

# Pediatric Traumatic Brain Injury

By Cathryn Palagyi, Arabella Escobedo, Melisa Fahey, & Abbi Foote

<b>Student Developed Simulation Scenario Storyboard</b>	
<p><b>Identified Problem/Scenario</b>  <b>Topic:</b> Traumatic Brain Injury (TBI) in a 3-month-old following a Fall  <b>Related Resources:</b>                      Pediatric Glasgow Coma Scale                      CDC Pediatric Head Injury Guidelines                      ATI Pediatric Nursing (2023)                      National Institute of Neurological Disorders and Stroke (NINDS)</p>	<p><b>Scenario Key Points:</b></p> <ul style="list-style-type: none"> <li>● Infant fell from a couch at home</li> <li>● Presents with vomiting, irritability, and decreased responsiveness</li> <li>● Bulging fontanelle and unequal pupils noted</li> <li>● CT scan pending; suspected intracranial injury</li> <li>● Parents are anxious and unsure how the fall occurred</li> </ul>
<p><b>Case Summary:</b> A 3-month-old male infant was brought to the ED after falling from a couch onto a hardwood floor. The mother reports the infant rolled unexpectedly. Since the incident, the infant has vomited twice, is irritable, and less responsive. Assessment reveals a bulging fontanelle, unequal pupils, and a high-pitched cry. Vital signs show bradycardia and elevated blood pressure. A CT scan is ordered. The infant is admitted for neuro monitoring and supportive care.</p>	<p><b>Expected Interventions of Students: (<u>Minimum of 5 required.</u>)</b></p> <ul style="list-style-type: none"> <li>● Perform frequent neuro assessments using <b>Pediatric Glasgow Coma Scale</b>  <b>Eye opening:</b> to pain= 2 pts  <b>Verbal Response:</b> high-pitched cry, irritable= 3 pts  <b>Motor Response:</b> withdraws to pain= 4 pts  <b>Total pts for Lane:</b> 9pts</li> <li>● Elevate head of bed to 30° and maintain head midline</li> <li>● Monitor for signs of increased intracranial pressure (Cushing's triad)</li> <li>● Administer all medications, using FLACC scale for pain assessment</li> <li>● Educate and emotionally support parents</li> <li>● Maintain NPO status and initiate IV fluids</li> <li>● Prepare for seizure precautions (suction, emergency meds)</li> <li>● Document all assessments and interventions thoroughly</li> </ul>
<p><b>Supplies:</b></p> <ul style="list-style-type: none"> <li>● Pediatric crash cart</li> <li>● Suction setup</li> <li>● Oxygen delivery system</li> <li>● IV start kit and fluids</li> <li>● Neurological assessment tools</li> <li>● FLACC pain scale chart</li> <li>● Pediatric medication supplies</li> </ul>	

**Medications:** (Include drug name, dosage, route, and concentration for scenario)

- Acetaminophen: 80mg q4-6h PRN, PO/PR, 160 mg/mL
- Lorazepam: 0.05 mg/kg PRN, IV, 2 mg/mL
- NS 0.9%NaCl: 10mL/kg continuous, IV, isotonic solution
- NS 0.9%NaCl: 10mL/kg bolus, IV, isotonic solution
- Ondansetron: 0.1 mg/kg q8h PRN, IV, 2 mg/mL

**Support Person: (Only complete if you want a support person)**

**Who is the person to the patient?** Mother

**Questions/Responses for Support Person:**

**Mom:** "Will my baby be okay?"

**Nurse:** "We're monitoring your baby closely and taking every step to ensure safety and recovery."

**Mom:** "How did this happen?"

**Nurse:** "Infants begin rolling around this age. We'll help you learn safety strategies to prevent future injuries."

## NCLEX Questions

- I. Which of the following findings indicates increased intracranial pressure in a 3-month-old infant?
- A. Soft, flat fontanelle
  - B. High-pitched cry
  - C. Regular Respirations
  - D. Warm Extremities

**Answer: B**

**Rationale:** A high-pitched cry is a classic sign of increased ICP in infants, along with bulging fontanelle and irritability.

- II. What is the priority nursing action for an infant with suspected TBI and vomiting?
- A. Administer oral fluids
  - B. Place infant in prone position
  - C. Maintain NPO and initiate IV fluids
  - D. Encourage breast feeding

**Answer: C.**

**Rationale:** Vomiting increases aspiration risk. NPO status with IV fluids ensures hydration and airway protection.

**Debriefing Questions:**

1. What signs and symptoms helped you identify increased intracranial pressure in this patient?
2. How did you support the parent emotionally while maintaining clinical priorities?

