ABI rehabilitation is often seamless:



# Benefits of Inpatient ABI Rehabilitation



Reduces prolonged bed rest which may lead to immobility and muscle wasting



Reduces length of stay in acute hospitals, which in turn reduces medical and surgical complications



Manages ABI specific problems such as post-traumatic agitation, confusion & amnesia and behavioral problems



Improves mobility, activities of daily living (ADLs) and functional independence



Improves rates of discharge to home



Reduces total inpatient hospitalisation costs



Enhances return to family, society and employment



Improves coping and awareness of ABI-related problems



Prevention of future TBI and chronic complications

After discharge, you will also spend time to apply and consolidate learnt skills, increase real-world practice and acquire new skills to adapt to life.

Even after your recovery has slowed down, rehabilitative exercises (physical and cognitive) and adaptations are crucial to maintain your physical fitness, function and cognitive abilities.

# The ABI Rehabilitation Team

- Rehabilitation care involves an interdisciplinary team of highly trained professionals who collaborate to deliver holistic treatment and recovery in a coordinated manner
- They work closely to share, exchange information and updates about your treatment and recovery progress
- The team involves you and your family in working towards a common recovery goal
- All team members meet weekly to discuss your progress and discharge plans
- Your rehabilitation schedule and therapy program is personalised by the team, based on their professional assessment and your rehabilitation needs. Therapy is conducted five days a week (from Monday to Friday), excluding public holidays and weekends.
- Members of the ABI rehabilitation team include:
  1. Rehabilitation Physician
  2. Rehabilitation Nurse
  3. Psychologist
  4. Physiotherapist
  5. Occupational Therapist
  6. Speech Therapist
  7. Medical Social Worker
  8. Nutritionist/Dietitian

# Learn about who we are and what we do!



## Rehabilitation Physician

Rehabilitation Physicians are specialist doctors/consultants who oversee your overall treatment and direct your rehabilitation program with the help of the inter-disciplinary team.

The Rehabilitation Physician will:

- Conduct daily review and assess your medical, physical, cognitive and functional status
- Prescribe customised therapies, medications, injections or referrals as needed
- Monitor your progress closely and communicate with your family members
- Manage complications with referrals to other medical specialists
- Advocate for your disability, well-being, future development and return to work
- Assist in handling compensation or litigation issues, where needed



## Rehabilitation Nurse

Rehabilitation Nurses work closely with the physician in managing your medical problems and preventing complications.

The Rehabilitation Nurse will:

- Assess a variety of issues, including self-care, bowel and bladder function, nutrition and mobility
- Reinforce treatments of other team members
- Educate you and your family about brain injury and prescribed medications



## Medical Social Worker

Social workers provide you and your family with information about community resources and assist in planning your hospital discharge and return to the community.

The Medical Social Worker will:

- Help determine your eligibility for benefits (e.g.: Medifund) or subsidies for assistive aids and equipment
- Make referrals to community resources for you and your family
- Provide supportive counselling to assist you in adjusting to your new situation



## Psychologist

Psychologists assess cognitive, emotional and behavioural problems often observed after brain injury and provide interventions to address these issues.

The Psychologist may counsel/educate your family members on treatment plans and equip them with necessary knowledge/skills to care for you.

The Psychologist may conduct:

- Behavioural management to assess behaviour and tailor behavioural strategies
- Neuropsychological assessment to evaluate cognitive status and suitability for return to work/school, decision-making capacity, and inform cognitive rehabilitation
- Cognitive rehabilitation either individually or in a group setting
- Psychotherapy to address mood, anxiety issues, coping and adjustment



## Occupational Therapist

Occupational therapists assess and train you in performing daily activities significant to you. These include basic self-care activities and more complex tasks such as meal preparation/cooking, money management and engagement in leisure/work.

