

We provide a systematic approach to treating trauma patients with our dedication to a **24-hour state of readiness**



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# Traumatic Brain Injury







L  VE YOUR  
**BRAIN**

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*Understanding and Encouragement*

*It is important for patient*



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# Introduction to Traumatic Brain Injury Pathway

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Brain injury is one of the most significant causes of death in trauma patients. Rapid detection and early management are crucial to the success of the treatment. Applying modern medical technologies and using a highly skilled and trained medical multi-professional team are essential parts of care during both the acute event and rehabilitation process.

At Bangkok hospital Emergency unit we value highly the care of traumatic brain injury patients. We have developed a traumatic brain injury guideline based on the international standard guideline by National Guideline Clearinghouse (NGC) Brain trauma foundation. The aim of the guideline is to provide the best quality of care for traumatic brain injury patients, standardize the management pathway and reduce the risk of possible associated complications during treatment.

Our medical team at Bangkok hospital has developed this booklet to provide medical knowledge to the general public, patients and families who are involved in taking care of traumatic brain injury patients. The booklet will cover the definition and red flag symptoms of brain injury, guidance of care in both inpatient and outpatient settings, related medical prescriptions, rehabilitation process in moderate to severe brain injury patients, nutritional aspect for patients, FAQ, prevention of brain injury, self care and how to regain or improve the quality of life after the event.





## Traumatic Brain Injury

**Traumatic brain injury or head injury** means an injury to the scalp, skull or brain and related tissues within the skull cavity. The injury can sometimes cause changes in conscious level.

Although it is difficult to define the exact number of head injury cases due to the wide variety of head injury definitions, the information from reliable reports suggest that there are significant number of patients arriving at the hospitals with head injury and related issues.

There are different degrees of severity of head injury. It can be minor and only cause soft tissue injuries. However significant brain injury can occur and the consequence can be:

- 1 **Brain concussion**
- 2 **Brain contusion with bleeding within the skull**

### Seek medical advice if any of the following symptoms are observed:

- Change in conscious level such as drowsiness and difficulty to arouse, agitation, confusion or unable to follow a simple command
- Arms or legs weakness or abnormal gait
- Convulsions or unexplainable muscle spasms
- Disturbance of vision
- Headache or worsening light head which is not resolved after taking simple analgesics longer than 2 hours
- Nausea or vomiting
- Cognitive impairment or changing of behaviour
- Abnormal sleep pattern

## Outpatient treatment

After providing the initial assessment and care the doctor may consider discharging a patient who only sustained a minor head injury under the condition that the patient will remain under supervision of his / her contact (s) for at least 48 hours.

In the case of patients who have a high risk of bleeding, such as patients who are older than 65 years taking anti-coagulation medication (blood thinning agent), or patient with red flag symptoms, the doctor will recommend further investigation with computer tomography (CT brain scan) as well as getting the opinion of a neurosurgeon.



### Care Guidance for outpatient cases:

- The patient remains under supervision for at least 48 hours and is checked every 4 hours to assure the level of consciousness.

- Symptoms of concern are:

- 1 Changes in conscious level such as difficulty to arouse, drowsiness, agitated or confused
- 2 Arms or legs weakness, changes in gait or convulsions and abnormal muscle spasm
- 3 Persisting headache or dizziness that does not improve after 2 hours of taking simple analgesics
- 4 Nausea, Vomiting
- 5 Changes in behaviour
- 6 Abnormal vision (blurred or double vision)
- 7 Bleeding or clear fluid secretion from nostrils or ear canal, hearing disturbance or abnormal perception of smell





## Inpatient care

Patients with a moderate to severe head injury or in a high risk group are recommended for further investigation. This may include a Computed Tomography (CT brain scan) and hospital admission under a neurosurgeon specialist. Patients are expected to have regular neurological monitor and examination every 1 - 4 hours.

In the case of a very severe head injury, a patient will be considered for admission to the Intensive Care Unit (ICU). In ICU the patient will be looked after by a multi-disciplinary team including a Neurosurgeon, Intensivist, Neurophysiologist, Intensive care nurse specialist, Pharmacist and Nutritionist.

### Care for severe traumatic brain injury patients includes:

- Close monitoring care and before emergency surgery, no food or liquid to be consumed
- Maintain nutrition and hydration by nasogastric tube feeding and intravenous fluid
- Further investigations including
  - 1 X-ray to detect any other possible associated injury that may occur at the same time
  - 2 Computed Tomography (CT brain)
  - 3 Magnetic resonance imaging (MRI Cervical spine)



- 4 Others: Doctors will consider request for other investigations including Chest x-ray, Electrocardiogram, Blood tests for electrolytes, complete blood count, blood sugar, etc as appropriate
  - In case of significant intracerebral bleeding the neurosurgeon will consider the possibility of neurosurgery
  - Provide treatment for other associated injuries such as leakage of cerebrospinal fluid
  - Some patients may require repeated CT scans in order to monitor the disease progression



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## Computed Tomography (CT)

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CT is a medical imaging procedure that can produce tomographic images or slices of almost every area of the body including heart, coronary artery, brain, lungs, etc. This medical technique can produce a large volume of information within a short period of time. The obtained images can also be reconstructed into 3 dimensions and represent a very accurate information of internal body structures especially the moving organs such as the heart.