**Case Flow (15-20 Minute Simulation Time)**

**Initiation of Scenario:**

**Patient statements:**

Waaah! (inconsolable crying)

Mother: "He rolled off the couch—I didn't think he could move like that yet."

"He's been vomiting and acting strange since the fall."

Mother is visibly upset and distraught at bedside.

**Pain on FLACC Scale**

<b>Vital Signs</b>	<b>T</b>	<b>98.96</b>	<b>HR</b>	<b>90</b>	<b>RR</b>	<b>28</b>	<b>BP</b>	<b>90/60</b>	<b>SpO2</b>	<b>96% RA</b>	<b>Pain</b>	<b>6/10</b>	<b>BS</b>	<b>Present</b>
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<b>Cardiac</b>	Bradycardia
<b>Respiratory</b>	Irregular breathing pattern
<b>Neuro</b>	Bulging fontanelle, unequal pupils (possible cranial nerve III compression), high-pitched cry, decreased responsiveness
<b>Skin</b>	Pale, cool extremities
<b>GI</b>	Vomiting x2
<b>GU</b>	Wet diaper noted
<b>Other</b>	Child is inconsolable at this time

**Patient changes during scenario:**

**Patient statements:**

"Waaah!" (crying becomes weaker)

Mother: "He's not looking at me like he usually does."

Infant becomes less responsive, eyes partially closed

Pain on FLACC Scale														
Vital Signs	T		HR	85	RR	26	BP	95/65	SpO2	94% RA	Pain	7/10	BS	Present
Cardiac	Continued Bradycardia													
Respiratory	Slight retractions noted													
Neuro	Decreased LOC, pupils sluggish													
Skin	Mottled appearance													
GI	No new vomiting													
GU	No new output													
Other	CT scan ordered													
New Patient Orders	NPO, IV D5 0.45% NS @maintenance rate, Acetaminophen IV 15mg/kg q4-6h PRN, Lorazepam IV PRN for seizure activity, CT scan STAT, Neuro checks q1h, seizure precautions initiated													
<b>End of Scenario:</b>														
<p><b>Patient statements:</b> Infant quiet, eyes closed  Mother: "Is he going to be okay?"</p> <p><b>Nurse:</b> "We're monitoring him closely and have started treatment to reduce brain swelling."</p>														
Vital Signs	T	99.32	HR	88	RR	30	BP	92/60	SpO2	97% RA	Pain	4/10	BS	Present
Cardiac	Stable													
Respiratory	Improved with Oxygen													
Neuro	Slight improvement in responsiveness													
Skin	Warm, pink													

<b>GI</b>	No new vomit
<b>GU</b>	Wet diaper
<b>Other</b>	Awaiting CT results

**Patient Report:** Patient arrives to the ER lethargic, decreased LOC, High-pitched cry, bradycardia (88 bpm), elevated BP (92/60) within normal limits, but in the context of **bradycardia and neurological signs**, even a **relative elevation** may signal **increased intracranial pressure (ICP)**], and bulging fontanelle. Seizure precautions in place.

### **Additional information, Medical History:**

**Patient data:** Arrived to ER with Mom after a fall off the couch at home.

**DOB:** 07/03/20XX

**MR#:** 001234567

**Prior medical history:** Full-term birth, No known conditions

**Allergies:** NKDA

**Social history:** Lives with Mom and Dad, no CPS involvement

**Firelands Regional Medical Center**

**Sandusky, Ohio**

**Physician's Orders**

<b>NAME:</b> Lane K. Fall	<b>STATUS:</b> SIGNED
<b>DATE ORD:</b> 10/03/20XX	<b>ROOM:</b> 2203
<b>ORD PHYS:</b> Dr. Arabella Escobedo, M.D.	<b>MR#</b> 001234567
<b>ATTENDING:</b> Cathryn Palagyi, M.D.	<b>DOB:</b> 07/03/20XX
<b>AGE:</b> 3 months old	<b>DATE:</b> 10/03/20XX

<b>Date/Time</b>	
10/03/20XX 1611	<b>Admit to:</b> PICU
	<b>Diagnosis:</b> TBI
	<b>VS:</b> every 15 mins
	<b>Activity:</b> bedrest
	<b>Diet:</b> NPO
	<b>I&amp;O:</b> Monitor strictly

	<b>IV:</b> D5 0.45% NS maintenance rate
	<b>Medications:</b> Acetaminophen IV 15mg/kg q4-6h PRN Lorazepam IV PRN for seizure activity Odansetron 0.1 mg/kg q8h PRN, IV, 2 mg/mL
	<b>Other:</b> Neuro checks q1h  CT scan of head STAT
	Dr. Arabella Escobedo, M.D.

