SimBox+ *Tele* SimBox

Pediatric Seizure



Emergency Department/Hospitalist/Resident



TeleSimBox Educational Media Version 3.0 2022

SimBox Toolkit

PREPARATION

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SimBox, SimBox+ vs *Tele* Simbox

Thank you for your interest in SimBox low-technology learning tools!

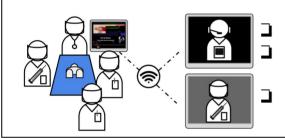
- Our low-technology simulation series allows your team to engage in the first 10 minutes of an emergency scenario.
- Use your own equipment and resources in your own clinical environment, or in the convenience of a virtual environment to practice non technical skills.

SimBox Original Version

- Low-technology manikin.
- + video.
- + tablet-based resources (*in situ* or sim lab).



SimBox+ (SimBox Original + tele-facilitator)



SimBox Original PLUS.

Learners in remote or underserved areas +/limited access to content or simulation experts. Remote facilitator.

Tele SimBox:

□ Non-technical skills all remote version.

Meets post-pandemic demands for virtual learning and continuous education for learners of all levels.



How to use these resources

SimBox or SimBox+

• Review this document + run a session in your ED with a doll/manikin/pillow.

Tele SimBox

- Reference: Tips / Tricks.
- Watch a sample recording of the telesimulation to see how it is run.

*If using this resource for EM / PEM trainees see Resource page at end of booklet with suggested case augmentation to meet Milestones.

**For additional questions or concerns, arrange a one-on-one tutorial with the project team.

Guide

This guide is for facilitators of all backgrounds in how best to use these didactic resources.

Novice Facilitator

- **Q** Review this entire guide and watch video *prior to* first session.
- Utilize the Prebriefing / Debriefing Scripts, Prompts and Resources.
- **Review the Checklist.**
- **□** Encourage all participants to complete the Survey.

Intermediate to Advanced Facilitators

- **Q** Review the case summary and progression.
- Use the Prebrief / Debrief scripts or use your own.
- **G** Review Educational Resources or use your own.
- Review this Checklist *or modify* to your specific learner group.

Tele Tips / Tricks

- **Trial sharing the video** *prior to* the session.
- □ Use Gallery View.
- Have participants *name themselves* with assigned *role*.
- Ask observers to mute audio and turn off video for simulation.
- Both participants and facilitators can use a "Time Out" whenever necessary to pause and regroup.
- An *embedded participant* can help move the scenario along.
- During the simulation, scroll through the monitor video based on the participants' actions.

For example, if the participants quickly stabilize the patient, you can "skip through" to the part of the video where the vital signs have normalized.

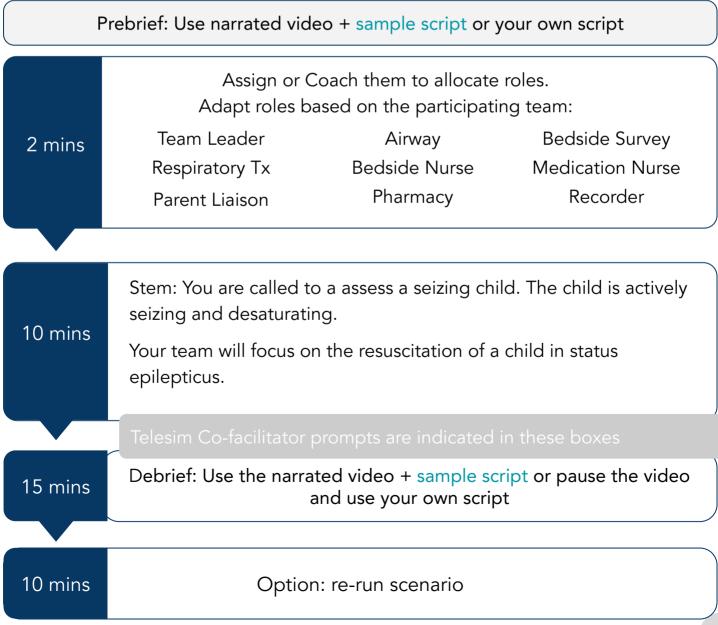
Conversely, if the necessary interventions, e.g. giving the patient oxygen, have not been performed, you can "scroll back" and spend more time in the part of the video where the vital signs are abnormal.