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## Magnetic resonance imaging (MRI)

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MRI is a medical imaging technique using radio-frequency magnetic field to visualize internal body structure without the need for patients to be exposed to ionizing radiation. Patients will not experience any pain from MRI. The MRI technique produces a more accurate detailed image of the internal organs in three dimensions.



# Neurosurgical treatment

The surgical procedure is performed to remove blood clots or relieve pressure from skull fractures and prevent or resolve brain swelling conditions, brain tissue damage and herniation.

The surgery may involve removing part of the skull to allow a swelling brain room to expand without being squeezed. A second operation may be performed later to reinstall the part removed in the first operation.

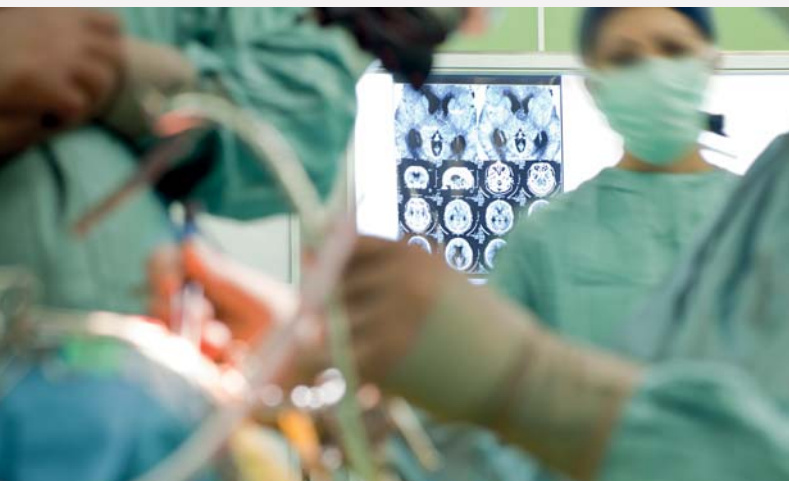
For the patients who suffer from significant brain swelling or brain contusion, the doctor may consider inserting an intracranial pressure measuring device to monitor the patient's condition and give treatment promptly when necessary.



## Risk and possible consequence of brain surgery:

- 1 Patients with a background of significant medical illness such as chronic renal disease, coronary artery disease, etc are at risk of losing their life as a consequence of major surgery such as brain surgery
- 2 A possibility of significant brain damage following brain surgery which may lead to developing weakness in arm(s) or leg(s), speech disturbance and others depends on which parts of the brain are affected.
- 3 Bleeding
- 4 Persistent brain swelling or post operative brain swelling
- 5 Infection
- 6 Post operative headache or wound pain
- 7 Collection of fluid in the brain
- 8 Brain ischemia or shortage of blood supply to the brain tissue following an operation
- 9 Increase in intracranial pressure despite the surgery





## Preoperative preparation

- 1 No food to be eaten or liquid taken for at least 6 hours or more (except for emergency situations) before the operation.
- 2 Gives details of medical background such as any chronic disease or regular medication and allergy
- 3 Refrain from any blood thinning agent medication
- 4 Take a shower and wash hair if possible. Part of the hair may be shaved.
- 5 Depending on patient's condition some patients will require urethral catheterization, airway intubation or other procedure to facilitate the surgery.

## Postoperative care

- 1 The patient will be moved from the theatre to the intensive care unit (ICU) for 2 - 3 days or longer before going to a ward.

- 2 The patient should have plenty of rest and avoid lying on the side where the incision was made during the operation.
- 3 Take great care of the dressing or any drainage and not taking the dressing off without any medical professional advice
- 4 Notify the medical team immediately if the patient develops any abnormal jerking movement, seizure, severe headache, severe wound pain or even nausea.
- 5 In the case where the surgeon has removed part of the skull, the patient's own skull part will not be reused due to the risk of infection. An artificial skull part is used for the corrective surgery where appropriate. The patient's own skull part will be kept for the patient or returned to the family to be kept or destroyed. The hospital can retain and process the skull part appropriately if requested by the patient or family, however a completed "Human tissue act and consent form" will be required.