<b>NAME:</b> Lane K. Fall		<b>DOB:</b> 07/03/XX <b>Age:</b> 3 mos
<b>Allergies:</b> NKDA	<b>Medication Administration Record – Current Medications</b>	<b>Account #:</b> 001234567
<b>Attending:</b> Dr Cathryn Palagyi, M.D.		<b>Unit:</b> Peds <b>Room #:</b> 2203 <b>ADM IN:</b> PICU
<b>Wt:</b> 6.4 kg; <b>Ht:</b> 24.4in		
<b>BSA:</b> 0.53 m2 <b>BMI:</b> 16.6		

Start	Medication	Time	TODAY
Stop			XX/XX/XXXX

XX/XX/XXX X	<u>Name Route How Often</u> Trade: Ofirmev (acetaminophen) 15mg/kg IV Administer: _____  Instructions: q4-6 hr PRN for pain 4< per FLACC Pain Scale	_____	
XX/XX/XXX X			
Active Acknowledged			

XX/XX/XXX X	<u>Name Route How Often</u> Trade: IV D5 0.45% NS  Administer: _____  Instructions: @maintenance rate	_____	
XX/XX/XXX X			
Active Acknowledged			

XX/XX/XXX X	<u>Name Route How Often</u> Trade: Ativan (lorzepam) IV PRN 0.5 mg/kg  Administer: _____  Instructions: PRN for seizure activity	_____	
XX/XX/XXX X			
Active Acknowledged			

XX/XX/XXX X	<u>Name Route How Often</u> Trade: _____  Administer: _____  Instructions: _____	_____	
XX/XX/XXX X			
Active Acknowledged			

XX/XX/XXX X	<u>Name Route How Often</u> Trade: _____  Administer: _____  Instructions: _____	_____	
XX/XX/XXX X			
Active Acknowledged			

**Firelands Regional Medical Center**

**Sandusky, Ohio**

**LABORATORY**

<b>NAME:</b> Lane K. Fall	<b>STATUS:</b> SIGNED
<b>DATE ORD:</b> XX/XX/XX	<b>ROOM:</b> 2203
<b>ORD PHYS:</b> Dr. Arabella Escobedo, M.D.	<b>MR#</b> 001234567
<b>ATTENDING:</b> Cathryn Palagyi, M.D.	<b>DOB:</b> 07/03/XX
<b>AGE:</b> 3 months	<b>DATE:</b> XX/XX/XX

HGB/HCT	XX/XX/XX Admission	Reference Range
HGB	<b>10 g/dL</b>	<b>9.5 – 13.5 g/dL</b>
HCT	<b>30%</b>	<b>29-41%</b>

<b>CMP</b>	<b>XX/XX/XX Admission</b>	<b>Reference Range</b>
<b>Na</b>	<b>125 mEq/L</b>	<b>135-145 mEq/L</b>
<b>CL</b>	<b>100 mEq/L</b>	<b>98-108 mEq/L</b>
<b>K</b>	<b>4.2 mEq/L</b>	<b>4.1-5.3 mEq/L</b>
<b>BUN</b>	<b>10 mg/dL</b>	<b>5-18 mg/dL</b>
<b>Creatinine</b>	<b>0.3 mg/dL</b>	<b>0.2-0.4 mg/dL</b>
<b>Blood Glucose</b>	<b>56 mg/dL</b>	<b>60-110 mg/dL</b>
<b>Blood pH</b>	<b>7.25</b>	<b>7.35-7.45</b>

<b>URINALYSIS</b>	<b>XX/XX/XX Admission</b>	<b>Reference Range</b>
<b>pH</b>	<b>6</b>	<b>5-7</b>
<b>Specific Gravity</b>	<b>1.030</b>	<b>1.005 – 1.020</b>
<b>Glucose</b>	<b>negative</b>	<b>negative</b>
<b>Protein</b>	<b>Trace</b>	<b>negative</b>
<b>Blood</b>	<b>negative</b>	<b>Negative</b>
<b>Ketones</b>	<b>Trace</b>	<b>Negative</b>
<b>Nitrite</b>	<b>negative</b>	<b>negative</b>
<b>Leukocyte esterase</b>	<b>negative</b>	<b>negative</b>
<b>Clarity</b>	<b>clear</b>	<b>clear</b>
<b>Color</b>	<b>Dark yellow</b>	<b>Pale yellow</b>