After this activity, the team will be able to manage a seizing pediatric patient with emphasis on the following objectives:

- 1. Apply Crisis Resource Management and teamwork in the care of a patient with a seizure (with attention to role designation, directed orders, sharing mental model and closed loop communication with team and family members).
- 2. Prioritize treatment of potential etiologies to the guide stabilization or escalation of care for a patient with a seizure.
- 3. Determine the appropriate destination for transfer.

Overall Scenario Schema



Scenario script:

"Lets assign roles, including team lead, bedside survey and airway provider and parent liaison. You will hear a brief EMS patch and then see a two minute countdown clock as you prepare for the arrival of the patient. You will now hear the EMS dispatch."

Link to ED Pediatric Seizure Video

	Video states: "This is EMS, we are coming in with an 8 year old boy with a generalized tonic clonic seizure. He has no history of recent illness, trauma, or prior seizures. He has been seizing for at least 5 minutes and we are about to give him intranasal midazolam. We will arrive in 2 minutes."
2 minute warning	 Team assembles + confirms roles Asks for equipment: monitor, temperature, oxygen, breathing (BVM/CPAP), access (IV), Broselow tape/app, medications Dons PPE Calls for help
	Facilitator states: "The patient has arrived. You have put on the appropriate PPE. EMS administered intranasal midazolam 2 minutes ago and placed him on 100% FiO2 via a non-rebreather en route. He is still seizing."
Time 0 min 7	 Team places the cardiac monitors, pulse oximeter, BP cuff, temperature probe Performs ABCDEs Uses Broselow tape/ app for weight and/ or asks parents Starts timer
	"Airway is patent. Breath sounds are equal bilaterally, but he is saturating 80% on 100% O2 via a NRB. Pulses are 2+ and CRT is brisk. He is unresponsive with tonic- clonic movements of his arms and legs. Pupils are equal, small and minimally reactive. No obvious injuries or rashes."
1 min 8 HR 140 BP 100/58 RR 20 Sat 80%	 Team notes hypoxia Performs airway repositioning maneuvers, suctions any oral secretions, and begins bag-valve-mask ventilation Requests temperature and POC glucose Asks RN for IV and istat/ gas, CBC, PT/PTT, CMP, iCa/ Mag/ Phos
ETCO2 58	"Saturations are improving with airway repositioning and BVM. POC glucose is 120. Working on the IV. Temperature is 36.5 C. Weight is 28 kg."
2 min 10 HR 140 BP 100/58 RR 20 Sat 90% ETCO2 48	 Team notes improvement in oxygen saturation with BVM Notes normal glucose level and temperature Orders 0.1 mg/kg of IV lorazepam if IV efforts successful Orders PR diazepam or IN/ BC/ IM midazolam as alternative Mentions using IO if IV unsuccessful after 90'

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SAMPLE history

Signs/Symptoms: Generalized seizure began at home a few minutes prior to EMS arrival, has never done this before. No recent fevers or infectious symptoms.

Allergies/meds: None.

Medical history: Uneventful perinatal and past medical history. Vaccines up to date. No known family history of seizures or neurologic, vascular, hematologic, or biliary diseases. Single child, lives with mom and dad.

Last meal: Usual cereal for breakfast ~2 hrs prior.

Events: No obvious triggering events. No trauma.

