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OUTREACH EDUCATION FOLLOW-UP INITIATIVE
Pediatric Critical Care

StEP
Stabilization Essentials in Pediatrics

Severe Trauma

Do you need quick access to resources to care for very sick children?

Access "In a Hurry" resources:

The Pediatric Critical Outreach Project is being led in collaboration by BC Children's Hospital PICU Team and Child Health BC with the vision to better support both the critically ill children while they are in their home community, as well as the clinicians who care for them.

Any questions or suggestions? Contact us at ped.critical.care.project@phsa.ca

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Stabilization Essentials in Pediatrics (StEP) is an interdisciplinary two-day course with components of didactic lectures, high fidelity simulations and hands-on workshops, prepared and delivered by PICU faculty. The target audiences are MDs, RNs, and RTs who care for critically ill children over the short term, usually while they await transport. These practitioners may be part of different departments depending on local workflows (ie. ED4, Adult ICU or High Acuity Pediatric Units).

Objectives

- Discuss similarities and differences in the assessment and management of pediatric and adult trauma
- Recognize patterns of injury in pediatric trauma
- Outline the priorities for the management of the critically injured child
- Review indications for imaging in pediatric trauma
- Review the approach to initial stabilization and management of:
  - Hemorrhagic shock
  - Severe traumatic brain injury and cervical spine injury
  - Severe thoracic and abdominal injuries
  - NAI and burns

Epidemiology

- #1 cause of morbidity and mortality in children
- Bimodal distribution (toddler/teens)
- Blunt >>>>>>>>>> Penetrating
- Largely preventable
  - MVCs
  - Window falls
  - Non-accidental trauma (NAT)

Background

- Pediatric trauma is more commonly multi-system
  - **> 50% multi-system injuries** (smaller body size + skeletal immaturity)
  - Most common injuries:
    - Head and neck
    - Abdomen (liver and spleen)
    - Lower extremities
- Anatomic/physiologic, cognitive, emotional and developmental vulnerabilities.

Assessment and management

- Determine weight as early as possible
  - age-based estimates allow preparation of drugs/equipment
- Primary survey: **CABCDEFG** sequence
  - **C** = **C**atastrophic hemorrhage
  - Pediatric challenges:
    - Vascular access – early IO
    - Hypoglycemia (Disability) – POC glucose
    - Hypothermia (Exposure)
    - F = family presence
    - G = glucose (really falls under D above)
- Secondary survey

Multisystem Trauma

Trauma

Multisystem Trauma

- Summary
- Trauma Fluid Resuscitation
- Cardiac Arrest in Trauma

In-a-Hurry Summary

Trauma Resuscitation Record

Website

Intubation in Trauma

- Before Intubation in Trauma
- Assessment
- Positioning
- Equipment
- Airway Equipment
- Checklist
- Pre-Oxygenation
- Fluids
- Medication

In-a-Hurry Summary

Videos on Trauma Assessment

- Initial Trauma Assessment
- Basics of Pediatric Trauma Assessment and Management

In-a-Hurry Summary

EQUIPMENT

Devices

Lines

Respiratory Equipment

Vital Signs

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Hemorrhagic Shock

Hemorrhagic Shock and Resuscitation

- What's the Same
  - ATLS priorities
    - Control exsanguinating hemorrhage first
      - Tourniquet, pressure, staples
  - Damage control principles apply
    - Keep warm
    - Limit crystalloid volume
    - Early (warmed) balanced blood products (MTP)
    - Hemostatic agents (TXA)

- What's Different
  - Less penetrating trauma
  - Excellent compensatory mechanisms
    - Increased SVR with blood loss maintains BP
    - Tachycardia is best sign of shock until collapse of BP as pre-terminal event
    - Permissive hypotension does not apply to children

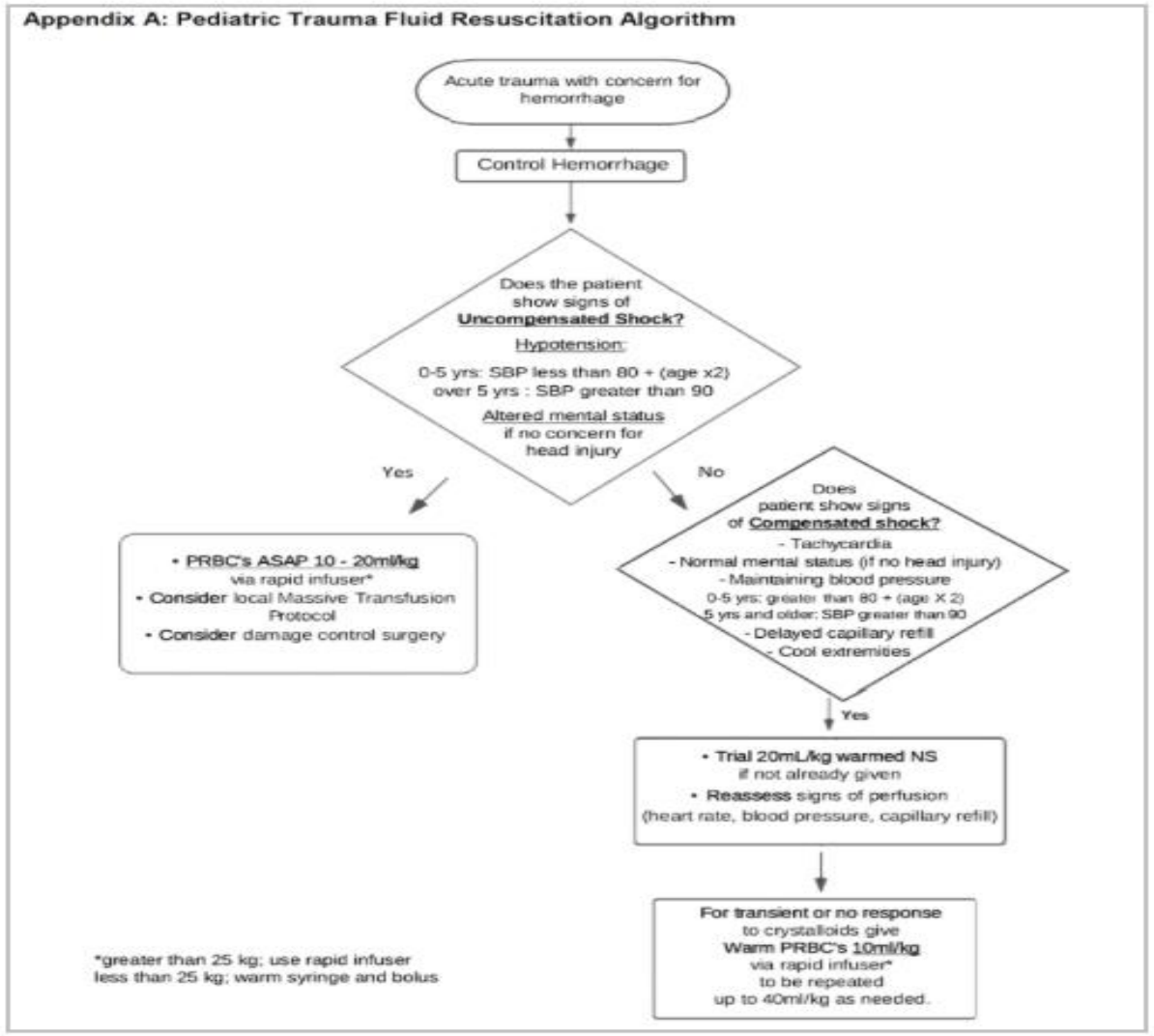
Children are (mostly) little adults…

Blood Loss and Clinical Manifestations in Children

	Mild (<30% EBV loss)	Moderate (30%-45% EBV loss)	Severe (>45% EBV loss)
Level of consciousness	Irritable, anxious	Irritable or lethargic	Comatose
Heart rate and respiratory rate	Mildly increased	Moderately increased	Severely increased or decreased
Pulses	Weak peripheral	Weak peripheral and central	No peripheral, weak central
Capillary refill	Mildly delayed	Moderately delayed	Severely delayed
Skin	Cool	Cool, mottled	Cold, cyanotic/pale
Blood pressure	Normal	Normal or mildly decreased	Decreased
Urine output	Mildly decreased	Decreased	Absent

