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

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Presented at MDTC/TPOPPs: 06/27/2018
Last Discussed at MDTC/TPOPPS: 08/24/2022
Last Updated: 08/15/2022

<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>
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<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>
</tr>
<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>
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<tr>
<td>mL</td>
<td>Milliliter</td>
</tr>
<tr>
<td>Na</td>
<td>Sodium</td>
</tr>
<tr>
<td>NSU</td>
<td>Neurosurgery</td>
</tr>
<tr>
<td>PaCO₂</td>
<td>Partial pressure of Carbon dioxide</td>
</tr>
<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>
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<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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<tr>
<td>TPOPPS</td>
<td>Trauma Program Operational Process Performance Committee</td>
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</tbody>
</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)

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

YES

Positive Head CT

Neurosurgery Consultation

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

New/Progressive CT Findings

STAT Head CT

*ASA can be resumed at 14 days post-injury. If need to resume ASA <14d, c/s neurosurgery

*DVT prophylaxis can be initiated at 24h post-injury

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)
Traumatic Brain Injury Pathway, GCS 9-15

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
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

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)

If ICP Monitor Placed

CPP <60

1st line: Phenylephrine
2nd line: Norepinephrine

ICP >20

Drain CSF if EVD

CPP < 60

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

ICP >20

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