11 min: SpO2 90s, HR 140s, 2nd BZ

16 min: SpO2 100%, HR 100

	"IV successful on 3rd attempt. It has been 5 minutes since he received the IN midazolam and 10 minutes since he started seizing. Administering 0.1 mg/kg of lorazepam IV now (min 10)."
3 min 12 HR 140 BP 103/62 RR 20 Sat 100% ETCO2 40	 Team verbalizes illness state: Patient in status epilepticus s/p second benzodiazepine administration Trials off BVM and places back on NRB Checks ETCO2 Orders 60 mg/kg of IV levetiracetam to be ready at bedside Verbalizes the need for advanced airway if the seizure persists
	"Blood gas results are 7.45/70/45/22 BE 1. The patient is still seizing. Is there anything else we should be thinking about?"
4 min 14 HR 120 BP 104/61 RR 20 Sat 100% ETCO2 36	 Team discusses the differential for status epilepticus: vascular emergency (stroke), CNS infection, head injury, toxidrome, metabolic, neoplasm/ mass Asks for a second IV and serum toxicology Verbalizes the need to administer the IV levetiracetam if the seizure persists after min 15' Prepares equipment for intubation/ advanced airway
	"The tonic clonic movements stop and he appears to be more alert and responsive. He is maintaining his airway and breathing well on his own."
a	dvanced learner option: "It has been 5 minutes since the IV lorazepam (min 15') nd he is still seizing. IV levetiracetam going in now. The seizure seems to be lowing down but the patient is desaturating, despite BVM." Team performs ndotracheal intubation.
Wrap min 16 HR 100 BP 99/57 RR 20 Sat 100% ETCO2 37	 Team notes that the seizure has stopped Reassesses ABCDE and repeats istat/ gas Updates the family and addresses any questions and concerns Consults pediatric neurology (if available) Discusses the need for head imaging and cEEG Hands off to the admitting/ PICU team
Video 0 min: Seizure starts 5 min: EMS adminis 7 min: Patient appe 8 min: SpO2 80%, H 11 min: SpO2 90s, J	sters 1st BZ concludes the simulation" and move to debrief.

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Milestone Checklist

	TASK	NOT DONE	NOT DONE CORRECTLY	DONE CORRECTLY
Team- centered care	Verbally assemble the necessary staff, equipment and resources to care for a seizing pediatric patient in the ED.			
	Demonstrate effective teamwork and communication (i.e. designate leader/roles, directed orders, closed-loop communication, sharing mental model).			
	Demonstrate appropriate PPE.			
Family- centered care	Obtain an appropriate history from the family member (SAMPLE).			
	Address family concerns, update on care (translate medical aspects of care in plain language).			
Medical knowledge	Verbalize the initial management of an acutely ill pediatric patient (airway, breathing, circulation).			
	Verbalize the first line diagnostic tests of a seizing patient (monitors, dextrose, electrolytes).			
	Discuss the first line therapeutic interventions of a seizing patient (benzodiazepines).			
	Form a broad differential for status epilepticus in pediatric patients.			
Communicatio n	Demonstrate handoff of care at the end of the case.			

Best practices for establishing psychological safety in simulation

Basic Assumption: "we believe that everyone participating in our activities is intelligent, capable, cares about doing their best and wants to improve" <u>Center for Medical Simulation, Boston MA</u>

Welcome your team, make introductions:

Prebrief

Demo

"This simulated resuscitation is to practice our team's response to an emergency. We will spend about 15' in simulation, then we will debrief for 20' to discuss what went well and what could be improved with input from the team. Even though it is not real, and the manikin can't be harmed, everyone will get the most out of this scenario if we take it as seriously as possible."

Describe simulator capabilities, equipment and how to participate:

"Act as you would within your role. You will not get monitor feedback unless your equipment is attached to the patient. Airway equipment should be attached to oxygen, etc. Try to make tasks realistic and timely using your equipment. Please ask for clarifications."

> DEMO: Closed loop communication: Know your role and task designation. Use closed loop communication to verify and complete. Leader: Tech, we need an EKG.