EBV, estimated blood volume

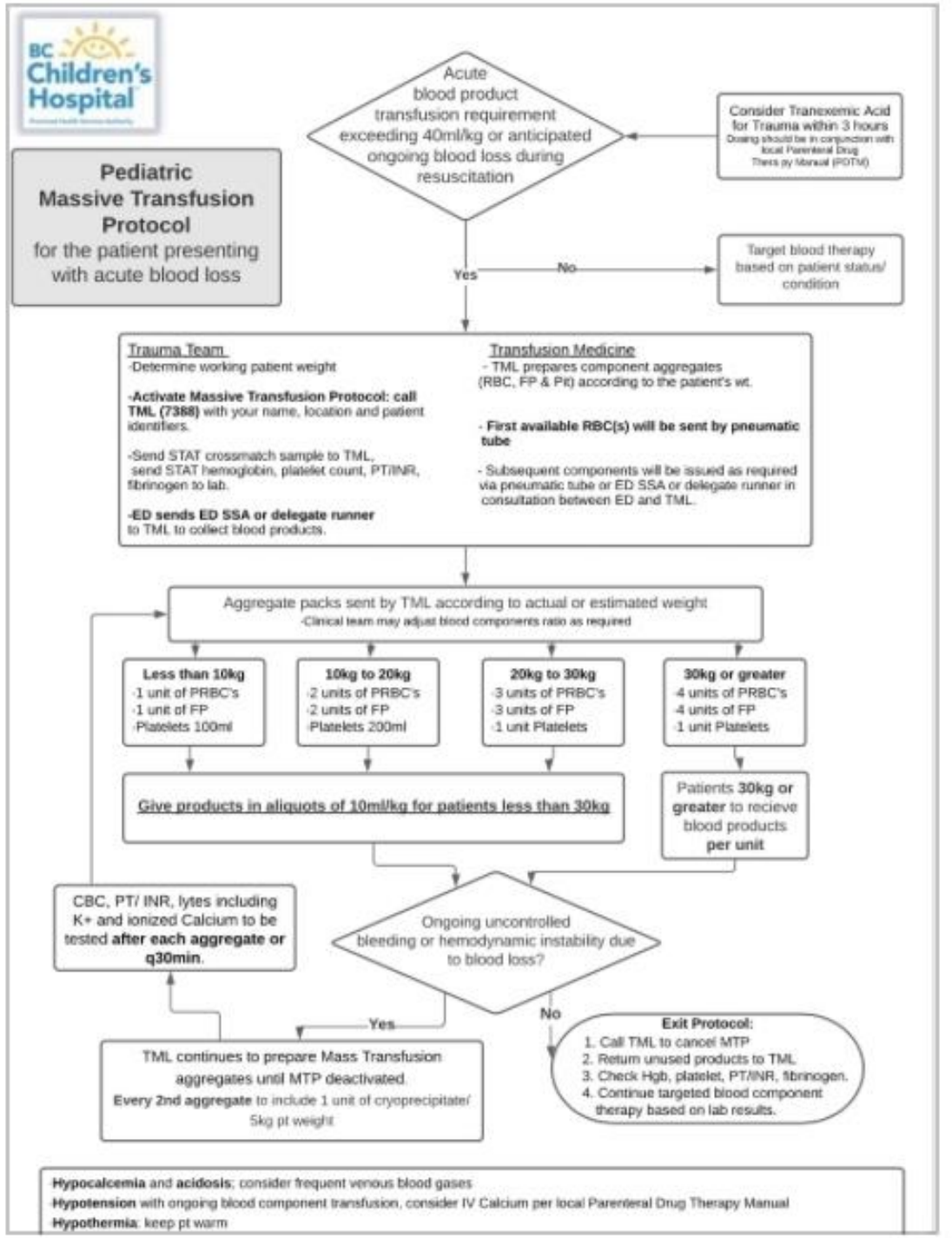
Fluid Resuscitation in Hemorrhagic Shock



- Additional consideration
  - Early IO if large bore IV not readily available
    - At least 20G (18G if possible)
  - Warm all fluids (incl. blood)
  - Rapid infusion preferred (> 25 kg)
    - Pull-push or multiple syringe method for infants
  - LR/Plasmalyte vs NS*

Massive Transfusion Protocol in Pediatrics

- Provincial Pediatric MTP – work in progress
- Ideal ratio not defined, but close to 1:1:1 = avoid acute coagulopathy
- No consensus on trigger tool
- Future directions
  - Low titer group 0 whole blood resuscitation
  - Cryoprecipitate
  - Prothrombin Complex Concentrate (PCC)



TXA

- Evidence
  - Despite strong adult evidence (e.g., CRASH-2), very limited pediatric data
  - Widely used in pediatric surgery and for common bleeding issues (e.g., epistaxis / menorrhagia)

Current Recommendation

- Consider for trauma-related hemorrhagic shock within 3 hours of injury
- Dose updated to match BCEHS
  - BC Children's: 30 mg/kg to 2g

Pediatric traumatic hemorrhagic shock consensus conference recommendations

Robert T. Russell, MD, MPH, Joseph R. Esparaz, MD, MPH, Michael A. Beckwith, MD, Peter J. Abraham, MD, Melania M. Bembea, MD, PhD, MPH, Matthew A. Borgman, MD, Randall S. Burd, MD, PhD, Barbara A. Gaines, MD, Mubeen Jafri, MD, Cassandra D. Josephson, MD, Christine Leeper, MD, Julie C. Leonard, MD, MPH, Jennifer A. Muszynski, MD, MPH, Kathleen K. Nicol, MD, Daniel K. Nishijima, MD, MAS, Paul A. Stricker, MD, Adam M. Vogel, MD, Trisha E. Wong, MD, MS, *and* **Philip C. Spinella, MD**, *Birmingham, Alabama*

ABSTRACT: Hemorrhagic shock in pediatric trauma patients remains a challenging yet preventable cause of death. There is little high-quality evidence available to guide specific aspects of hemorrhage control and specific resuscitation practices in this population. We sought to generate clinical recommendations, expert consensus, and good practice statements to aid providers in care for these difficult patients. The Pediatric Traumatic Hemorrhagic Shock Consensus Conference process included systematic reviews related to six subtopics and one consensus meeting. A panel of 16 consensus multidisciplinary committee members evaluated the literature related to 6 specific topics: (1) blood products and fluid resuscitation for hemostatic resuscitation, (2) utilization of prehospital blood products, (3) use of hemostatic adjuncts, (4) tourniquet use, (5) prehospital airway and blood pressure management, and (6) conventional coagulation tests or thromboelastography-guided resuscitation. A total of 21 recommendations are detailed in this article: 2 clinical recommendations, 14 expert consensus statements, and 5 good practice statements. The statement, the panel's voting outcome, and the rationale for each statement intend to give pediatric trauma providers the latest evidence and guidance to care for pediatric trauma patients experiencing hemorrhagic shock. With a broad multidisciplinary representation, the Pediatric Traumatic Hemorrhagic Shock Consensus Conference systematically evaluated the literature and developed clinical recommendations, expert consensus, and good practice statements concerning topics in traumatically injured pediatric patients with hemorrhagic shock. (*J Trauma Acute Care Surg.* 2023;94: S2–S10.