**Firelands Regional Medical Center**

**Sandusky, Ohio**

**IMAGING DEPARTMENT**

<b>NAME:</b> Lane K. Falls	<b>STATUS:</b> SIGNED
<b>DATE ORD:</b> 10/03/XX	<b>ROOM:</b> 2203
<b>ORD PHYS:</b> Dr. Arabella Escobedo, M.D.	<b>MR#</b> 001234567
<b>ATTENDING:</b> Cathryn Palagyi, M.D.	<b>DOB:</b> 07/03/XX
<b>AGE:</b> 3 months	<b>DATE:</b> 10/03/XX

**CLINICAL DATA/Reason for Test: Pediatric TBI**

**CT: Subdermal hematoma; bleeding between the dura and brain surface; common in infants due to fragile bridging veins, may cause ICP. Cerebral edema; swelling of brain tissue, can compress brain structures and lead to herniation. Skull fracture; linear or depressed fracture, may be associated with underlying brain injury. Midline shift; displacement of brain structures, indicates significant mass effect from bleeding or swelling. Loss of gray-white differentiation; blurring of cortical boundaries, suggests diffuse brain injury or hypoxia. Ventricular depression; narrowed or displaced ventricles, signs of increased ICP or mass effect. Signs of herniation; brain tissue pushing into adjacent compartments, life-threatening emergency requiring immediate intervention.**

**IMPRESSION: Shows diffuse cerebral edema with ventricular compression and midline shift, consistent with increased intracranial pressure secondary to traumatic brain injury. Findings indicate significant brain swelling.**

 **Case Flow (15–20 Minute Simulation Time)**

**Initiation of Scenario**

**Patient Statements:**

- **“Waaah!” (inconsolable crying)**
- **Mother: “He rolled off the couch—I didn’t think he could move like that yet.”**
- **“He’s been vomiting and acting strange since the fall.”**

**Vital Signs**

- **T: 37.2°C**
- **HR: 90 bpm**
- **RR: 28/min**
- **BP: 90/60 mmHg**
- **SpO<sub>2</sub>: 96% RA**
- **Pain: FLACC score 6/10**
- **BS: Present**

## **Systems Assessment**

- **Cardiac: Bradycardia noted**
- **Respiratory: Irregular breathing pattern**
- **Neuro: Bulging fontanelle, unequal pupils, high-pitched cry, decreased responsiveness**
- **Skin: Pale, cool extremities**
- **GI: Vomiting x2**
- **GU: Wet diaper noted**
- **Other: Child is inconsolable at this time**

## **Patient Changes During Scenario**

### **Patient Statements:**

- **“Waaah!” (crying becomes weaker)**
- **Mother: “He’s not looking at me like he usually does.”**
- **Infant becomes less responsive, eyes partially closed**

### **Vital Signs**

- **T: 37.3°C**
- **HR: 85 bpm**
- **RR: 26/min**
- **BP: 95/65 mmHg**
- **SpO<sub>2</sub>: 94% RA**
- **Pain: FLACC score 7/10**
- **BS: Present**

## **Systems Assessment**

- **Cardiac: Continued bradycardia**
- **Respiratory: Slight retractions noted**
- **Neuro: Decreased LOC, pupils sluggish**
- **Skin: Mottled appearance**
- **GI: No new vomiting**
- **GU: No new output**
- **Other: CT scan ordered**

#### **New Patient Orders**

- **NPO status**
- **IV D5 0.45% NS at maintenance rate**
- **Acetaminophen PR 80 mg q4–6h PRN**
- **Lorazepam IV PRN for seizure activity**
- **CT scan of head STAT**
- **Neuro checks q1h**
- **Seizure precautions initiated**

### **End of Scenario**

#### **Patient Statements:**

- **Infant quiet, eyes closed**
- **Mother: “Is he going to be okay?”**
- **Nurse: “We’re monitoring him closely and have started treatment to reduce brain swelling.”**
- **Vital Signs**
- **T: 37.4°C**

- HR: 88 bpm
- RR: 30/min
- BP: 92/60 mmHg
- SpO<sub>2</sub>: 97% on nasal cannula
- Pain: FLACC score 4/10
- BS: Present

### Systems Assessment

- Cardiac: Stable
- Respiratory: Improved with oxygen
- Neuro: Slight improvement in responsiveness
- Skin: Warm, pink
- GI: No new vomiting
- GU: Wet diaper
- Other: Awaiting CT results

### Patient Report

### Additional Information / Medical History

- DOB: 07/01/2025
- MR#: 001234567
- Prior Medical History: Full-term birth, no known conditions
- Allergies: NKDA
- Social History: Lives with mother and father, no CPS involvement

## Firelands Regional Medical Center

### Physician's Orders:

NAME: Lane K. Fall

KA 7/11/25