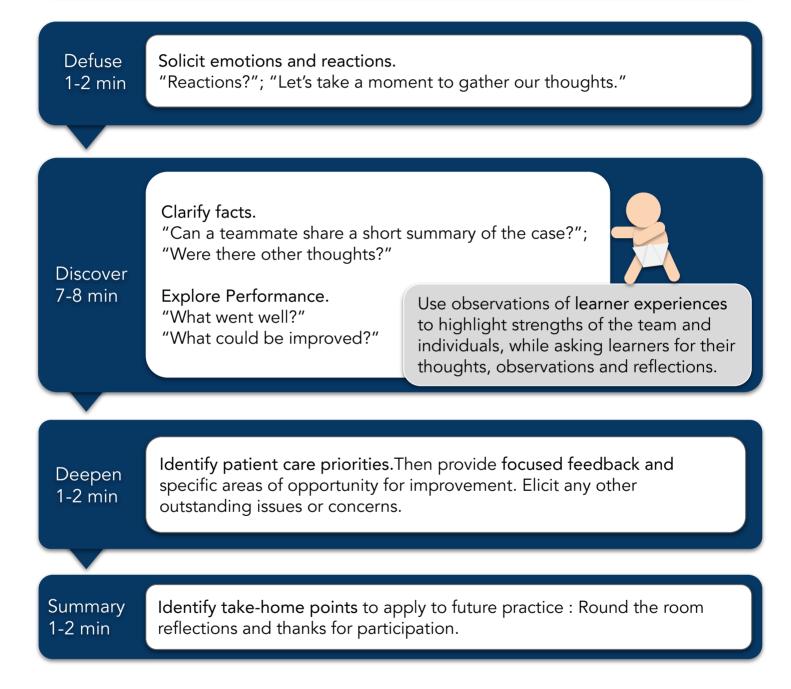
Tech: OK going to get the machine.

Tech: OK, I've got the EKG machine here.

Disclose	If a safety concern arises during the simulation, I will state: "Let's take a safety pause." If a real event happens that is not part of the simulation, I will state: "This is not a simulation."
	Disclose if video recording, privacy and permission.

Components of a Debrief (Based on 3Ds + PEARLS)

"The purpose of this debrief is to discuss areas of great performance and discover areas for improvement. It is not a blame session- everyone is here to do their best."



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This page provides possible questions to elicit teaching points during the debrief. These questions are not meant to replace your team's discussion, but can help to steer the debriefing session.

PERFORM A SYSTEMATIC ASSESSMENT/ REASSESSMENT OF A SEIZING PATIENT	 How does your team perform a systematic assessment of an ill pediatric patient? PAT Pediatric Assessment Triangle: Appearance TICLS: tone, interactivity, consolability, look/gaze, speech/cry Work of breathing: Important to undress visualize WOB Circulation/capillary refill: Where and how is this assessed in the pediatric patient? Airway Breathing Circulation Caveats: Consider pediatric anatomical differences. ABC vs CAB (in adult patient) SAMPLE mnemonic: signs/symptoms, allergies, medications, last meal, events preceding
PRIORITIZE EARLY ADMINISTRATION OF APPROPRIATE MANEUVERS AND MEDICATIONS	How did you prioritize the interventions for this seizing patient? ABCDs, Monitors, AEDs, Access Always reassess - monitor for apnea side effect (of both seizure and AEDs). Call for help.
	What is your first priority in this patient? The Airway. When the breathing was slow and irregular and the patient was hypoxic on 100% NRB, what maneuvers worked? Performing BVM (rate 30-50).
	What are ways to give benzodiazepine medication without IV/IO access? Intranasal, buccal, intramuscular, per rectum.
	How did you get access? PALS recommends 3 PIV attempts in 90 secs prior to getting IO. Proximal tibia is preferred location for IO.
DESCRIBE COMMON SEIZURE ACTIVITY IN KIDS AND GENERATE A DIFFERENTIAL DIAGNOSIS FOR A SEIZURE	 How do you recognize a seizure in a pediatric patient? There are various clinical manifestations including: unresponsiveness, apnea, tremulousness, tonic-clonic activity, fixed eye deviation, etc.
	 What mnemonic is useful in remembering seizure etiologies? VITAMINS: Vascular, Infection, Cerebral malaria, Trauma/Toxicology, Autoimmune, Metabolic, Idiopathic, Neoplasm, Syndromes
DEMONSTRATE FAMILY CENTERED CARE INTERACTIONS	 How does the team manage the reactions of family members while you are caring for a seriously ill child? A large body of literature supports family presence. This does not lead to
	 increased malpractice. A social worker or other provider should be assigned to stay with the family through this difficult time.