# Medications for traumatic brain injury patients:

- 1 **Pain control** such as Paracetamol, NSAIDs (Nonsteroidal Anti-inflammatory drugs),
- 2 **Tramadol and other analgesics**  
**Antibiotics** to prevent or treat the infected wound
- 3 **Anti-epileptic medications** to prevent or treat the seizure in the patients





# 1. Pain control

## Paracetamol or Acetaminophen

Commonly used to reduce fever and relieve mild to moderate pain. Paracetamol has multiple mechanisms one of which can inhibit the pain transmitter receptor and



modulate the thermoregulator centre in order to reduce the fever

The recommended dose is 500 - 1000 mg every 4 - 6 hours and should not exceed 4,000 mg in 24 hours (8 tablets of 500 mg Paracetamol). The patient should not continue to take Paracetamol longer than 5 to 7 days due to possibility of liver toxicity. The patient with liver disease should discuss with their doctor before taking this medication. Moreover the patient should avoid drinking alcohol while taking regular paracetamol.

The patient should consult their doctor or pharmacist if they develop a rash, nausea or vomiting while taking paracetamol.

Taking medicine under professional guidance will not cause addiction.

## Non-Steroidal anti-inflammatory drugs (NSAIDs).

NSAIDs inhibit the cyclooxygenase enzyme leading to the reduction in prostaglandins formation. The prostaglandins play an important role in the process of inflammation the refore the NSAIDs can reduce the inflammation and fever. NSAIDs are commonly used for pain control for mild to moderate pain as well as in combination with other analgesics for more severe pain.

There are many classifications of NSAIDs with different qualities and mechanisms. Safe prescription can only be done by doctors or pharmacists.



### Adverse effects

- Gastrointestinal tract irritation causing indigestion, peptic ulcers or even gastrointestinal bleeding (symptoms are black or tarry stool, vomiting of blood, etc.)

**To reduce this side effect the patient should not take NSAIDs on an empty stomach**

- Prolong bleeding time due to NSAIDs effect on platelet function.
- Impair kidney function. The patient should be careful and strictly follow instructions from doctors while taking NSAIDs. Regular kidney monitoring is essential



- Allergic reaction. Some patient may develop allergic reaction toward NSAIDs. The symptoms are a rash, difficulty in breathing, tight chest pain, etc. The patient must stop taking NSAIDs immediately if they develop any of the above symptoms
- NSAIDs can cause salt and water retention which can lead to higher blood pressure. Patients with diabetes, hypertension or chronic kidney disease must be careful using NSAIDs and consult their doctor before taking this medication

NSAIDs can interact with many other medications. Therefore patients must inform their doctor about all current regular medications so that the doctor can consider prescribing NSAIDs safely.

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## Tramadol

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This medication has multiple actions one of which is opioid receptor blockage. Tramadol is used for moderate to severe pain. Common side effects are

nausea, vomiting and constipation. Other reactions that may occur are drowsiness and reducing the seizure threshold. Patients must avoid driving or operating any machinery requiring good concentration while taking tramadol.



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## Opioids or narcotic analgesics

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These are highly effective pain control and used for severe or post operative pain. The side effects of medication in this group are drowsiness, respiration suppression and wering blood pressure. They can also cause tolerance and addiction in abuse cases.



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## Muscle relaxants.

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There are many medications in this category. The commonly used medications normally act on a receptor in the central nervous system causing relaxation of the skeletal muscle. The side effects of medication in this group are nausea, dizziness, drowsiness, etc. Patients must take the same precautions as using other medications that cause drowsiness

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## Antidepressants and anticonvulsants.

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These groups of medications are used to treat neuro-pathic type pain. The side effects include drowsiness, headache, blurred vision and falls. Patients must avoid driving or operating machinery while on antidepressants or anticonvulsants



## 2. Antibiotics



Doctors will consider using antibiotics to treat an infected wound or where there is a high risk of wound infection such as a soiled wound from an accident. There are many groups of antibiotics. It is necessary that the doctors are given as much information about the patient as possible:

**2.1** The patients must inform the doctors or pharmacists about their allergy history

**2.2** When taking antibiotics if the patient develops symptoms of possible medication side effect, then the patient must stop taking medication and inform the medical team immediately. Symptoms include nausea, vomiting, diarrhoea, severe headache, rashes and difficulty in breathing.

**2.3** The patient must complete the antibiotics treatment course. Stopping early or poor compliance with medication can lead to recurrent infection or drug resistant problems.



