Pediatric Febrile Status Epilepticus

Section 1: Case Summary

Scenario Title:	Pediatric Febrile Status Epilepticus
Keywords:	Peds Febrile Status Epilepticus
Brief Description of Case:	A 5 year-old boy with a 3-day history of fever presents with his first seizure lasting for 10 minutes. He is unresponsive and has some abnormal posturing. IV and IO access is not obtained. Learner must work through the BCCH status epilepticus protocol and workup patient appropriately

Goals and Objectives	
Educational Goal:	
Objectives: (Medical and CRM)	**Medical:** -recognize status epilepticus in a child -demonstrate knowledge of the different routes of administration of antiepileptics in children -follow BCCH status epilepticus protocol -apropriately initiate workup of status epilepticus **CRM:** -assign clear roles and used closed-loop communication -demonstrate leadership in a CTAS 1 situation
EPAs Assessed:	

Learners, Setting and Personnel				
Target Learners:	☐ Junior Learners	☒ Senior Learners	☐ Staff	
	☐ Physicians	☐ Nurses	☐ RTs	☐ Inter-professional
	☐ Other Learners:			
Location:	☒ Sim Lab	☐ In Situ	☐ Other:	
Recommended Number of Facilitators:	Instructors: 1			
	Confederates: 1 Nurse, 1 RT, 1 MD			
	Sim Techs:			

Scenario Development	
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Last Revision Date:	
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Section 2A: Initial Patient Information

A. Patient Chart					
Patient Name: Timmy Shakesalot			Age: 5	Gender: m	Weight: unknown (White on Broselow)
Presenting complaint: seizure					
Temp: 38.6	HR: 189	BP: 122/88	RR: 14	O_2Sat: 94%	FiO_2: R/A
Cap glucose:			GCS: (E V M)		
Triage note: • A 5 year-old boy with a 3-day history of fever, witnessed first seizure that started 15 minutes ago. Parents called EHS immediately. EHS gave IM midazolam approx. 5 minutes ago • Direct to care					
Allergies: NKDA					
Past Medical History: none			Current Medications: none		

Section 2B: Extra Patient Information

A. Further History	
Include any relevant history not included in triage note above. What information will only be given to learners if they ask? Who will provide this information (mannequin's voice, confederate, SP, etc.)? -learner will have to ask someone to get the following information from parent, answers only given if specific question asked: -fever since yesterday, runny nose, dry cough, vomited a few times -no recent travel -immunizations up to date -attends kindergarten	
B. Physical Exam	
List any pertinent positive and negative findings	
Cardio: sinus tachy, no murmurs	Neuro: eyes deviated to left, mouth clenched, tonic-clonic movements, generalized rigidity
Resp: spontaneous resps	Head & Neck: bilateral anterior cervical nodes
Abdo: soft, BS present	MSK/skin: no mottling, normal cap refill, no rash
Other:	

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Section 3: Technical Requirements/Room Vision

A. Patient
☒ Mannequin *(specify type and whether infant/child/adult)* **child**
☐ Standardized Patient
☐ Task Trainer
☐ Hybrid
B. Special Equipment Required
Broselow tape Pediatric IO Pediatric intubation supplies (DL, tubes) Pediatric ng
C. Required Medications
Rectal diazepam Midazolam Phenytoin Fosphenytoin Phenobarbital Lorazepam Ceftriaxone Ampicillin
D. Moulage
E. Monitors at Case Onset
☐ Patient on monitor with vitals displayed ☐ Patient not yet on monitor
F. Patient Reactions and Exam
Include any relevant physical exam findings that require mannequin programming or cues from patient (e.g. – abnormal breath sounds, moaning when RUQ palpated, etc.) May be helpful to frame in ABCDE format.

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Section 4: Confederates and Standardized Patients

Confederate and Standardized Patient Roles and Scripts	
Role	*Description of role, expected behavior, and key moments to intervene/prompt learners. Include any script required (including conveying patient information if patient is unable)*

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Section 5: Scenario Progression

Scenario States, Modifiers and Triggers				
Patient State/Vitals	Patient Status	Learner Actions, Modifiers & Triggers to Move to Next State		Facilitator Notes
1. Baseline State RR: 14 SpO2: 94% HR: 189 BP: 122/88 Gluc: 8.2 Temp: 38.6	LOC: unresponsive with extensor posturing then starts seizing again	Expected Learner Actions ☐ ABCs, monitor, place child in recovery position ☐ O2 via nasal prongs ☐ Check cap glucose ☐ attempt to gain IV access, then attempts IO access ☐ Orders first dose of medication (benzo) PLUS long-acting antiepileptic ☐full head-to-toe exam ☐Use Broselow to dose meds/equipment	Modifiers -IV attempts fail, MD to try IO Triggers -attempts IO access>>stage 2 -5 minutes passes>> stage 2	
2. LOC: seizing RR: 8 SpO2: 88% HR: 195 BP: 133/91	Child continues to seize	Expected Learner Actions ☐ Orders second dose of benzo ☐ Orders antiepileptic after 2nd benzo dose given (IM fospheytoin or rectal paraldehyde) ☐ Attempts to increase oxygen (facemask, BMV with oral airway); recognizes need for advanced airway ☐ If not already done, orders septic workup, lytes, ☐ set up for intubation >> order meds (ketamine, suxs, atopine, midazolam infusion)>>intubate ☐call Peds	Modifiers -RN to alert learner to vital sign changes if not recognized -O2 increases only to 89% with FM and NRB, if tries to insert oral airway unable to due to trismus -RN to alert learner that IO has gone insterstitial, asks if IV should be reattempted -child stops shaking after second benzo but then starts again after 1 minute >> IV access successful Triggers -5 minutes passes AND no intubation done>>hypoxemic	

