



Trauma System Implementation Programme

Protocol for the management of acute traumatic brain injury in non-neurosurgical hospitals

Final Version

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1. Introduction

1.1 Background

Data from national clinical audits shows that in 2021, head injuries constituted 24% (n = 962) of all traumatic injuries reported, and in 2020, only 21% (n = 218) of patients with a severe Traumatic Brain Injury (TBI) were brought directly to a specialist neurosurgical unit. Until such a time as the Trauma System for Ireland is fully implemented as envisaged in the National Trauma Strategy, some head-injured patients will continue to be brought to an initial receiving hospital without access to adequate neurosurgical or major trauma care.

This risk is partially mitigated by a centralised referral system, facilitated by the National Ambulance Service (NAS) National Emergency Operations Centre (NEOC), through which requests for advice and/or secondary transfer to the Major Trauma Centres (MTCs) in the Mater Misericordiae University Hospital (MMUH) and Cork University Hospital (CUH) and the National Neurosurgical Centre (NNC) at Beaumont Hospital are facilitated. This referral process, known as 1800-TRAUMA, is currently operational for both MTCs and the NNC.

We are aware of incidents which have highlighted potential service challenges, risks and issues in relation to the current non-operative management of patients with a TBI in acute hospitals that do not have on-site neurosurgery services in Ireland. Following discussion between key national stakeholders on these service challenges, issues and risks, there is an urgent need to bring clarity to a number of areas:

- Head injury management in hospitals that do not have on-site neurosurgery services.
- Standardised communication between neurosurgical centres and other hospitals with a record of transmission and receipt of referral and advice given.
- Continuous clinical responsibility and governance for TBI patients managed over time in non-neurosurgical hospitals.
- Specific training and education for general surgeons who have overall responsibility for managing TBI patients, along with appropriate additional training and education for nursing, anaesthesia, critical care and medical staff who will also have a role to play.
- Criteria for transfer to neurosurgical centres.

1.2 Scope

This document exclusively guides the acute phase of management of TBI. When it is decided clinically that the patient's primary clinical need is rehabilitation, this should be formally documented, indicating that the 'acute' phase of management has ended.

2. Initial Management in the Emergency Department

The initial management of acute TBI in the Emergency Department (ED) should continue as before;

- a. The clinical assessment of patients presenting following head trauma and the management of patients with a confirmed TBI should continue to be in line with clinical best practice guidelines such as NICE Guideline 232 for adults or the PECARN or Children's Health Ireland Guidelines for the management of traumatic brain injuries in children.
- b. For patients in whom it is established that a CT brain is warranted, this should be performed within 1 hour as per the Major Trauma Audit (MTA) target. The most recent MTA indicates that just 50% of patients with a TBI and a Glasgow Coma Scale (GCS) of <13, had a CT brain performed within 1 hour (Major Trauma Audit, 2021).
- c. The NNC at Beaumont Hospital and the MTC at CUH have developed operational and injury inclusion criteria for referral to the NNC for patients who have sustained a TBI. These criteria are detailed in Appendix A1, however the salient points are:
 - i. All patients who have experienced head trauma and have an abnormal CT scan, must be discussed with a neurosurgical service **regardless** of their clinical findings;
 - ii. All patients who have experienced head trauma and have a GCS of ≤8, must be discussed with a neurosurgical service **regardless** of their CT findings;
- d. All TBI referrals to neurosurgical services must be carried out via 1800-TRAUMA. This service provides a recorded phone line, ensuring that advice is documented and provides a closed loop for two-way communication between referring sites and neurosurgical services.
 - i. A national, standardised, ICT-based mechanism to underpin this referral process is currently in development;
 - ii. The NNC at Beaumont Hospital currently requires an online proforma to be completed prior to the referring site contacting the NNC via 1800-TRAUMA.

3. Management of patients who require transfer to a neurosurgical centre

If the advice of the neurosurgical team at the NNC in Beaumont Hospital or in CUH is that the patient should be transferred to the neurosurgical unit, it must be established that the patient is either:

- a. Clinically stable or has been stabilised prior to transfer.
- b. Where the patient requires transfer but remains unstable, a clear plan must be in place regarding management, with particular reference to:
 - i. Admission to the local Intensive Care Unit (ICU) under a named consultant;
 - ii. A definitive plan for the management of other injuries/conditions which may preclude transfer to a neurosurgical centre;
 - iii. Regular scheduled communication (i.e. hourly) with neurosurgery/neurocritical care. This communication and the outcome of any discussion must be clearly documented in the patient's clinical notes.

4. Management of patients who do not require transfer to a neurosurgical centre

If the advice of the neurosurgical team at the NNC in Beaumont Hospital or in CUH is that the patient does not require transfer to the neurosurgical unit, there must remain clear clinical governance for the ongoing care of the patient in the referring hospital.