## 3. Antiepileptic medications

### Antiepileptic medications

The doctors may consider using this group of medication in patients with moderate to severe head injuries especially post neurosurgery patients. Doctors may consider measuring the drug level for the purpose of monitoring and adjusting the medication doses as appropriate

**3.1** Patient must inform their doctor or pharmacist if they are known to have antiepileptic or other medication allergy

**3.2** Patient must inform their doctor or pharmacist if they are known to have any chronic health conditions such as diabetes, hypertension, dyslipidemia, asthma, tuberculosis, or immunodeficiency state. Antiepileptic medication can interact with the patient regular medications

**3.3** When taking antiepileptic medication if the patient develops symptoms of possible medication side effect, then the patient must stop taking medication and inform the medical team immediately. Symptoms include nausea, vomiting, diarrhoea, severe headache, rashes and difficulty in breathing

**3.4** Some of antiepileptic medications can cause drowsiness, blur vision, impair balance. The patient must take extra care on walking as they can easily fall from losing their balance. Furthermore the patient must avoid driving and operating machinery

**3.5** Patient must continue to take their antiepileptic medication on regular basis. Sudden stop can cause seizure and make further management more difficult

**3.6** While taking antiepileptic medication the patient must have regular visits to the doctor for monitoring the medication effectiveness and check up on a possibility of toxicity. The doctor then can adjust the treatment dose appropriately





## Additional recommendation

1

The patient must inform their doctor or pharmacist if they are on any of blood thinning agents such as aspirin, Clopidogrel, Ticagrelor, Cilostazol, Warfarin, Rivaroxaban, Dabigatran, Apixaban, etc. These medications are generally stopped when treating acute traumatic brain injury

2

Patients who are at risk of experiencing medication side effects must take a great care when they are walking or doing any rapid movement or changing positions. They should avoid driving or operating machinery. The patients at risk are ones who already take regular medications for controlling of blood pressure, blood sugar lowering agents such as insulin, antihistamine, or any other medications that can cause drowsiness, dizziness, blurred vision, or impaired balance.



## Nutritional care in traumatic injury patients

Traumatic brain injury (TBI) consists not only of the initial injury, but also an insidious secondary injury cascade that occurs after the principal insult. Every severity of TBI affects to physical, mental, memory, and also nutritional status. The injuries create unique metabolic derangements such as hypermetabolic state that require more energy and nutrients. The injuries may lead to structural and functional defect of digestive tract. For example,

- Patients with the injuries of face, mouth, teeth, or oral cavity may not be able to take normal diet. Liquid diet should be considered.
- Changing of taste buds, loss of appetite, swallowing problem due to brain injury.
- Absorption disorders due to gastrointestinal tract injury.
- Increase nutrient requirements for wound healing process or recovery process after fall, fracture, or surgery

Early and appropriate nutritional care to manage and prevent malnutrition after brain and other injuries may improve outcomes and decrease hospital stay.



There are many types of nutritional support. Important information such as nutritional status, problem of gastrointestinal tract, result of swallowing test which assessed by multidisciplinary team will be used for selection of appropriate nutritional support regimen. The most frequently used type of nutritional supports are regular diet and enteral tube feeding.

### 1 Regular diet

Regular diet can be used when gastrointestinal or digestive system is normal. Dietary supplements will be provided if the patient cannot take more than 50% of energy requirement by mouth. Snack, milk, soy milk, or medical foods can be used.

### 2 Enteral tube feeding

Enteral tube feeding refers to the delivery of foods directly into the stomach, duodenum or jejunum by using a tube. Enteral tube feeding plays a major role in the management of patients with poor voluntary intake (more than 7 days), chronic neurological or mechanical dysphagia or gut dysfunction and in patients who are critically ill. Commercial or blenderized enriched liquid diets are used via a tube to maintain or improve nutritional status. Residual volume must be evaluated by nurses or caretakers before every feeding to assess patient's tolerance.

When enteral tube feeding cannot provided enough energy and nutrients, parenteral nutritional support via intravenous administration will be considered.





# Rehabilitation in traumatic brain injury

## Physiotherapy exercise programme

- Exercise of different part of muscle groups
- Practice on balancing position while sitting, standing or walking.
- Practice on using stick, walking frame, wheelchair, shoulder support or ankle support
- Applying some electrical device to stimulate muscle contraction or to reduce pain

## Speech therapy programme

To improve patients ability to speak or pronouncing voice following an impairment of speech as a consequence of head injury

## Occupational therapy programme

- Practice on daily routine physical activities such as dressing, eating, picking up an object, etc
- Modify the patients housing to suit each patient individual need.
- Swallowing practice
- Brain stimulation practice to improve patient cognitive function



# Rehabilitation in patients with traumatic brain injury

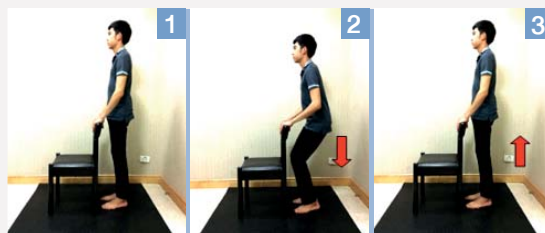
The most common cause of mild traumatic brain injury is fall. Anyone can have a fall, but older people are more vulnerable and likely to fall, especially if they have a long-term health condition. Around one third of adults over 65 years old who live at home will have at least one fall a year. Fall and Traumatic brain injury results in deterioration of consciousness, cognitive, perception, and response to the environment. These results lead to repeat fall. Thus, Fall-risk assessment is the key of fall prevention. All patients with traumatic brain injury should completed this assessment. Berg balance scale (BBS) is one of assessment tools for traumatic brain injury patients. The results can be divided in 2 groups.