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			cardiac arrest, if ACLS protocols followed X 2 minutes but no advanced airway obtained>> end scenario - intubation>>stage 4	
3. Paralyzed Ventilated RR 14 SpO2 100% FiO2 0.25 HR 150 BP 90/55		Expected Learner Actions ☐Order sedation meds>>midazolam infusion ☐Recheck cap glucose ☐antibiotics and antivirals in antimeningitis doses ☐start antiepileptic if not already done ☐ Call PTN/PICU/Neurology	Modifiers -RN to relay that Pediatrician is busy at a delivery and can't come for a while Triggers	
4. LOC: unresponsive RR: ventilated at 14. SpO2: 99% HR: 188 BP: 142/81		Expected Learner Actions ☐Recognize possible ongoing seizure activity, repeat neuro exam (sees eyes are still deviated, child stiff) ☐Increase midazolam infusion dose ☐post-intubation care>> CXR, foley, NG	Modifiers - RN to alert learner of VS change if not recognized after 1 minute Triggers -Increases midazolam infusion >> end scenario -If seizure activity not recognized by 5 minutes>>end scenario	

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Appendix A: Laboratory Results

Gas:			**Lytes**:	
	• pH	7.06	Na+	131 mmol/L
	• PCO2	61 mmHg	K+	2.1 mmol/L
	• HCO3	12 mmol/L	HCO3-	17 mmol/L
	• BE	-8.0 mmol/L	Chloride	96 mmol/L
cbc:			Anion Gap	21 mmol/L
	• Hgb	105 g/L	BUN	6.0 mmol/L
	• HCT	0.44 L/L	CREAT	52 umol/L
	• WBC	28.5 x 10*9/L	Glucose	9.1 mmol/L
	• PMN:	23.2 x 10*9/L	Calcium	2.62 mmol/L
	• PLT	75 x 10*9/L	Magnesium	0.8 mmol/L
Coags:			Phosphate	1.5 mmol/L
	• INR	1.9	CRP	112.3

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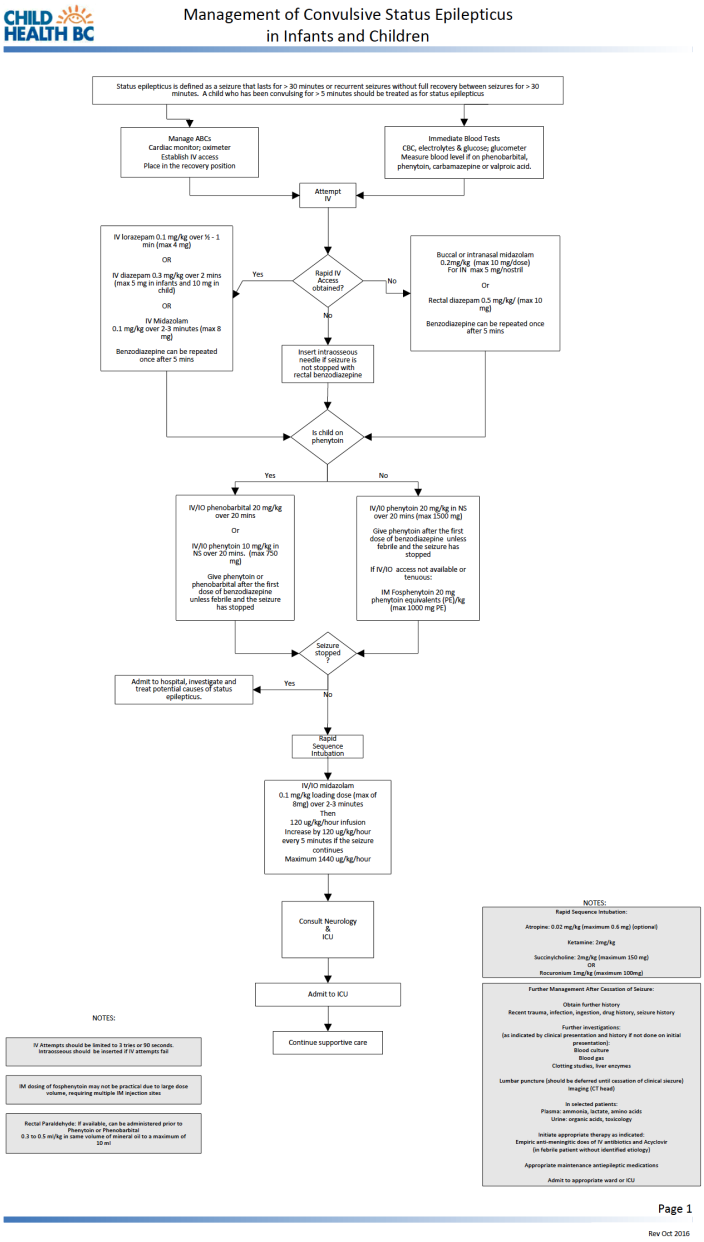
Appendix B: ECGs, X-rays, Ultrasounds and Pictures