KEY WORDS: Trauma; pediatrics; hemorrhage; consensus.

Trauma is the leading cause of pediatric mortality, potential years of life lost, and a significant medical cost in the developed world.[1,2] Thirty-day mortality in children with traumatic hemorrhagic shock is 36% to 50% compared with 20% to 25% reported in adults.[3,4] An stimated 1,000 to 2,000 preventable traumatic deaths in children per year after injury occur in the United States because of inadequate or delayed care.[5] Recent retrospective and prospective observational studies indicate that transfusion strategies (limiting crystalloid, appropriate transfusion ratios, and use of whole blood [WB]) and intravenous hemostatic adjunct therapies can reduce morbidity and mortality in children with traumatic hemorrhagic shock.[6–9] For this

Submitted: August 17, 2022, Revised: September 26, 2022, Accepted: September 27, 2022, Published online: October 17, 2022.
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This study was presented at the Pediatric Hemorrhagic Shock Consensus Conference, April 22–24, 2022, in Birmingham, Alabama.
Supplemental digital content is available for this article. Direct URL citations appear in the printed text, and links to the digital files are provided in the HTML text of this article on the journal's Web site (www.jtrauma.com).
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DOI: 10.1097/TA.0000000000003805

Key Reference

Trauma

Multisystem Trauma

- Summary
- Trauma Fluid Resuscitation
- Cardiac Arrest in Trauma

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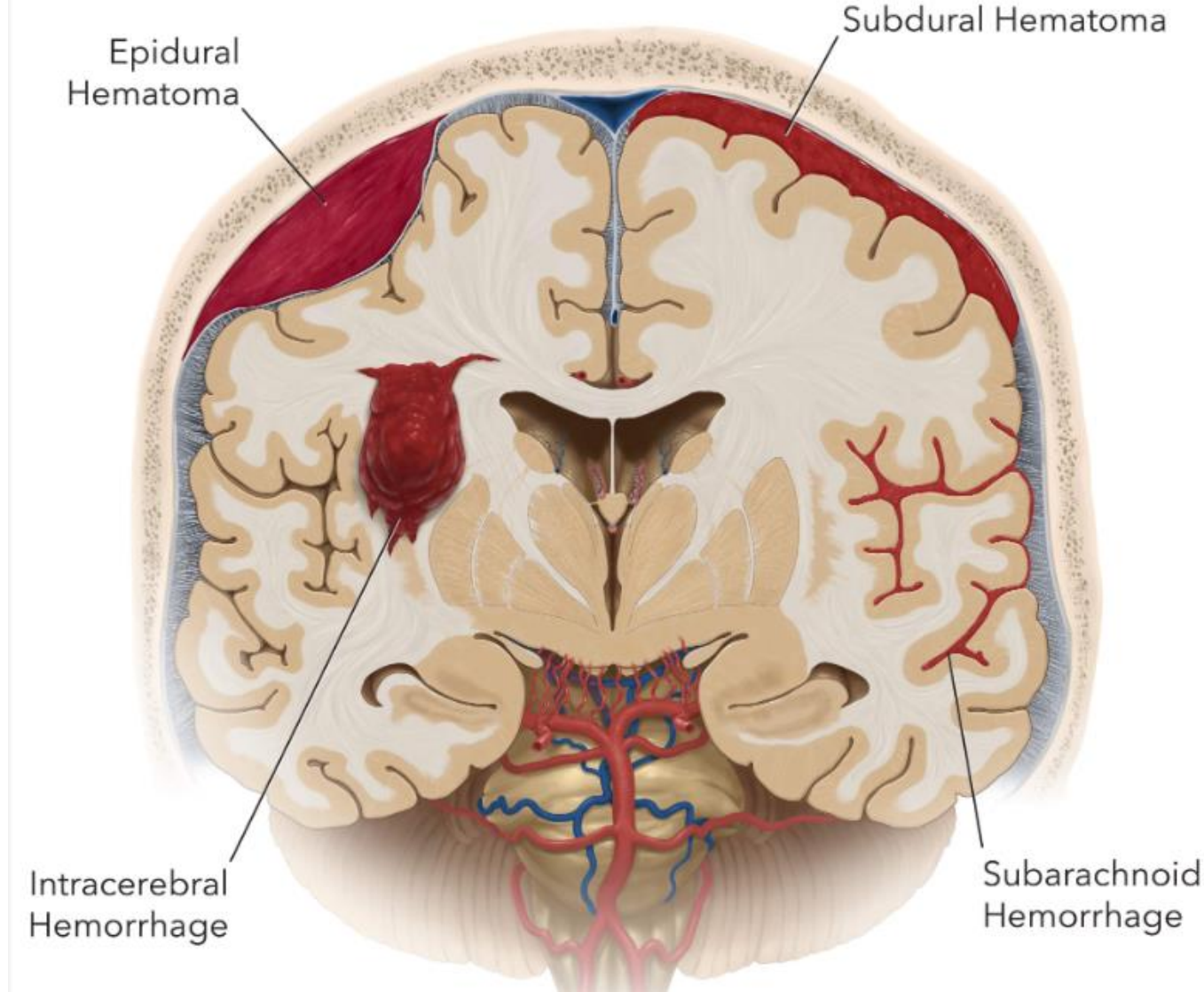
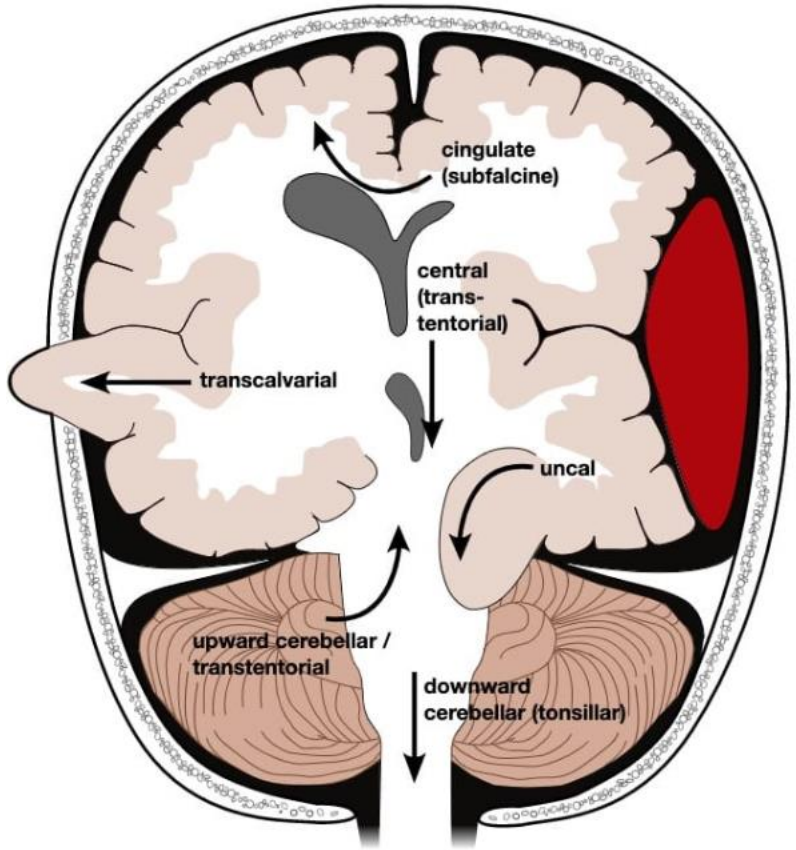
In-a-Hurry Summary