## 1 The patients with high risk of fall

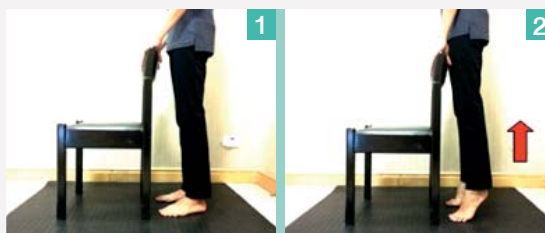
Patients with the BBS score lower than 45 are classified as high risk of fall. They should consult with physician to screen the possible risk factor and design individualized training program to prevent fall.

## 2 The patients with low risk of fall

Patients with the BBS score more than 45 are classified as low risk of fall. Fall precautions should be advised for them.



- 1 Place your hands on the back of a chair until stable.
- 2 Slowly kneel down, like you are sitting back on a chair behind you. Keep your knees in line with your feet. Keep your body in upright position and look straight ahead.
- 3 Slowly stand up and contract muscle at your buttocks while you are standing up



- 1 Place your hands on the back of a chair until stable.
- 2 Tiptoe both foot then slowly go back to the standing position.



- 1 Sit on a chair.
- 2 Slowly stand up and bend down to the front. Use the strength from your legs, not your arm.
- 3 Stand in upright position then slowly sit down.

# Rehabilitation in patients with moderate to traumatic brain injury



Patients with moderate to severe head injury are at risk of develop further complications such as

- Chest infection related to the use of ventilation machine for breathing (Ventilator associated pneumonia)
- Impaired respiratory function causing collapsing some part of lungs (Atelectasis)
- Significant reduction in physical activity resulting in decreasing in responsiveness of muscle or losing muscle tone or joints function (Deconditioning)

Rehabilitation and physiotherapy are essential tools to reduce or prevent the above complications. Physiotherapy can promote the success of the treatment as well as help the patients weaning off the ventilator support.

## Physiotherapy includes

Chest physiotherapy (postural drainage, chest percussion, chest vibration and suction of the secretion, etc)

### 1 Prepare the patient

- Should only be done 1 – 2 hours before or after meal
- Pulse rate are monitored before and after the

physiotherapy session

### 2 Postural drainage or positional treatment

to facilitate the drainage of respiratory secretion. Low head position is not allowed with the following conditions

- Unstable intracranial pressure
- Unstable heart function
- Poor blood oxygenation level
- Poor breathing ability
- Patients with high risk of aspiration

**3 Chest percussion** is an airway clearance technique that involves clapping on the chest and/or back to help loosen thick secretions. Chest percussion should be avoided in patient with chest wall or rib(s) injury

**4 Chest vibration** can be done alone or in combination with chest percussion

**5 Suction of the secretion** This technique can be done if the patient cannot cough up the phlegm by themselves



# Simple home exercise regime

## Shoulder exercise

Lift both arms up. Put your hands together and move them up above your head as high as you can. In case that assistant is needed, the assistant will support the patients at the wrists or elbows to slowly reach the same position as directed above



## Open and close your hands

Assistant uses one hand to hold the patient's thumb and the other hand support the patient other four fingers to open and close their hand

## Move the arm outward away

from the body and back toward the body. Assistant can help patient by supporting at the patient's wrists or elbows.



## Bending and stretching knee

Assistant uses one hand to hold the patient's knee and the other hand support the patient's ankle to bend and stretch the knee joint

## Bending and stretching elbow

Assistant can help patient by holding at their wrists or elbows



## Opening and closing leg

Assistant supports the patient's ankle with one hand and support the back of the patient's knee with with the other hand. The hand at ankle joint gently supports the patient leg to move away from the other leg for 45 degree and move back.

## Cock your wrist up and down

Assistant uses one hand to hold on to the patient's wrist and uses the other hand to support patients four fingers up and down



## Cock the ankle up and down

Assistant supports the patient at the back of his knee with one hand and gently push the patient's ankle with the other hand.

Aim of regular exercise is to prevent any deconditioning that may occur to muscle and joints. The patient should perform 20 – 30 times of each exercise routine on each session and they should regularly perform 3-4 sessions a day.