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Resources: Seizure Management

ABCDE's of SEIZURE MANAGEMENT

- Airway
- Breathing
- Circulation
- Disability/Dextrose
- Exposure/Anti *Epileptic drugs*

Airway Management

- Jaw thrust, Chin lift, Shoulder roll
- Suction PRN
- Accessories: NP/OP airway

Assist breathing

- Bag mask ventilation (BVM)
- Continuous positive airway pressure(CPAP)
- Consider definitive airway



ANTIEPILEPTIC MANAGEMENT

By 5 min: Give 1st line antiepileptic drug ASAP: Benzodiazepine

IV or IO Lorazepam 0.1 mg/kg (max 4 mg) Midazolam 0.1 mg/kg Diazepam 0.2 mg/kg IF NO IV: DO NOT DELAY Midazolam 0.2 mg/kg IM (max Midazolam 0.3 mg/kg IN/BUC (max Diazepam 0.5 mg/kg PR (max

(max 10 mg) (max 10 mg) (max 20 mg)

IF SZ NOT CEASED BY 10 MIN: CAN REPEAT Benzodiazepine (as above)

IF SZ NOT CEASED BY 15 MIN: 2ND LINE ANTIEPILEPTIC MEDICATION

Levetiracetam 60 mg/kg or Fosphenytoin 20 mg PE/kg or Valproate 40 mg/kg or Phenobarbital 20 mg/kg (infants less than 1yr)

Consider Nonconvulsive status epilepticus NCSE if prolonged "seizure" or postictal period



PEDIATRIC SEIZURES

MANAGING CONVULSIVE STATUS EPILEPTICUS Defined as:

1) Seizure >5 min and/or ongoing seizure upon arrival to ED 2) 2+ seizures without full recovery of consciousness between them



Vascular: stroke, AV malformation meningitis, Lyme, TB, brain nfection: abscess, HIV-related

rauma: hemorrhage, toxicologic

utoimmune: SLE, CNS vasculitis

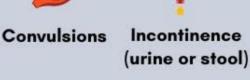
etabolic: hypoglycemia, low Na|Ca|Mg encephalopathy

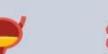
diopathic

N eoplasm Tuberous sclerosis, Rhetts, Syndromes: Sturge Weber, VHL

SYMPTOMS

Incontinence







Clenched Teeth



Irregular breathing or apnea

Trouble Speaking

Staring or eye rolling

OPTIMIZING THE PEDIATRIC AIRWAY

Airway Differences: Short, anterior airway, large tongue and epiglottis, prominent occiput. Neonatal seizures are non focal: watch for lipsmacking or blinking



Position Head

Jaw Thrust

🚽 Use index/middle fingers to push back of jaw up, thumbs on chin

Chin Llft



Use two fingers under chin to lift

Shoulder Roll



Suction secretions

from nose and oral cavity

Assist Breathina



- 1) Airway adjuncts: NP/OP
- 2) Bag Mask Assist if RR <20

4) Consider supraglottic device or tracheal intubation if apneic and unconscious

EMERGENCY MANAGEMENT

5 min

IV Access

- Lorazepam (0.1 mg/kg) over 2 min OR
- Midazolam (0.1 mg/kg)
- Diazepam (0.2 mg/kg)

No IV Access

- Midazolam IM (0.15 mg/kg) OR
- Intranasal / Buccal Midazolam (0.2 mg/kg) (0.5 mg/kg)
- Rectal Diazepam (0.5 mg/kg)

10 min

Repeat Benzodiazepine

- Obtain intraossesous (IO) access if failed IV attempts x2
- Prepare second line agent

15 min

Administer 2nd line agent

- Fosphenytoin 20 mg/kg IV/IO over 10 min OR
- Levetiracetam 20-60 mg/kg IV/IO over 15 min OR
- Phenytoin 20 mg/kg IV/IO over 20 min OR
- Phenobarbital 20 mg/kg IV/IO over 20 min

30 min

Administer

alternative 2nd line agent

- e.g. if fosphenytoin used, give
- levetiracetam or
 - phenobarbital.
 - Consider 3rd line agent