The Occupational Therapist will:

- Work with you to identify and develop new roles and meaningful activities following brain injury
- Help you improve your strength, balance, trunk control (ability to control your upper body) and visual-perceptual abilities (ability to organise and interpret visual information and give it meaning)
- Teach strategies for independence in daily tasks and life roles
- Use purposeful activities to improve thinking skills such as attention, memory and problem-solving
- Conduct home assessment prior to your discharge to identify environmental barriers or supports that impact your functioning
- Recommend appropriate equipment and home modifications that you may need to help you be independent and safe at home
- Organise return to work/school evaluations and programmes
- Provide individual or couple sexual counselling/rehabilitation to address sexuality and sexual health after brain injury



## Physiotherapist

Physiotherapists help improve your physical function and mobility. Through personalised therapeutic exercises, they re-educate your muscles and nerves for effective performance.

The Physiotherapist's goals may include:

- Teaching you to be as physically independent and safe as possible
- Strengthening muscles
- Improving endurance
- Improving walking and balance



## Nutritionist/Dietitian

Dietitians evaluate your nutritional status and make recommendations on proper nutrition and diet.

Patients are frequently malnourished and underweight after a hospital stay. Individualized attention to diet and caloric intake assists in recovery and prevents complications.

The Dietitian will:

- Educate you and your family regarding menu selection, proper food consistencies and dietary adjustments as per your needs
- Make recommendations on enteral feeding should you be on a feeding tube upon discharge
- Provide follow up if you remain malnourished even after discharge or develop new problems such as persistent weight loss or poor appetite



## Speech Therapist

Speech therapists are responsible for treating speech, swallowing and communication problems.

The Speech Therapist will:

- Help you with communication problems such as difficulty understanding what others say or expressing yourself clearly
- Teach you exercises and techniques to improve your ability to speak and express yourself. This includes muscle strengthening exercises for speech/swallowing, and speech drills to improve clarity
- Assess your language skills, such as listening, speaking, reading, and writing
- Assess your thinking skills that may impact your communication (e.g. organisation, problem solving, memory, reasoning)
- Provide a communication device if you are on a breathing tube (tracheostomy)
- Evaluate your swallowing abilities if you have difficulty swallowing (dysphagia) and recommend safe types and consistencies of foods and drinks if needed

# Features of the ABI Ward

The relocation of TTSH Rehabilitation Centre to Integrated Care Hub (ICH) heralds a new era of environmental interfaces to enhance **patient & staff safety**, and **team functioning**. Notable new features of the ABI ward include:



## Specialised Gym Spaces

Specialised gym spaces on every level to cater to the different needs of patients. Patients can be easily brought to the space, allowing for increased frequency of gym utilisation.



## Locked Ward

The ward is designed as a secured area to safeguard patients who are at risk of escaping from wards or abscondment due to their brain injury.



## Indoor Taxi Training

Therapists can train patients and their caregivers on how to get in and out of the vehicle in an indoor setting without risks of unfavourable weather or temperature. Caregivers can also learn how to load a wheelchair in the boot.

## Wander Path

Memory loss, perseveration and wandering are recognized common symptoms of brain injury. Wandering may occur due to disorientation and your loved ones feel the urge to escape or pursue the usual tasks that they normally do, such as going to work.

With the wandering path, it allows your loved ones to wander safely and to calm down during the therapeutic walk.



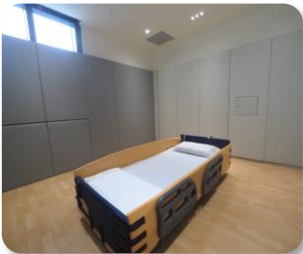
# Brain Injury Monitoring Room (BIMR)

A proportion of ABI patients may experience agitation, where they experience heightened awareness, agitation and aggression towards others or their surroundings.

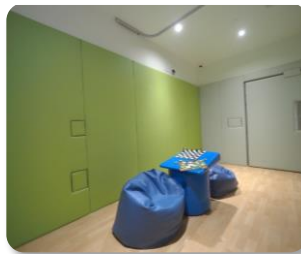
ICH Ward 9G, a designated brain injury rehabilitation ward, has two secure rooms – termed Brain Injury Monitoring Rooms (BIMR) – equipped with cushioned wall paddings and shock absorbing flooring.

This room is designed to safely manage brain injury agitation while allowing nurses to closely monitor patients via CCTV and communicate with them using dedicated communication systems, enabling prompt intervention and appropriate support during episodes of behavioural outbursts.