## Recommendation for the patient and relatives

### **Preparation before physiotherapy or occupational therapy session**

- Appropriate clothing for exercise which is not too loose or too tight
- Patient with incontinent problem should prepare some cleaning pack and replacement ready to use
- Exercise can be done at least 30 minutes after meal and the patient should not eat during the exercise

### **Home activities**

- The patient is placed in appropriate sitting or lying position

- Reposition the patient every 2 hours or less
- Alternate patient lying position from left to right or on their back every 1 hour
- Continue to practice on routine exercise as recommended by the physiotherapist or occupational therapist
- Regularly check for pressure sore especially over the bony points
- Ensure the house condition is safe for the patient
- Mental support is essential for patient rehabilitation process
- Regularly check for any change in the patient such as drowsiness, further or new weakness, choking on food, vomit, heavy breath



## Environmental management in house

Unsafe environment in house may lead to fall and traumatic brain injury. Examples of safe environment in house as following.

### The floor

- Carpets, mats, rugs, floor covering should be fixed or have non-slip surface.
- Keep dry all the time and avoid using slippery wax on floors.
- Remove electrical or telephone cords from traffic areas.

### The stair

- Have non-slip surface and.
- Have sturdy rails for all stairs inside and outside the house.

### Kitchen

- Store heavier or frequently used objects at waist level.
- Store hazardous items separate from food.

### Bathroom

- Skid-proof the tub and make sure the bath mat has a non-slip bottom.

### Bedroom

- have lamp or switches nearby headboard.
- have good lighting on the way from bed to bathroom or use automatic light in the night time.





# Psychological care

Going through an accident with significant brain injury can be overwhelming. Naturally patients will find it is very hard to accept the drastic changes in their life. Changing in their body image, losing job,

losing ability to achieve the goal previously set, changing way of life, etc can easily cause depression and losing self-esteem. Acute stress disorder is very common in patient with traumatic brain injury. The patients will need as much support as possible to face

the reality and plenty of encouragement to work through the rehabilitation process

There are different degrees of disability that can occur such as speech disturbance, language impairment, poor memory, poor concentration, etc. This depends on the area of the brain damage. Unsurprisingly some patients will only pay attention on their loss. Patients will need constant reassuring, support and appropriate advice to build up their confidence and to be ready to participate in the rehabilitation process.

## Patients' advice

- 1 Consult your doctors for advice such as activities that you can resume, activities that you may need to avoid, treatment available for your depression, etc. Getting questions answered can reduce your anxiety
- 2 Follow the doctor's advice and keep up with your follow up appointment
- 3 Persevere with your regular exercise regime as recommended by the physiotherapist
- 4 Try to maintain your usual family activities as much as you can

*'When accidents happen, they do not effect only to the patients, but also their families'*



# Frequently asked questions



## • Which treatment option is right for you?

### Answer

- Treatment decision is based on severity of the injury
- The attending doctor can give as much information as possible to the patient and relatives regarding the available treatment options, treatment process and progression. Some patients only require an outpatient follow up appointment while some other patients will require intensive care unit (ICU) admission depend on the severity of the injury
- Following the hospital discharge the patient generally require further care provided by family members or carer arranged by family. The care at home will aim at prevention of common complications such as aspiration pneumonia, deep vein thrombosis etc.



## • What can be done if patient has cannot remember anything new to them?

### Answer

- Set a routine daily activities
- Encourage the patient to use calendar, memo note or diary. Delete the tasks that already completed
- Encourage the patient to make a note of new things they come across
- Persuade the family members to write up new sentence to communicate with the patient
- Ask the patient to go through his notes and try to remember what has been written down





- **What the relatives should do when patient appears to be confused such as disoriented to time, muddle up the daily events or make up a story to fill the gap?**

#### Answer

- Ask the patient to make a diary and encourage the patient to check up the detail from his own note when muddled
- Keep reminding the patient about the past and present events patiently. The carer may have to repeat the same conversation a few more times.
- Simplify the patient's activities plan as much as possible so that the patient can complete the tasks successfully
- Allow some changes in patient's routine activities but set a limitation on this change and make sure that the change is not an overwhelming experience for the patient.
- Prepare simple short explanations and easy to understand of daily activities for the patient to follow



- **When I will completely recover?**

#### Answer

- Recovery rate and end result are largely depend on the initial degree of injury and area of brain damage. Some patients only require weeks to months while some other require years to recover. Family or carer should not worry if the patient does not show some consistency in his improvement. For example the patient was able to follow a simple command before but unable to do so on the next attempt. This process can take several days to weeks to improve.
- The patient can set a goal based on their treatment plan. Having a set goal can be a very useful tool to reassure the patients that they are on the way to recovery.
- Family and friends should try to build up a calm supportive atmosphere for the patient. Try not to overly disturb the patient but at the same time being observant on the patient progression can be very useful. Giving useful information to the medical team can help the recovery process to be faster and more effective



# Common problems



## • Unable to achieve the goal:

- Poorly organized plans, unwilling to do the tasks, Difficulty in planning the next tasks

### Answer

- Restart with less ambitious tasks
- Get the patient involve in making plans
- Explain the objectives of each task to the patient before hand
- Simplify the task in to several simple steps
- Ask the patient to repeat each step back to us to check his understanding
- Encourage the patient to complete each task and cross off the tasks that done



- **What to do** if the patient loses self control.