TESTING

- Perform STAT blood glucose and electrolytes. Consider sepsis workup if febrile.
- Treat hypoglycemia/hyponatremia/hypocalcemia
- Consider neuroimaging if first time seizure with prolonged post-ictal period, R/O NAT

ANTIEPILEPTIC MEDICATIONS

FIRST LINE Benzodiazepines

Bind inhibitory GABA(A) receptor to facilitate GABA attachment

Levetiracetam

may bind synaptic vesicle protein SV2A that alters vesicle fusion; indirectly modulates GABA

SECOND LINE Phenytoin Fosphenytoin

blocks voltagedependent neuronal sodium channels; watch PR interval

Phenobarbital

bind GABA(A) receptor, extending duration of GABAmediated chloride channel opening

Please refer to your insititutional seizure algorithm for further direction*

SOURCES:

https://trekk.ca/system/assets/assets/attachments/453/original/2020-03-09_SE_algorithm_v_3.0.PDF?1583872609
 UpToDate: https://tinyurl.com/yb8uqj8q

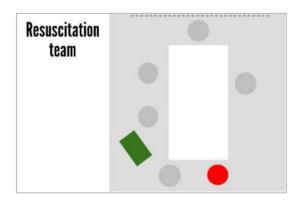
SimBox Educational Media 2020 Infographic: Elizabeth Sanseau MD, Keyuree Satam MS4 @DrM_Kou

COMPONENTS OF EFFECTIVE TEAMS: TEAMSTEPPS IN A NUTSHELL

https://www.ahrq.gov/professionals/education/curriculum-tools/cusptoolkit/modules/implement/teamworknotes.html

LEADERSHIP SITUATION MONITORING		MUTUAL SUPPORT		
BRIEF STEP Status of pt Planning, Team Members setting the tone Environment Progress toward goal		TASK ASSISTANCE Awareness of team work load		
HUDDLE"I'M SAFE"Ad-hoc planning or updatesTool for self evaluationIllness Medication		FEEDBACK Providing information for purpose of team improvement		
DEBRIEF Exchange of information to inform team of performance and effectiveness	Stress Alcohol/Drugs Fatigue Eating + Elimination	ADVOCACY & ASSERTION Advocating for patient in case of a disagreement with decision maker		
	2 CHALLENGE RULE Information conflict regarding patient safety			
ction nt sessment ituation Safety Concern ground tions Timing Ownership		Descri Expre Sug		DESC Script Tool for personal conflict* Describe situation Express your concern Suggest an alternative Consensus statement
		CUS STATEMENT I'm concerned I'm uncomfortable This is a safety issue		
SI	COLLABORATION Working toward a common mission			
	BRIEF Planning, setting the tone HUDDLE Ad-hoc planning or updates DEBRIEF Exchange of information to inform team of performance and effectiveness	LEADERSHIPMONITORINGBRIEFSTEPPlanning, setting the toneSTEPHUDDLE Ad-hoc planning or updates"I'M SAFE"DEBRIEFTool for self evaluation Illness MedicationExchange of information to inform team of performance and effectivenessStress Alcohol/Drugs Fatigue Eating + EliminationVV		

CRISIS RESOURCE MANAGEMENT: CRM and the Shared Mental Model:



CRM (established by the airline industry) is based upon team leadership and defining clear roles for team members. Closed loop communication when used by all team members reduces errors and improves safety through:

- Addressing team members by name when assigning tasks.
- Giving confirmation when tasks are acknowledged or completed.

A shared mental model allows a team to anticipate the plan for patient care and what equipment or medications might be needed.