## Features of BIMR



Hidden wall features (medical rails, socket and gases) allow BIMR to cater to varying patients' needs.



Adjacent areas to their sleeping areas provide quiet zones for training



Ensuite bathrooms with safety features (enclosed shower heads)

# Rehabilitation Programmes

## 1 Neurobehavioural Rehabilitation Programme

The Neurobehavioural Rehabilitation Programme is a highly specialised and individualised programme that caters to patients presenting with behaviours of concern after an acquired brain injury.



### Common Behaviours of Concern



Agitation  
(presenting as  
confusion, poor  
emotional  
regulation)



Aggression  
(verbal/physical)



Wandering/  
Abscondment



Passivity/Difficulty  
getting started on  
things



Impulsivity (acting  
without thinking)  
and doing things  
that are unsafe



Inappropriate  
social/sexual  
behaviours

These behaviours often interfere with their ability to participate and benefit from conventional rehabilitation.



## **Aims of Neurobehavioural Rehabilitation Programme**

This programme aims to empower the patients and their families with tools to better control their behaviours, allowing:

- Optimisation of patients' safety and ability to perform day to day activities
- Smooth reintegration back to homes and community

## **Key Components of Neurobehavioural Rehabilitation Programme**

- Purpose-built facility in ward 9G which is secured to prevent patient abscondment
- Two Brain injury monitoring rooms (BIMR) to provide a safe, regulated environment that facilitates "just right" engagement
- Enhanced patient:staff ratio in BIMR
- Use of behavioural management techniques to reinforce desirable patient behaviour to reduce TBI-related agitation
- Early and specific education and support for families/caregivers in applying specific behaviour management strategies
- Reinforcement of above techniques will aid long-term family coping post-discharge

## 2 GRACE Programme

The Group Rehabilitation Activities for Cognitive Enrichment (GRACE) Programme consists of a collective suite of groups activities specially designed to cater to patients with varying levels of cognitive functioning.



### Benefits of Group Participation

- Enhancement of physical wellness and conditioning, cognition, interpersonal skills and functional abilities
- Opportunities for peer learning and support
- Boost motivation for therapy, improve coping and mood

### Key Activities of GRACE Programme



#### A. Circuit Training

Circuit training involves different stations that aim to improve cardiovascular and muscular endurance, gait speed and balance.

This include:

- Increase repetition of task specific training such as using the treadmill or overground ambulation to improve gait speed
- Tandem walking to improve balance and sit-to-stand
- Improve low limb muscular endurance and strength



## B. Bingo Group

- During the early stages of ABI recovery, patients often face difficulties concentrating on tasks for extended periods due to cognitive fatigue
- Bingo group is structured to increase attention and memory
- Turn-taking during the game targets attention and visual scanning



## C. Baking Group

- Focuses on using baking as a functional activity to target patients' higher cognitive abilities (e.g.: following instructions, sequencing a task)
- Encourages patients to manoeuvre around in a simulated kitchen environment
- Promotes social wellness through mutual support and shared experiences



## D. Cognitive Simulation Group

- Includes activities targeting attention, learning, memory, and planning, to compensate for cognitive deficits
- Strategies are introduced and reinforced to enhance practical learning and practice
- Group sharing is encouraged to promote peer learning and social interaction

### 3 Disorders of Consciousness (DoC) Programme

The DoC programme is a specialised medical and rehabilitation programme targeted towards comprehensive and holistic evaluation and management of individuals with various altered states of consciousness following ABI.



#### Causes of DoC



Traumatic brain injuries (TBI)



Stroke



Cerebral hypoxia  
(lack of oxygen)



Brain tumours



Meningitis/Encephalitis  
(Infective conditions)



Metabolic conditions,  
drug or poisonings

#### Challenges Faced by DoC Individuals

1. Keeping awake
2. Following instructions consistently
3. Communicating reliably
4. Physically interacting with the environment
5. Basic mobility
6. Activities of daily living

## Aims of DoC Programme

The DoC programme aims to reduce mortality and complications, maximise function and quality of life, and empower families and caregivers to cope with the complex and long-term care needs of such individuals.