Traumatic Brain Injury (TBI)

Traumatic Brain Injury

- Leading cause of death in pediatric victims of trauma
  - Poor prognosis: GCS, NAI, thoracic injuries, hypotension, hypoxia
- Increased risk of severe TBI (GCS 3-8) in children
  - Large heads + weak neck muscles = increased rotational and acceleration-deceleration
  - Immature myelination = increased axonal injury
  - Thin pliable skull + rich vascular supply = increased risk of skull fracture AND intra-cranial hemorrhage (with or without skull fracture)
- Presents with decreased level of consciousness (not localizing signs)


Epidural
Hematoma
Subdural Hematoma
Intracerebral
Hemorrhage
Subarachnoid
Hemorrhage



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https://en.wikipedia.org/wiki/File:Brain_herniation_types-2.svg

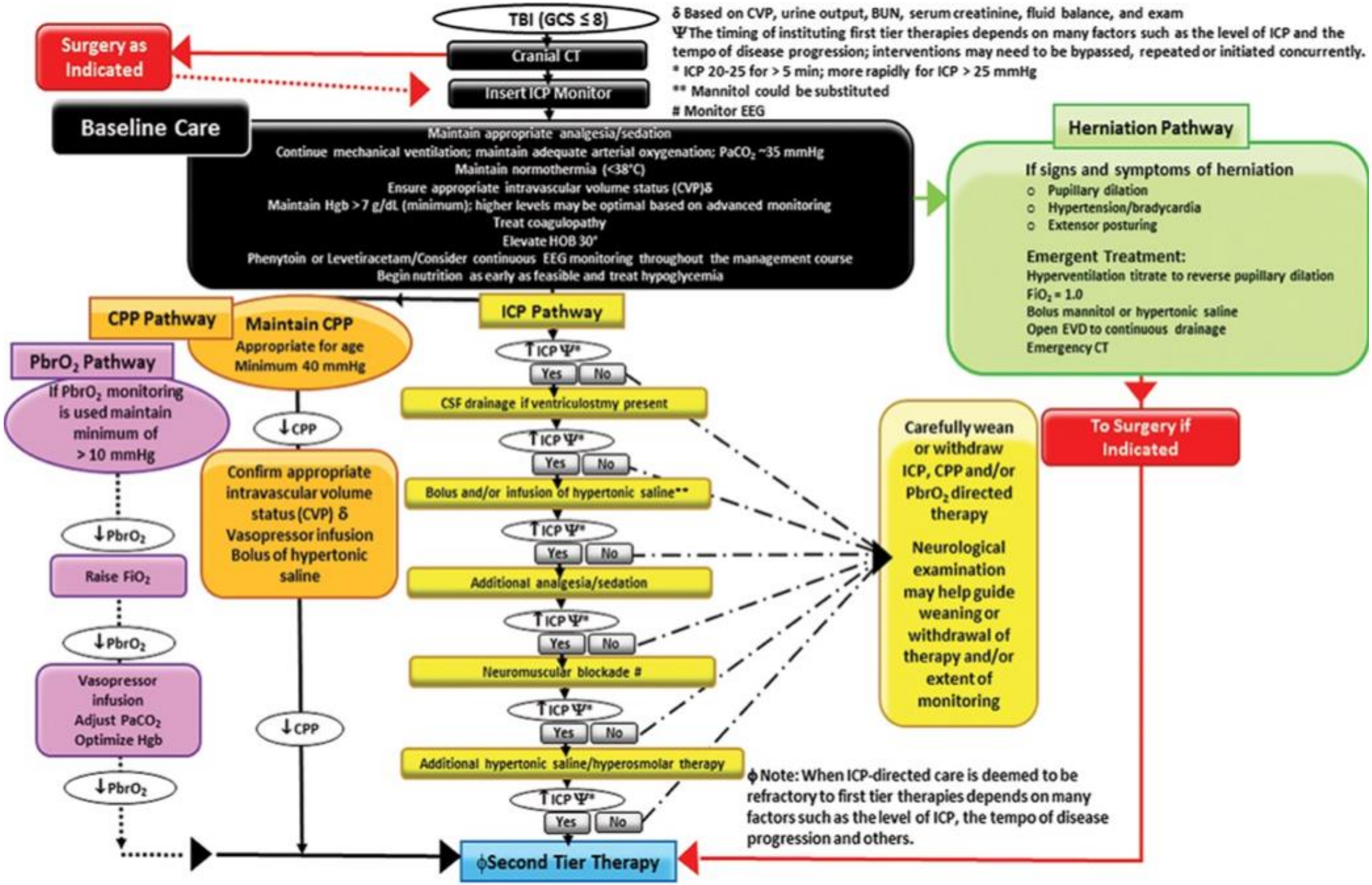
Management of severe TBI

- Aim = prevent secondary injury by optimizing tissue oxygenation
- “Neuro-protective measures”
  - Optimize oxygen delivery
    - Venous drainage: HOB 30 degrees, head midline, c-spine collar not too snug
    - Cerebral perfusion: normocapnia (35-40), normoxemia
    - Minimize swelling: keep Na>140
  - Decrease cerebral metabolic demand
    - Sedation/analgesia +/- paralysis
    - Normothermia
    - Seizure prophylaxis + treatment

Management of intracranial hypertension

- Guided by: CPP/ICP or clinical symptoms
- Hyperosmolar therapy
  - 3%NaCl bolus: **5ml/kg** over 10-20 minutes
  - 3% NaCl infusion: 0.1-1ml/kg/h (keep Na 140-160)
  - *Mannitol: 1g/kg = **5mls/kg***
- CSF drainage / EVD
- Additional sedation/analgesia, paralysis
- Vasopressors

Call Neurosurgery
Time = brain cells


TBI (GCS ≤ 8)
Cranial CT
Surgery as Indicated
Insert ICP Monitor
δ Based on CVP, urine output, BUN, serum creatinine, fluid balance, and exam
Ψ The timing of instituting first tier therapies depends on many factors such as the level of ICP and the tempo of disease progression; interventions may need to be bypassed, repeated or initiated concurrently.
* ICP 20-25 for > 5 min; more rapidly for ICP > 25 mmHg
** Mannitol could be substituted
# Monitor EEG
Baseline Care
Maintain appropriate analgesia/sedation
Continue mechanical ventilation; maintain adequate arterial oxygenation; PaCO2 ~35 mmHg
Maintain normothermia (<38°C)
Ensure appropriate intravascular volume status (CVP)δ
Maintain Hgb >7 g/dL (minimum); higher levels may be optimal based on advanced monitoring
Treat coagulopathy
Elevate HOB 30°
Phenytoin or Levetiracetam/Consider continuous EEG monitoring throughout the management course
Begin nutrition as early as feasible and treat hypoglycemia
Herniation Pathway
If signs and symptoms of herniation
Pupillary dilation
Hypertension/bradycardia
Extensor posturing
Emergent Treatment:
Hyperventilation titrate to reverse pupillary dilation
FiO2 = 1.0
Bolus mannitol or hypertonic saline
Open EVD to continuous drainage
Emergency CT
To Surgery if Indicated
CPP Pathway
Maintain CPP
Appropriate for age
Minimum 40 mmHg
↓CPP
Confirm appropriate intravascular volume status (CVP) δ
Vasopressor infusion
Bolus of hypertonic saline
↓CPP
PbrO2 Pathway
If PbrO2 monitoring is used maintain minimum of >10 mmHg
↓PbrO2
Raise FiO2
↓PbrO2
Vasopressor infusion
Adjust PaCO2
Optimize Hgb
↓PbrO2
ICP Pathway
↑ICP Ψ*
Yes
No
CSF drainage if ventriculostmy present
↑ICP Ψ*
Yes
No
Bolus and/or infusion of hypertonic saline**
↑ICP Ψ*
Yes
No
Additional analgesia/sedation
↑ICP Ψ*
Yes
No
Neuromuscular blockade #
↑ICP Ψ*
Yes
No
Additional hypertonic saline/hyperosmolar therapy
↑ICP Ψ*
Yes
No
Carefully wean or withdraw ICP, CPP and/or PbrO2 directed therapy
Neurological examination may help guide weaning or withdrawal of therapy and/or extent of monitoring
ϕSecond Tier Therapy
ϕ Note: When ICP-directed care is deemed to be refractory to first tier therapies depends on many factors such as the level of ICP, the tempo of disease progression and others.