- a. Advice regarding the management of the acute TBI, provided by the neurosurgical team must be clearly documented in the patient's clinical notes and must be adhered to.
- b. The patient must be admitted under the care of a named consultant until discharge/receipt at the receiving facility if later transferred:
 - i. If the patient is to be admitted in an Emergency Department Clinical Decision Unit or equivalent, this should be under the care of the emergency medicine consultant on call;
 - ii. In the case of adult acute TBI, most cases will be admitted under general surgery and this should be under the care of the general surgeon on call. Some facilities may have alternative pathways but every hospital must have an explicit policy where the admitting clinician is named so that there is a clear understanding of clinical ownership. Such local arrangements must be individually assessed as equivalent and appropriate.
 - iii. If it is advised by the neurosurgical centre on initial contact, that a member of the intensive care medicine team must review the patient, this must be arranged without delay.
 - iv. In the case of acute paediatric TBI, cases are likely to involve both the general surgery and paediatric teams on call. In these cases, the patient must still be admitted under the care of a named consultant or consultants where joint admission applies;
 - v. If the patient requires ICU or High Dependency Unit (HDU) level care, then they should be admitted jointly under the care of general surgery and intensive care medicine.
- c. Until discharge, admitted patients with an acute TBI must be seen at least once daily by the admitting consultant or consultant on call;
 - i. Where necessary, documented handover to on call services with formal transfer of care must take place;
 - ii. A consultant must be available to review the patient where escalation is deemed necessary by medical or nursing staff;
 - iii. Any significant change in the patient's condition must be communicated to the named consultant.
- d. When transfer is not required but the patient remains an inpatient, ongoing communication with the neurosurgical centre must be scheduled and documented;
 - i. Timing of re-evaluations must be documented and confirmation that the outcome of re-evaluations has been communicated must be documented;

- ii. Any change in patient condition or requirement for additional investigations must be communicated to the neurosurgical team via 1800-TRAUMA and any recommendations arising from this call must be recorded in the patient's chart and actioned;
- iii. All initial and subsequent communications with the neurosurgical team should be made by medical staff at registrar level or above and the admitting or on-call consultant must be made aware in each instance;
- iv. The identity of the responsible registrar and consultant as part of the neurosurgery team providing advice, must be documented. They must be available for consultation whenever required.

5. Recognition and escalation of clinical deterioration in patients with acute TBI in non-neurosurgical hospitals

It must be recognised that while not all patients with a TBI will require transfer to a neurosurgical centre, their clinical condition may change during the course of their inpatient stay. Medical and nursing staff caring for these patients must be aware of the clinical signs of deterioration in patients with an acute TBI and must take appropriate action when these signs are recognised.

Clinical examination is key to identification of the deteriorating patient with an acute TBI.

The following should also trigger an escalation of care for patients with an acute TBI who are admitted in hospitals without a neurosurgical service:

1. Any deterioration in the patient's neurological assessment, in particular any¹;
 - a. Deterioration in the motor aspect of the patient's GCS;
 - b. New focal motor deficit;
 - c. New pupillary asymmetry;
 - d. New decrease/loss of pupillary reactivity.
 - e. Increasing disorientation, confusion, nausea, vomiting
 - f. Any change in condition that requires repeat CT scanning
2. Concern expressed by nursing staff;
3. Concern expressed by the patient or their family/next of kin;
4. A deterioration in their National Early Warning Score (NEWS);
5. Abnormal investigations pertinent to the TBI;
 - a. Radiological investigations i.e. repeat CT scans at the advice of the neurosurgery team or following a clinical deterioration;
 - b. Laboratory investigations, with particular reference to serum electrolytes given the risk of hyponatremia in patients with an acute TBI and the potential for significant harm if untreated.

Where a trigger for escalation is noted, this change must be reported to the responsible local consultant, the relevant neurosurgical service and the local intensive care service without delay.

6. Training for clinicians caring for patients with acute TBI

All staff responsible for the care of patients with an acute TBI must ensure that they are appropriately skilled in the core competencies required. This is one of the core competencies upon completion of specialist training in General Surgery. It is also encompassed as part of Advanced Trauma Life Support (ATLS) or European Trauma Course (ETC) certification. There should be an ongoing commitment to remaining current with up to date guidance on the management of acute TBI and recertification when necessary. It is the responsibility of the hospital Clinical Director to ensure that these competencies are maintained.

Appendix

A1. Inclusion Criteria for Referral to the NNC at Beaumont Hospital

1800-TRAUMA: Conditions for Inter Hospital referral to Beaumont Hospital from the Central Trauma Network

Agreed operational and injury conditions for trauma patient referral from hospitals across the Central Trauma Network (CTN) to the National Neurosurgical Centre at Beaumont Hospital.



Operational Inclusions	Injury Inclusions & Exclusions (following discussion)
<ul style="list-style-type: none"> All patients with TBI and an abnormal CT scan must be discussed with neurosurgery NCHD to NCHD referral initially Online proforma completed Transfers will take place when clinically indicated. Some transfers may be safely delayed until next day or according to bed availability. 	<p>Patients with GCS 13-15 with:</p> <ul style="list-style-type: none"> Extradural haematoma (EDH) > 5 mm in thickness Subdural haematoma (SDH) > 5 mm in thickness Contusion > 4 cm (30 cc); midline shift > 5 mm Open skull fracture with torn dura / exposed brain. Other patients on a case by case basis. <p>All patients with GCS 9-12: <u>except</u> those with a completely normal CT scan</p> <p>All patients with GCS 3-8: <u>Exceptions:</u> The following situations require case by case discussion between referrer and neurosurgeon and may not be appropriate for transfer:</p> <ul style="list-style-type: none"> Completely normal CT scan and high alcohol or drug levels on toxicology who qualify for wake & assess. Bilaterally dilated and unreactive pupils where any intervention is deemed futile. Age > 75 years – the prognosis in this age group with severe TBI (GCS 3-8) is extremely poor and decisions will be made case by case.