## Key Components of DoC Programme

### 1. Early Identification and Multi-Disciplinary Assessment and Management

This process starts from the ICU and post-ICU phase involving trained neurosurgical, medical, rehabilitation, allied health, nursing professionals monitoring progress from coma to community.



### 2. Diagnosis and Assessment



This includes thorough neurological examinations and standardised coma measurement scales to assess the levels of consciousness, track responsiveness to physical environmental stimulation, and communication.

### 3. Multi-Disciplinary Management

Interventions are tailored to the individual's specific condition and needs. These include:

- Pharmacological treatments to optimise arousal
- Rehabilitative therapies aimed at reducing dependency, managing muscle tone and pain
- Prevention and treatment of specific medical conditions, management of tubes (e.g. nasogastric feeding, gastrostomy tubes, breathing tubes, urinary catheters)
- Sensory regulation aimed at stimulating cognitive and physical function whilst balancing time for brain rest



### 4. Family Education and Caregiver Support



Family engagement plays a critical role in achieving positive DoC rehabilitation outcomes. Early education involves understanding general trajectory of progress, DoC phases, course of recovery, complications, purpose of rehabilitation.

Supporting caregivers includes assessment of caregiver support, resources, supportive counselling for emotional stress and financial counselling.

### 5. Discharge Planning and Follow-up

The interdisciplinary treatment team will assist in discharge planning where planning commences early during inpatient rehabilitation. Options include and are not limited to returning home, nursing homes and community hospitals.



# How Can Family Members Help?



Have a positive attitude and participate actively in your loved one's recovery. Be there for them!



Get to know the team members caring for you or your loved one



Meet the rehab team to ask questions about TBI /ABI and help us understand your loved one better



Encourage your loved one to participate actively in therapy



Ensure your loved ones takes his/her medications and report any new symptoms he/she is experiencing



Have early discussions on where or how your loved one will be cared for after discharge, so that caregiver training can be facilitated

# Discharge Planning



Every discharge plan is different and reflects a patient's unique personal and social situation.

Recovery from a brain injury can take months or even years. Ongoing therapy and rehabilitation follow-up is usually required after discharge.

# Rehabilitation Options after Discharge

## A. Home-based Therapy Services



Home-based therapy services are appropriate if you are:

- Too dependent/frail to visit a Day Rehabilitation Centre (DRC)
- Have no one available to bring you to the hospital
- Required to practice specific skills (e.g.: crossing roads, taking public transport)

You and your loved ones may be recommended additional home-based services to better support you at home. Such services include:

- Medication management
- Escort for medical appointments
- Meals delivery
- Assistance with laundry or bathing/showering

Some examples of providers of home-based therapy services include the Community Rehabilitation Programme (CRP), Home Nursing Foundation or TOUCH Home Care.

# Rehabilitation Options after Discharge

## B. Outpatient Therapy Services or Centre-based Therapy Services



This service is appropriate for those who are well enough to be discharged home and can travel to the outpatient therapy clinic or a DRC for therapy.

In most cases, family members or caregivers should be available to bring you to the nearby centres for your therapy. Transportation may be requested to and from DRC to home.

Examples include Clinic for Advanced Rehabilitation Therapeutics (CART), or DRC coordinated by the Agency for Integrated Care (AIC).

# General Resources On ABI

Platform	Website(s)
Hope after Brain Injury	<a href="http://www.hopeafterbraininjury.org">www.hopeafterbraininjury.org</a>
Brain Injury Association of America	<a href="http://www.biausa.org">www.biausa.org</a>
Centers for Disease Control and Prevention (CDC)	<a href="http://www.cdc.gov">www.cdc.gov</a>
National Institutes of Health (NIH)	<a href="http://www.nichd.nih.gov/health/topics/tbi/more_information/resources">www.nichd.nih.gov/health/topics/tbi/more_information/resources</a>
Model Systems Knowledge Translation Center	<a href="http://www.msktc.org/TBI">www.msktc.org/TBI</a>
Ontario Neurotrauma Foundation	<a href="https://www.braininjuryguidelines.org/">https://www.braininjuryguidelines.org/</a>

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