Herniation Pathway

If signs and symptoms of herniation

- Pupillary dilation
- Hypertension/bradycardia
- Extensor posturing

Emergent Treatment:

Hyperventilation titrate to reverse pupillary dilation

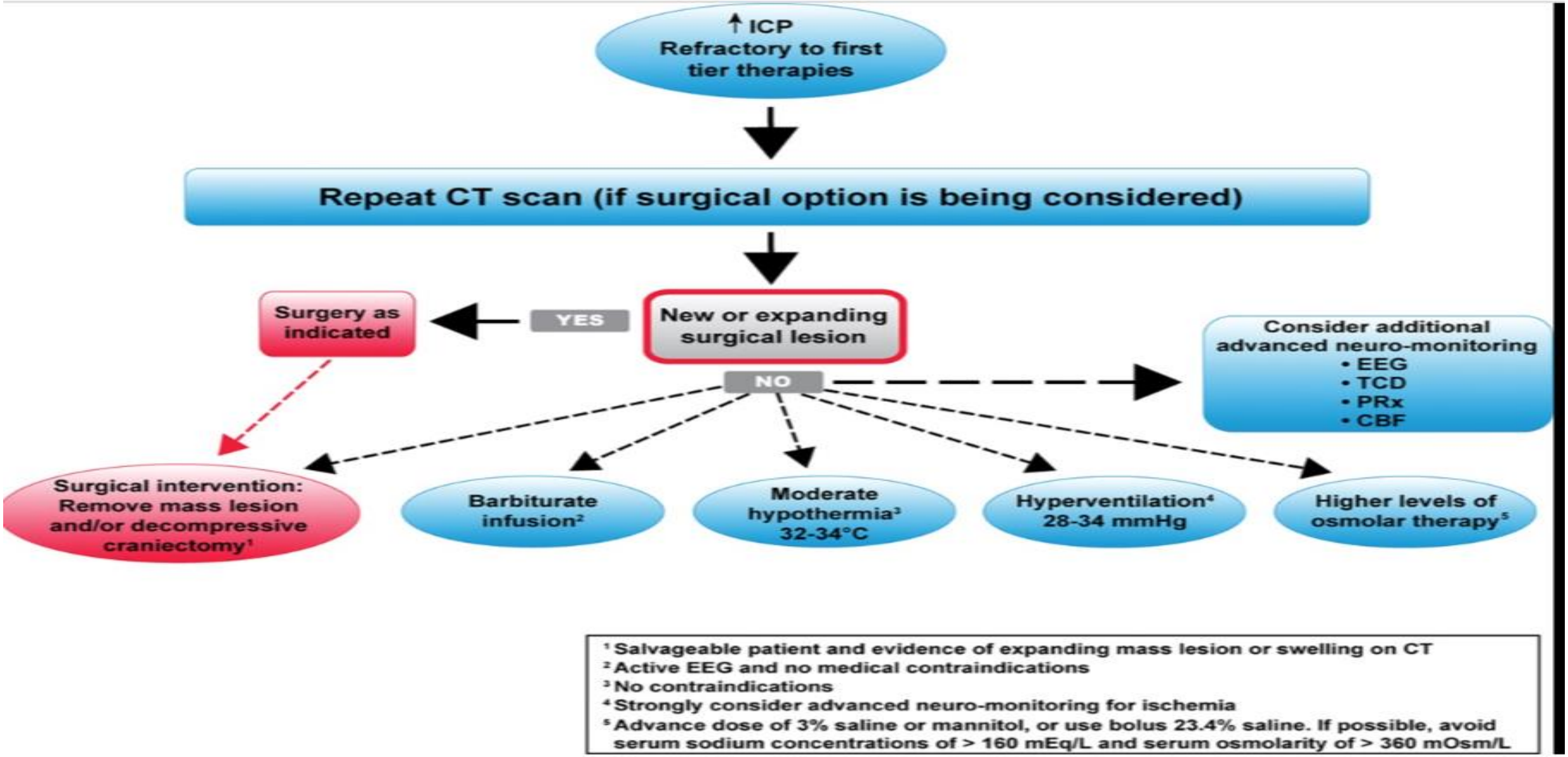
$FiO_2 = 1.0$

Bolus mannitol or hypertonic saline

Open EVD to continuous drainage

Emergency CT

Management of refractory intracranial hypertension



Head Injury

Head Injury

Head Injury Summary

- Traumatic Brain Injury (TBI)
- Assessment
- Treatment
- Management of Intracranial Hypertension/ Cerebral Herniation

In-a-Hurry Summary

Severe TBI

- Pediatric Traumatic Brain Injury (GCS <8)

In-a-Hurry Summary

Intubation in Trauma

- Before Intubation in Trauma
- Assessment
- Positioning
- Equipment
- Airway Equipment
- Checklist
- Pre-Oxygenation
- Fluids
- Medication

In-a-Hurry Summary

Pediatric Cervical Spine Injury (PCSI)

