# Traumatic Brain Injury Pathways
for Adult ED Patients Being Admitted to Trauma Service

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<thead>
<tr>
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## ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>CBC</td>
<td>Complete Blood Count</td>
</tr>
<tr>
<td>Cl</td>
<td>Chloride</td>
</tr>
<tr>
<td>CPP</td>
<td>Cerebral Perfusion Pressure</td>
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<tr>
<td>CSF</td>
<td>Cerebrospinal Fluid</td>
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<tr>
<td>CT</td>
<td>Computed Tomography</td>
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<tr>
<td>CVP</td>
<td>Central Venous Pressure</td>
</tr>
<tr>
<td>d</td>
<td>Day</td>
</tr>
<tr>
<td>DVT</td>
<td>Deep Venous Thrombosis</td>
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<tr>
<td>ED</td>
<td>Emergency Department</td>
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<tr>
<td>EEG</td>
<td>Electroencephalography</td>
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<tr>
<td>EDH</td>
<td>Epidural Hematoma</td>
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<tr>
<td>EVD</td>
<td>External Ventricular Drain</td>
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<tr>
<td>FFP</td>
<td>Fresh Frozen Plasma</td>
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<tr>
<td>GCS</td>
<td>Glasgow Coma Scale</td>
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<tr>
<td>h</td>
<td>Hour</td>
</tr>
<tr>
<td>HOB</td>
<td>Head of Bed</td>
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<tr>
<td>ICH</td>
<td>Intracerebral/Intraparenchymal Hematoma/Hemorrhage</td>
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<tr>
<td>ICP</td>
<td>Intracranial Pressure</td>
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<tr>
<td>INR</td>
<td>International Normalized Ratio</td>
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<tr>
<td>IPH</td>
<td>Intracerebral/Intraparenchymal Hematoma/Hemorrhage</td>
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<tr>
<td>MDTC</td>
<td>Multidisciplinary Trauma Conference</td>
</tr>
<tr>
<td>mL</td>
<td>Milliliter</td>
</tr>
<tr>
<td>Na</td>
<td>Sodium</td>
</tr>
<tr>
<td>NSU</td>
<td>Neurosurgery</td>
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<tr>
<td>PaCO₂</td>
<td>Partial pressure of Carbon dioxide</td>
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<tr>
<td>PaO₂</td>
<td>Partial pressure of Oxygen</td>
</tr>
<tr>
<td>PI</td>
<td>Process Improvement</td>
</tr>
<tr>
<td>PT</td>
<td>prothrombin time</td>
</tr>
<tr>
<td>PTT</td>
<td>partial thromboplastin time</td>
</tr>
<tr>
<td>Q</td>
<td>Every</td>
</tr>
<tr>
<td>SAH</td>
<td>Subarachnoid hemorrhage</td>
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<tr>
<td>SBP</td>
<td>Systolic Blood Pressure</td>
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<tr>
<td>SDH</td>
<td>Subdural Hemorrhage</td>
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<tr>
<td>TBI</td>
<td>Traumatic Brain Injury</td>
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<tr>
<td>TICU</td>
<td>Trauma Intensive Care Unit</td>
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<td>TPOPPS</td>
<td>Trauma Program Operational Process Performance Committee</td>
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</table>
Minimal Traumatic Brain Injury Pathway
for Adult ED Patients Being Admitted to Trauma Service Only

Positive Head CT

Blunt Trauma GCS ≤13 or GCS 14-15 with seizures at Trauma Evaluation

Pre-Injury Anticoagulants or Antiplatelet Agents (Excluding ASA)?

NO

Isolated pneumocephalus +/- Non-displaced Skull Fracture

Q4h Neurological checks For 24h post-injury
Surgery OK 12h post-injury
Speech-Cognition Consult
DVT Protocols* (See VTE px PMG)

Concerns &/or Other Findings
EDH or IVH
Multifocal IPH or >4mm
Bilateral SDH >4 mm
Displaced Skull Fx
Non-traumatic bleed
ED attending request

Neurosurgery Consultation

Any Decline in Neurologic Exam
Unexplained GCS decline
New focal neurologic sign
New Seizure
Abnormal pupillary exam
New Delirium or Agitation

STAT Head CT

YES

Trumatic Intracranial Bleed
SAH, Unilateral SDH≤4mm, Single IPH ≤4mm

Q2h Neurological checks For 24h post-injury
Surgery OK 12h post-injury
Speech-Cognition Consult
Post-TBI Seizure/DVT Protocols*
(See seizure px and VTE px PMG)

New/Progressive CT Findings

DVT prophylaxis can be initiated at 24h post-injury
ASA can be resumed at 14 days postinjury. If need to resume ASA <14d, c/s neurosurgery
Positive CT Head in Adult ED Patient Being Admitted to Trauma Service

GCS 14-15 Excluded from Minimal TBI Pathway or GCS 9-13 (any mechanism) on initial evaluation

**TRAUMA SERVICE ADMISSION**
Consult Neurosurgery Consult
Speech-Pathology
7d Seizure prophylaxis protocol
CBC, PT/INR, PTT
Consider Reversal of Anticoagulant/Antiplatelet Use
DVT Protocols *(See VTE px PMG)*

**Consider Repeat Imaging within 6-24h, if any of following:**
- High Risk CT Features:
  1. SDH or IPH>4 mm
  2. Epidural hemorrhage
- Clinical Deterioration
- Anticoagulant/Antiplatelet Use
- Consultant request
**Traumatic Brain Injury Pathway, GCS < 9**

**ADULT ED PATIENT ADMITTED TO TRAUMA WITH POSITIVE HEAD CT**

Consult Neurosurgery *(Trauma Attending & Neurosurgery Attending to have Direct Conversation for Major Diverging MultiTeam Plans)*

Consult Speech-Pathology

7d Seizure prophylaxis protocol; Arterial Blood Gas, CBC, PT/INR, PTT

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**Intubation - Keep PaCO₂ 35-40, PaO₂>60**

**HOB > 60 degrees (or reverse Trendelenberg until Spine cleared)**

**SBP > 90 mm Hg**

Consider FFP (and/or K-Centra) for target INR<1.7

Consider DDAVP for pre-injury antiplatelet use

Consider Platelet transfusion only for NSGY interventions

Maintain Euvolemia; Optimize Sedation and Analgesia

Low threshold for Hyperosmolar Therapy

DVT Protocols *(See VTE px PMG)*

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**If ICP Monitor Placed**

**ICP >20**

**Drain CSF if EVD**

**CPP <60**

1st line: Phenylephrine

2nd line: Norepinephrine

**ICP >20**

**Hyperosmolar Therapy**

3% NaCl (Bolus +/- Gtt)

CVP high: Mannitol bolus q6h

CVP low: 3% NaCl bolus q6h

Q6h BMP, Osm

Max: Na 160, Osm 320

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Persistent ICP >20 and/or CPP <60

- Contact TICU Attending or fellow
- Contact Neurosurgery (decompressive craniectomy vs. PB coma)
- Monitor intraabdominal pressures
- Consider pentobarbital coma (req Neurology c/s with continuous EEG)
- Consider Palliative Care c/s
REFERENCES

Mild-Moderate TBI

Severe TBI
• Furay E, Daley M, Teixeira PG, Coopwood TB, Aydelotte JD, Malesa N, Tellinghuisen C, Ali S, Brown LH, Brown CVR. Goal-directed platelet transfusions correct platelet dysfunction and may improve survival in patients with severe