- Some patients with traumatic brain injury may lose their insight and awareness. Patients in this category may lose their self inhibition and say something without consideration. Patients may make very unreasonable decisions. They may not able to think outside of their mind frame.

### Answer

- Set a limitations on the patient's options
- Immediately intervene the patient does something that is inappropriate
- Encourage the patient to take time to make a decision
- Show your support to the patient with your posture as well as speech
- Clearly explain to the patient about the consequence of inappropriate behaviour



- **What to do** the patient suffer from emotional instability such as agitation, inappropriate laugh or cry, unable to manage any stress.

### Answer

- Praise the patient when he controls his emotion appropriately
- Avoid comparing the patient's past and present behaviour
- Family and carer should be made aware that damage to some part of the brain can make the patient lose their conscience and unable to understand others. This can be a very challenging task for the family but understanding the patient together with patience will help the family get through this difficult time

# How to prevent traumatic brain injury

Common cause of traumatic brain injury is an accident. Prevention of accident therefore is the most effective way of preventing traumatic brain injury

## Prevention from road traffic accident

- Use seat belt every time when driving or sitting in the car
- Use a helmet while riding on a motorbike
- Regularly check the brake system, tyres, lights of the car
- Do not exceed the speed limit
- Understand and respect the road signs
- Avoid dangerous routes
- Do not drive under influence of alcohol or drugs
- Take a brake from driving when tired
- Pay attention on the road while driving a vehicle

## Prevention from slip and fall

Slip and fall are the main cause of head injury in elderly patients. Avoiding slip and fall can be done by

- **Regular exercise** Exercise can help stabilise and strengthen muscles. Exercise helps the body to maintain balance and coordination skill for all of different muscle



groups in the body. Consult a doctor for an appropriate exercise program that suits individual health

## • **Ensure safety house environment**

- Keep the house tidy
- Do not leave things on the floor or staircases
- Keep the most used items within reach
- Ensure appropriate railing on the staircases
- Use nonslip material in the bathroom floor
- Install a set of rails next to toilet seat and showering area
- Adequate lighting in the bedroom and ensure the light switch is within easy reach
- Wearing appropriate footwear
- Avoid wearing clothes that are too long or too much for frilly as the patient can stumble on their own clothes





- **Medication** Consult doctor or pharmacist about your regular medications and be aware of possible side effects. Seek medical advice if dizziness or palpitation develop after taking the pills
- **Vision** Arrange an eye check on a yearly basis

## Additional advice



- Elderly patients with head injury who are on antiplatelet medication should seek medical advice as soon as possible. These patients are at risk of internal bleeding



- After a significant head injury the patient generally will develop symptoms within 48 - 72 hours of the injury although some patient will develop the symptoms immediately



- Having emergency telephone numbers in hand in case of accident or emergency





# NOTE

A series of horizontal dotted lines for writing notes.



# HOTLINE

For more information please contact Tel. 1719 or +662 310 3000

In the event of an emergency Bangkok Trauma Center Tel. 1724



Bangkok Hospital Coordinator Traumatic Brain Injury

Tel. +662 310 3000 ext. 795433



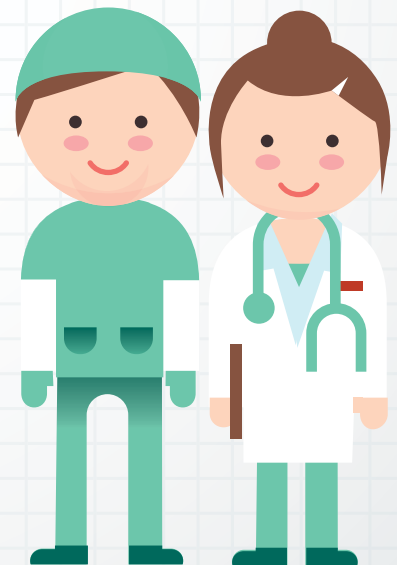
For more drug information please contact