PSCI Epidemiology

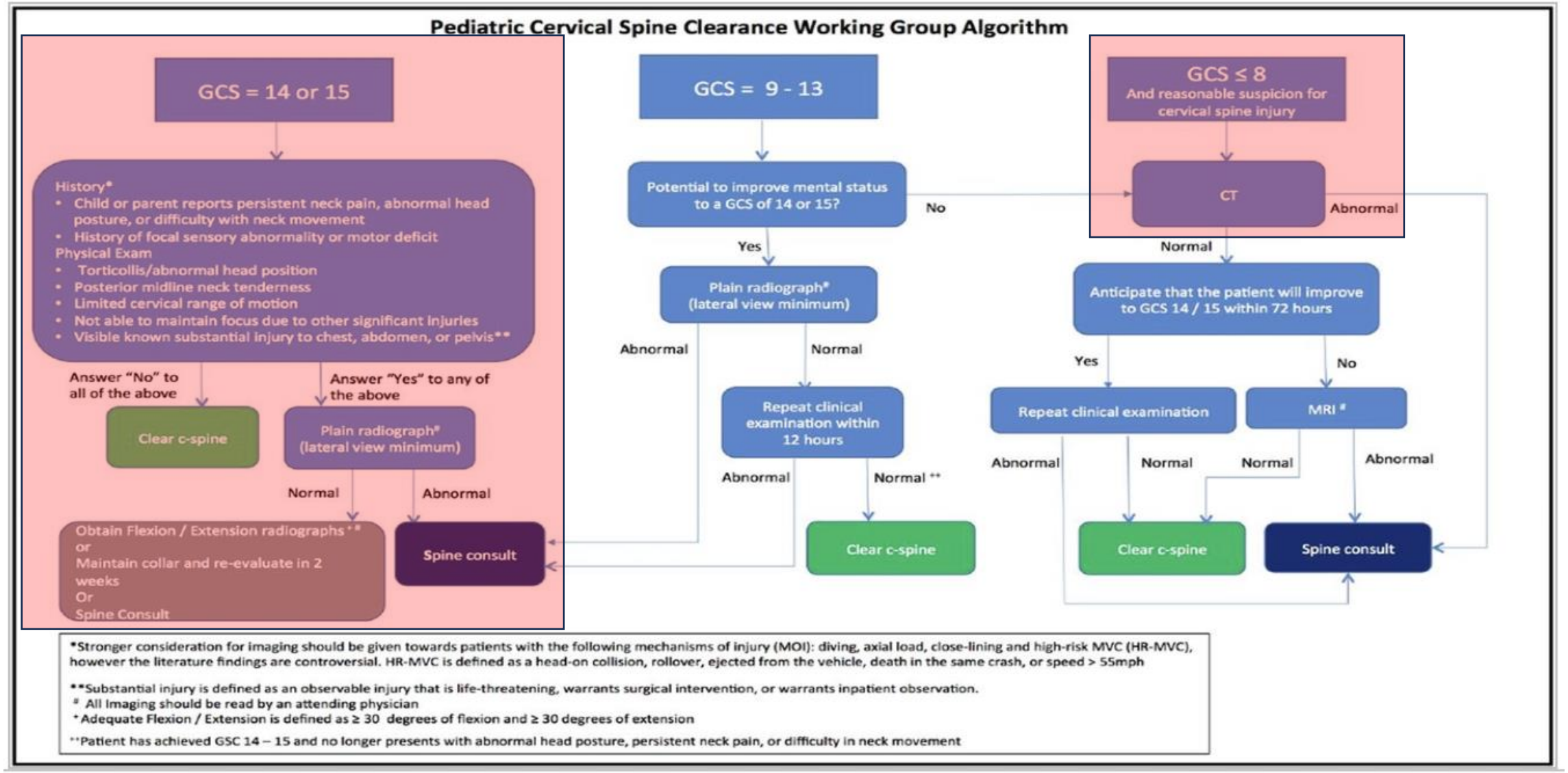
- Pediatric C-spine Injury is rare
  - 873/84,554 = 1.03%
  - Age <4 less common (0.68%)
- Age-dependent patterns
  - <2: 74% axial with AOD most common
  - 2-7: 78% axial with AARS and AOD most common
  - 8-15: 53% subaxial (body fx) + 16% SCIWORA

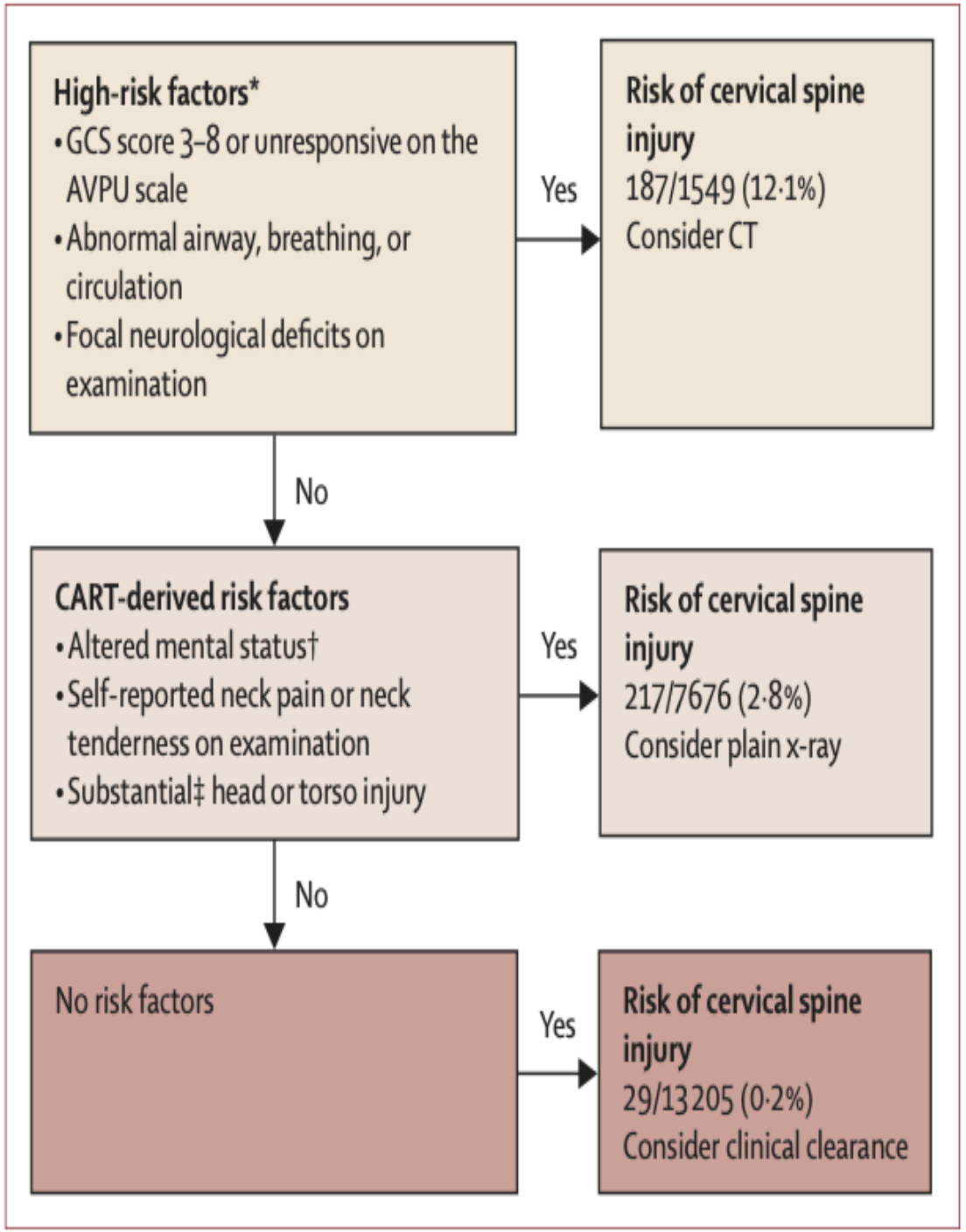
Cervical Spine Immobilization

- Rationale
  - Prevent secondary injury from movement
- Assumption
  - Spinal immobilization prevents motion and secondary injury
    - FALSE!

- Adverse Effects of C-Collars
  - Airway[2]
    - Intubation difficulty
    - Aspiration risk
  - Breathing
    - Restrictive lung function[1,3]
  - Neurologic
    - Increased ICP[4]
    - Pain[5]
    - Increased mortality in penetrating trauma[6]
    - Increased morbidity in blunt spine trauma[7]
  - Increased imaging and admissions[8]

Pediatric Cervical Spine Clearance





ABC: required to halt trauma survey and intervene

Focal deficits: in ED only
(strength, sensation, paresthesia)

AMS: GCS 9-14

Neck pain: without prompting

Substantial injury: requiring surgery or admission

29 missed CSI
No surgical interventions

Pediatric C-spine Summary and Tips

- Pediatric CSI is rare, with age-dependent patterns of injury
- C-collars and imaging are reasonable for children with GCS <14
- Clinical clearance for children with GCS 14-15 meeting low-risk criteria
  - http://shop.healthcarebc.ca/phsa/BCWH_2/BC%20Children's%20Hospital/C-05-07-60737.pdf
- Young children with GCS 14-15 spontaneously moving their neck without life-threatening torso injuries can be clinically cleared

Thoracic Injuries

Thoracic Injuries

- Less than 1/10th of pediatric trauma related injuries
- BUT 2nd leading cause of pediatric trauma death (14%)
- Blunt thoracic trauma is usually associated with multisystem trauma (92%)