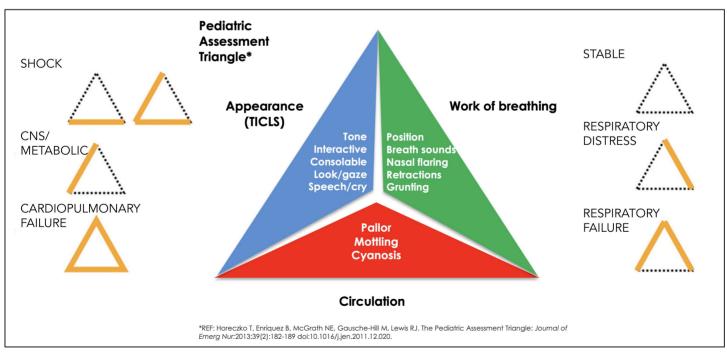


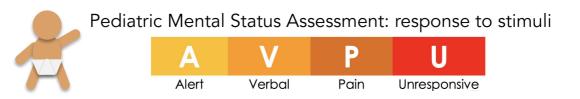
Pediatric Vital Signs/Weight by Age

Age	Weight (kg)	Pulse	Resp	Systolic BP*
Newborn	3	100-180	30-60	60-70
6 mos	7	100-160	30-60	70-80
1 yr	10	100-140	24-40	72-107
2	12	80-130	24-40	74-110
3	15	80-130	24-40	76-113
4	16	80-120	22-34	78-115
5	18	80-120	22-34	80-116
6	20	70-110	18-30	82-117
8	25	70-110	18-30	86-120
10	35	60-100	16-24	90-123
12-15+	40-55	60-100	16-24	90-135
			*BP ir	n children is a late and 🦰

unreliable indicator of shock

Using the Pediatric Assessment Triangle (PAT)





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Family-centered care:

- Obtain appropriate history from family member (SAMPLE).
- Address family concerns and update on care.
- Manage the expectations of those who receive care in the ED and use communication methods that minimize the potential for stress, conflict, and misunderstanding [Assess via their communication to prep family for intubation and then for transfer, Patient Centered Communication (EM Milestone ICS1) Level 3:].

Medical knowledge:

- Verbalize the initial management of an acutely ill pediatric patient (ABC's.
- Verbalize first line diagnostic tests of a seizing patient.
- Verbalize the first line therapeutic interventions of a pediatric seizure.
- Demonstrate handoff of care at the end of the case.
- Integrate hospital support services into a management strategy for a problematic stabilization situation [Trainee should request transfer early, Emergency Stabilization (EM milestone PC1) Level 4], Performs rapid sequence intubation in patients using airway adjuncts Employs appropriate methods of mechanical ventilation based on specific patient physiology [Airway Management (EM milestone PC10) Level 3/Pediatric ACGME intubation procedure requirement].

OVERVIEW

Ben Lawton. The First Afebrile Seizure, Don't Forget the Bubbles, 2014. Available at: <u>The First Afebrile Seizure - Don't Forget the Bubbles</u>

Thanos Konstantinidis. Febrile seizures, Don't Forget the Bubbles, 2014. Available at: <u>Febrile seizures - Don't Forget the Bubbles</u>

Dalziel, Stuart R., et al. "Levetiracetam versus phenytoin for second-line treatment of convulsive status epilepticus in children (ConSEPT): an open-label, multicentre, randomised controlled trial." *The Lancet* 393.10186 (2019): 2135-2145.

VIDEOS & PODCASTS

Elma Raissi. Febrile Seizure. Peds Cases, 2015. Available at: <u>Febrile Seizures</u> <u>PedsCases</u>

Michelle Bischoff. Status Epilepticus in Children. Peds Cases, 2010. Available at: <u>Status</u> <u>Epilepticus in Children | PedsCases</u>

Michelle Bischoff. Seizure Types and Epilepsy. Peds Cases, 2010. Available at: <u>Seizure</u> <u>Types and Epilepsy | PedsCases</u>

Anand Swaminathan, "REBEL Core Cast 9.0 – Pediatric Status Epilepticus", REBEL EM blog, April 17, 2019. Available at: https://rebelem.com/rebel-core-cast-9-0-pediatric-status-epilepticus/

ALGORITHMS

TREKK Status Epilepticus PedsPac, 2018. Available at: <u>Search results for 'status epilepticus'</u>

Thank you for participating in the simulation. Please complete the facilitator and participant surveys by clicking on the links or scanning the QR codes below:

Facilitator Survey



Participant Survey



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