Paste in any auxiliary files required for running the session. Don't forget to include their source so you can find them later!



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Appendix C: Facilitator Cheat Sheet & Debriefing Tips

Include key errors to watch for and common challenges with the case. List issues expected to be part of the debriefing discussion. Supplemental information regarding any relevant pathophysiology, guidelines, or management information that may be reviewed during debriefing should be provided for facilitators to have as a reference.

Status epilepticus:

- Defined as a seizure that lasts for > 30 minutes or recurrent seizures without full recovery between seizures for > 30 minutes
- A child who has been convulsing for > 5 minutes should be treated as for status epilepticus.
- Mortality is between 1-5%

-The underlying cause is considered to be the most important determinant of outcome, and the morbidity appears to be less in those with febrile and unprovoked status epilepticus. Studies of status epilepticus in primates have demonstrated a direct relationship between the duration of the seizure and the development of permanent brain injury that probably occurs as a result of the depletion of energy substrate.
-resistance to first- and second-line treatments for SE is directly related to the duration of seizures prior to treatment
-Blood glucose should also be checked at the bedside and 5 mL/kg 10% dextrose administered if blood glucose is less than 3 mmol/L

IV Attempts should be limited to 3 tries or 90 seconds. Intraosseous should be inserted if IV attempts fail.

- Start with benzodiazepines:

-if IV:
IV lorazepam 0.1 mg/kg over 1/2 - 1 min (max 4 mg)
IV diazepam 0.3 mg/kg over 2 mins (max 5 mg in infants and 10 mg in child)
IV Midazolam 0.1 mg/kg over 2-3 minutes (max 8 mg)
-if no IV:
Buccal or intranasal midazolam 0.2mg/kg (max 10 mg/dose) For IN max 5 mg/nostril
Rectal diazepam 0.5 mg/kg/ (max 10 mg)
-Benzodiazepine can be repeated once after 5 mins
- A longer-acting antiepileptic drug should also be administered immediately after first dose of benzo (unless seizure responds immediately to benzo and lasts <15 minutes)

- Rectal Paraldehyde can be administered prior to Phenytoin or Phenobarbital at 0.3 to 0.5 ml/kg in same volume of mineral oil to a maximum of 10 ml.
    - Give phenytoin or phenobarbital after the first dose of benzodiazepine unless febrile and the seizure has stopped:
        - if on phenytoin:
        - IV/IO phenobarbital 20 mg/kg over 20 mins
        - IV/I0 phenytoin 10 mg/kg in NS over 20 mins. (max 750 mg)

-if not on phenytoin:
        - IV/I0 phenytoin 20 mg/kg in NS over 20 mins (max 1500 mg)
        - if no IV/IO access, give IM fosphenytoin 20 mg/kg phenytoin equivalents (max 1000 mg PE)
    - Advantages of fosphenytoin include:
        - Is not toxic to tissues and can be given IM
        - doesn't contain ethylene glycol diluent and can be given 3x faster rate than phenytoin

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- does not cause arrhythmias
- can be mixed in a dextrose-containing IV fluid
- IM dosing of fosphenytoin may not be practical due to large dose volume, requiring multiple IM Injection sites

-RSI, then midazolam infusion
RSI:
Atropine: 0.02 mg/kg (maximum 0.6 mg) (optional)
Ketamine: 2mg/kg
Succinylcholine: 2mg/kg (maximum 150 mg) OR
Rocuronium 1mg/kg (maximum 100mg)>> but you might not want to paralyze for a prolonged period of time (consider during transport, maybe?)
Midazolam Infusion:
-IV/IO midazolam: 0.1 mg/kg loading dose (max of 8mg) over 2-3 minutes, then 120 ug/kg/hour infusion Increase by 120 ug/kg/hour every 5 minutes if the seizure continues (Maximum 1440 ug/kg/hour)

- In febrile patients without identified etiology, start empiric anti-meningitic does of IV antibiotics and Acyclovir
- Contact ICU and Neurology, continuouis EEG monitoring, neuroimaging

References

1. Guideline for the management of convulsive status epilepticus in infants and children. BCMJ, vol. 53 , No. 6 , July August 2011 , Pages 279-285 Clinical Articles
2. BCCH status epilepticus protocol

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