Common Injuries

- Pulmonary contusion, PTX, HTX

Less Common Injuries

- Rib fractures * / flail chest
- Great vessel
- Tracheo-bronchial
- Esophageal

Thoracic Injuries - Imaging

- NICE (2016):
  - CXR / POCUS 1st line for children <16 years
- RCR Paediatric Trauma Protocols (2017):
  - CXR

CT chest

- Penetrating chest trauma
- Hemodynamic instability / unconscious
- Concerning CXR findings, clinical condition (HD stability, LOC), CXR findings

Thoracic injuries - Management

Pulmonary contusions

- May be delayed
- Respiratory support including NIPPV or MV

Pneumo-hemothorax

- Chest tube insertion
  - Pigtail or surgical thoracostomy
  - 4 x ETT size
- OR for >25% EBV OR >4ml/kg/h in hemothorax

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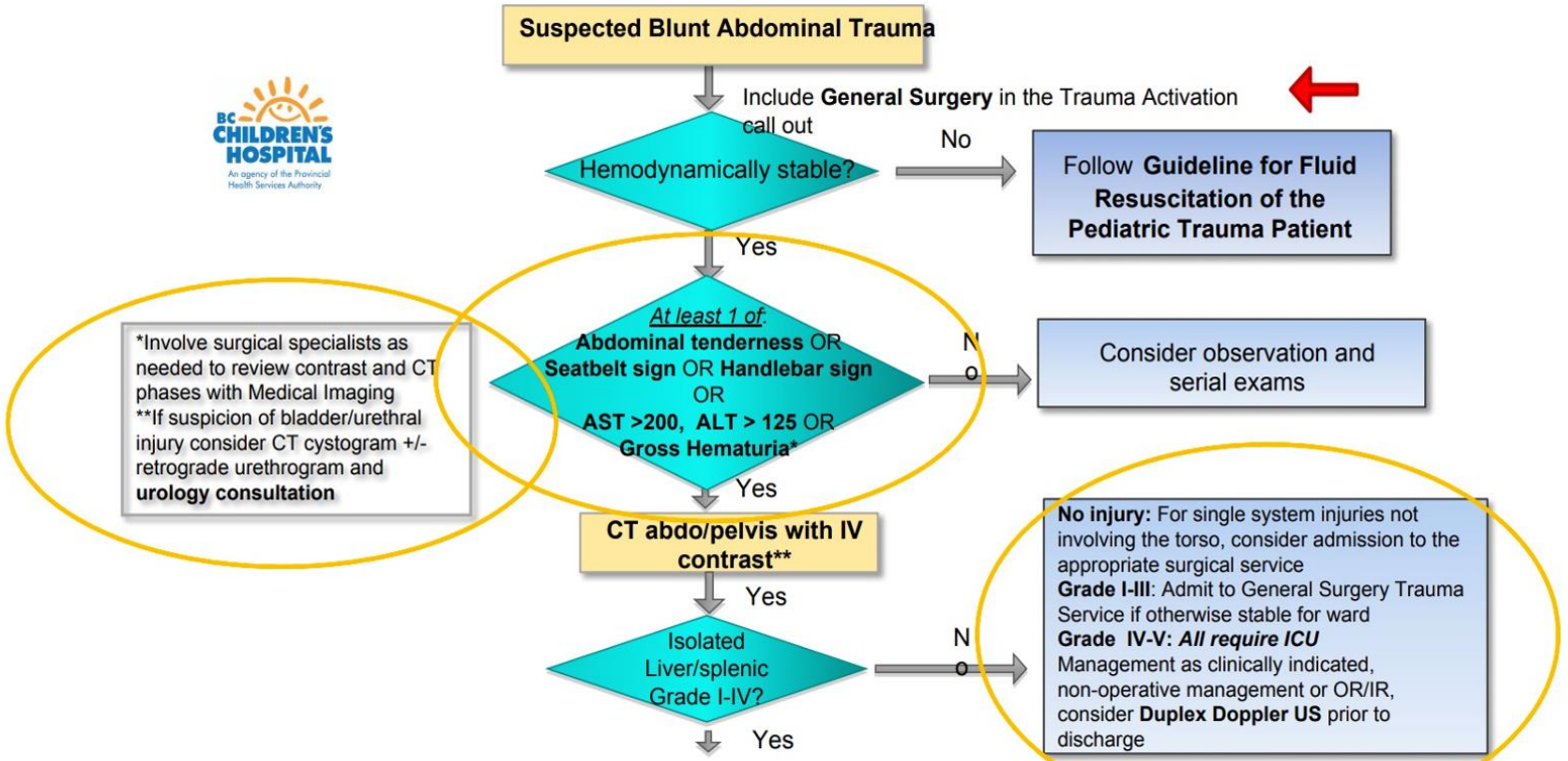
Abdominal Trauma

Abdominal Trauma

- 3rd cause of pediatric trauma death
- Increased risk of severe injury and multiple injuries
- Common IAI
  - Spleen / liver
  - Kidneys
  - GI tract

Red Flags

- Seatbelt sign
- Focal abdominal bruising
- Lower rib fractures
- Vertebral fractures
- Inflicted injuries



CT Grade	I	II	III	IV & V
ICU LOS	none	none	none	24 hrs
Hospital LOS	1-2 days	2-3 days	3-4 days	4-5 days
Pre-discharge imaging	none	none	Consider	Consider
Post discharge imaging	none	none	Consider	Consider
Activity restriction/follow-up	3 weeks	4 weeks	5 weeks	6 weeks

Abdominal Injuries – Imaging & Management

- Imaging
  - CT: solid organ injury identification and grading
    - Poor sensitivity / specificity for hollow viscous injury
  - eFAST: not sensitive enough to affect decision-making, better specificity
    - US: cannot grade solid organ injury
- Medical Management of IAI
  - Analgesia, IVF, blood products, rest
- Surgical/IR Management
    - Hemodynamically unstable patients (despite initial resuscitation)
    - Penetrating injury
    - +/- Perforation to hollow viscus

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Special Considerations
Inflicted Injuries & Burns

Inflicted Injuries

- Assess + manage using same ATLS principles (higher risk of multi-system trauma)
  - CT head (<6 months or abnormal neurologic exam) +/- c-spine imaging
  - CXR
  - Trauma labs + NAT labs
  - +/- abdominal and extremity imaging

Inflicted Injuries

- 10% of admitted trauma < 5 yo
- Higher risk of multiple injuries (>50%), severe injury and mortality
- Most common injuries:
  - Head
  - Extremities
  - Trunk
  - Abdomen (<1yo)

Assessment & Management

- Follow ATLS principles
- Evaluation
  - CT head (<6 months or abnormal neurologic exam) +/- c-spine imaging
    - CXR
  - Trauma labs
    - abdominal CT for elevated LFTs
- CPS Consult / MoH Report

Burns

Classification	Involvement	Clinical
Superficial	Epidermis	Dry. Red + blanches. Painful
Partial Thickness	Superficial dermis	Blisters. Moist. Red + blanches. Pain
	Deep dermis	Blisters. Wet/waxy, mottled pink/white, does not blanch, no pain
Full Thickness	Subcutaneous tissue Fascia, muscle, bone	Avascular. Waxy white to charred. Dry. No blanching. No pain.