Clinical Pharmacy Department Tel. +662 755 1588



## Emergency Call

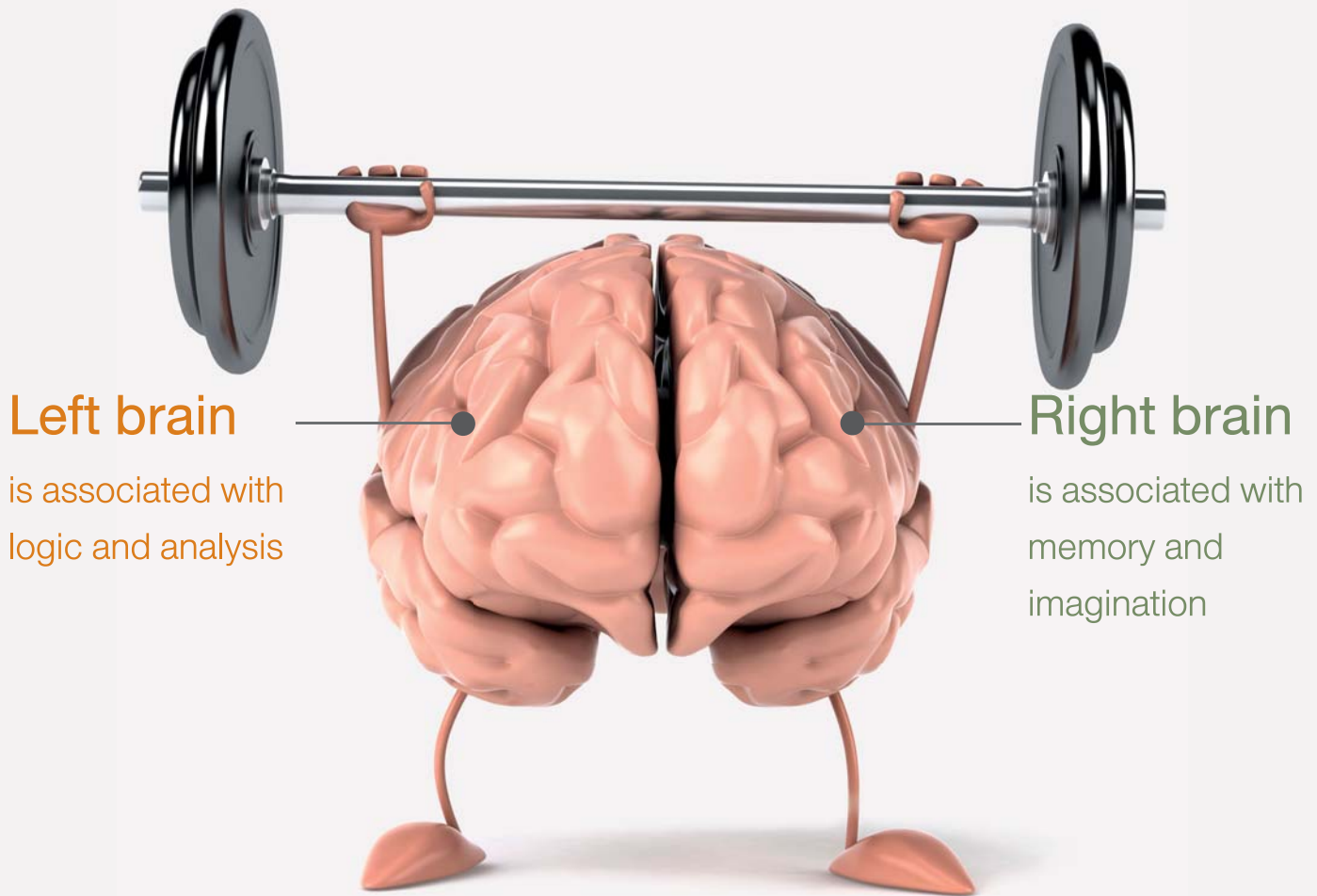
Royal Thai Police	191
Highway Police	1193
ศูนย์จราจรอุบัติเหตุ จส.100	1137
Narenthorn EMS Center	1669



### หนังสืออ้างอิง

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3. 2013 UpToDate, Inc. All rights reserved. Licensed to: Bangkok Dusit Med Svcs PLC
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## Left brain

is associated with  
logic and analysis

## Right brain

is associated with  
memory and  
imagination

## Some of the brain functions

- Regulate and maintain physiological balancing system (homeostasis) such as heart rate, blood pressure, fluid balance and body temperature, etc
- Central part of the automatic nervous system that control breathing, heart rate, some certain reflex actions such as coughing, sneezing, etc
- Important part of hormone regulation system
- Regulate sleep and awake cycle, several types of “consummatory” behaviors, including eating, drinking, defecation, and copulation
- Percept and analyse the sensations such as pain, taste, smell, hearing
- Develop learning process and memory formation
- Control dexterity and body movements
- Control articulation for normal speech and pronunciation
- Control eyes movements and organize the visual perception
- Coordinate different facial muscle groups in forming facial expression
- Develop social interaction and individual personality
- Strongly associated with feeling, emotional development, motivation