Estimate BSA (partial and full thickness)

- Lund-Browder charts
- 1% BSA = child's palm

BCCH Burns Diagram (1 to 14 years)

BURN DIAGRAM
AGES 1-14 yrs

BC CHILDREN'S HOSPITAL

PATIENT LABEL

Date of Burn ___/___20___

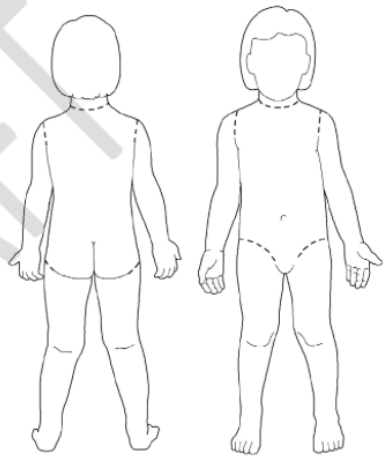
Date of Admission ___/___20___

Date of TBSA Estimation ___/___20___ (Preliminary) by Dr _____

Date of TBSA Estimation ___/___20___ (Final) by Dr _____

Area	Age 1– 4 yr	Age 5 – 9 yr	Age 10-14 yr	Preliminary TBSA (0.0%) 2° SD	2° MD	2° DD	3° FT	Final TBSA (0.0%) 2° SD	2° MD	2° DD	3° FT
Head	17	13	11								
Neck	2	2	2								
Ant. Trunk	13	13	13								
Post. Trunk	13	13	13								
R. Buttock	2.5	2.5	2.5								
L. Buttock	2.5	2.5	2.5								
Genitalia	1	1	1								
R.U. Arm	4	4	4								
L.U. Arm	4	4	4								
R.L. Arm	3	3	3								
L.L. Arm	3	3	3								
R. Hand	2.5	2.5	2.5								
L. Hand	2.5	2.5	2.5								
R. Thigh	6.5	8	8.5								
L. Thigh	6.5	8	8.5								
R. Leg	5	5.5	6								
L. Leg	5	5.5	6								
R. Foot	3.5	3.5	3.5								
L. Foot	3.5	3.5	3.5								
			Total								

Preliminary TBSA ____ Final TBSA ____



SD (Superficial Dermal) DD (Deep Dermal) MD (Mid Dermal) FT (Full Thickness)

To Health Records: This form is implemented as DRAFT from November 2015 to April 2016. Please file this form in patient's chart.

Source: https://www.ubcplastics.ca/_files/ugd/ce5ba8_aed12b59f22a4f75be2620aac42f2b30.p...

BURN DIAGRAM - AGES 1-14yrs [Internet]. BCCH and UBC Plastic Surgery; 2015. Available from: https://www.ubcplastics.ca/_files/ugd/ce5ba8_aed12b59f22a4f75be2620aac42f2b30.pdf

BCCH Burns Diagram (0 to 1 year)

BURN DIAGRAM
AGE 0-1 yr

BC CHILDREN'S HOSPITAL

PATIENT LABEL

Date of Burn ___/___20___

Date of Admission ___/___20___

Date of TBSA Estimation ___/___20___ (Preliminary) by Dr _____

Date of TBSA Estimation ___/___20___ (Final) by Dr _____

Area	Age 0 – 1 yr	Preliminary TBSA (0.0%) 2° SD	2° MD	2° DD	3° FT	Final TBSA (0.0%) 2° SD	2° MD	2° DD	3° FT
Head	19								
Neck	2								
Ant. Trunk	13								
Post. Trunk	13								
R. Buttock	2.5								
L. Buttock	2.5								
Genitalia	1								
R.U. Arm	4								
L.U. Arm	4								
R.L. Arm	3								
L.L. Arm	3								
R. Hand	2.5								
L. Hand	2.5								
R. Thigh	5.5								
L. Thigh	5.5								
R. Leg	5								
L. Leg	5								
R. Foot	3.5								
L. Foot	3.5								
	Total								

Preliminary TBSA ____ Final TBSA ____

SD (Superficial Dermal) DD (Deep Dermal) MD (Mid Dermal) FT (Full Thickness)

To Health Records: This form is implemented as DRAFT from November 2015 to April 2016. Please file this form in patient's chart.

Source: https://www.ubcplastics.ca/_files/ugd/ce5ba8_d8e0a6a6c1004b209eb22ce9b73531c2.p...

BURN DIAGRAM - AGE 0-1 yr [Internet]. BCCH and UBC Plastic Surgery; 2015. Available from: https://www.ubcplastics.ca/_files/ugd/ce5ba8_d8e0a6a6c1004b209eb22ce9b73531c2.pdf

Burn Resuscitation

A: Indications for intubation

- signs of inhalation injury (singed nasal hair, sooth in mouth, facial burns)
- Impending respiratory failure (hoarseness, stridor, respiratory distress, drooling)
- SA>50%

B: oxygen, arterial gas (PaO2, carboxyHgb)

C: IV/IO x2, foley catheter, initial fluid resuscitation

E: remove clothing, temperature-controlled environment

History: Enclosed space (**CO/cyanide**), trauma, **tetanus**

Initial investigations: CBC, lytes 7, gas, CK, UA, gas+/- imaging

Management – Initial 24h

- Replace losses: parkland formula, LR
  - 3-4 mL x %BSA x wt (kg) = first 24 hours (1/2 in first 8 hours)
  - Adjust with urine output (see BCCH burn protocol)
- Maintenance with dextrose
- Pain control
- Wound care (consult with plastics early) + monitor closely for infections
- Management of inhalation injury: I+V with aggressive pulmonary toilet
  - CO: 100% oxygen +/- hyperbaric chamber
  - Cyanide: hydroxycobalamin

Burns

Burns

Burns Summary

- Pediatric Considerations
- Criteria for Referral to a Burn Centre (BCCH)

In-a-Hurry Summary

Burns Management

- Fluid Management
- Burn Resuscitation Protocol (First 48 Hours)
- Management of Hypotension

In-a-Hurry Summary

Burn Diagrams (Printable)

- Measuring Total Body Surface Area of the Burn
- BCCH Burns Diagram (0 to 1 year)
- BCCH Burns Diagram (1 to 14 years)
- BCCH Burns Diagram (15 years to Adult)

In-a-Hurry Summary

BURNS MANAGEMENT

Fluid Management

Burn Resuscitation Protocol (First 48 Hours)

Management of Hypotension

Psychosocial Considerations

- Children are at higher risk for psychological sequelae following severe trauma
  - Immature cognitive/emotional abilities
  - Dependence on caregivers who may have also been injured
  - Increased risk: mass casualty event, injury to loved ones, secondary stressors, separation from caregiver etc.
  - Minimize secondary stressors
    - Ensure the presence of parents/family whenever possible
    - Provide support person (child-life specialist, volunteer)
    - Minimize painful/invasive procedures
    - Provide age-appropriate care

Thank you for your attention

When on the fence:
call the trauma team

References

- Kochanek, Patrick M. et al Management of Pediatric Severe Traumatic Brain Injury: 2019 Consensus and Guidelines-Based Algorithm for First and Second Tier Therapies. Pediatric Critical Care Medicine 20(3):p 269-279, March 2019. | DOI: 10.1097/PCC.0000000000001737
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- Herman MJ, Brown KO, Sponseller PD, Phillips JH, Petrucelli PM, Parikh DJ, Mody KS, Leonard JC, Moront M, Brockmeyer DL, Anderson RC. Pediatric Cervical Spine Clearance: A Consensus Statement and Algorithm from the Pediatric Cervical Spine Clearance Working Group. JBJS. 2019 Jan 2;101(1):e1.
- RCR Paediatric Trauma Protocols (2017)
- BCCH Guideline: MANAGEMENT OF TRAUMATIC BRAIN INJURY IN CHILDREN WITH GCS < 8
- BCCH Guideline: Massive Transfusion Protocol
- BCCH Algorithm: PEDIATRIC TRAUMA FLUID RESUSCITATION