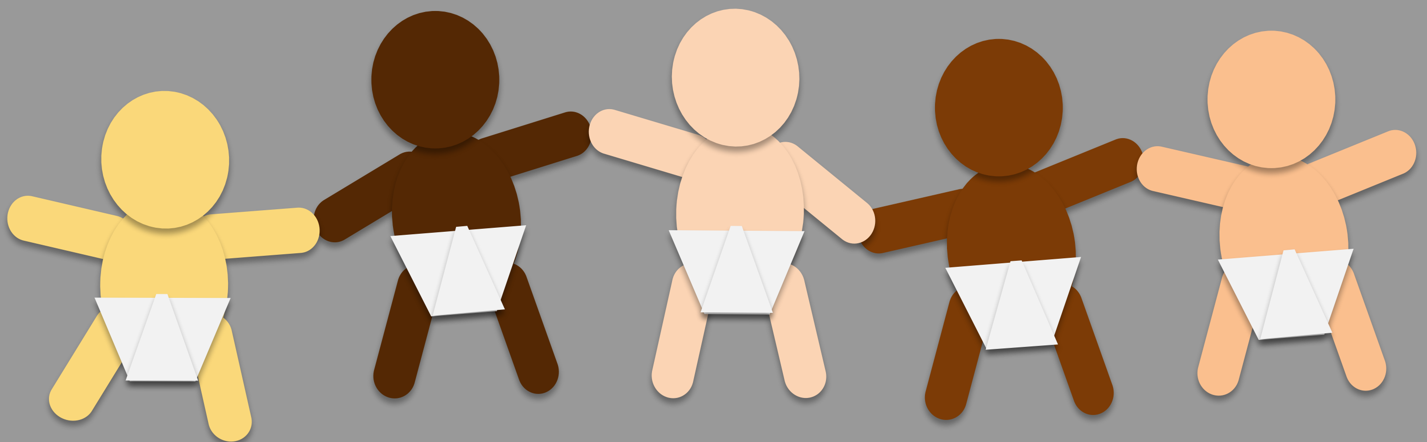
SimBox+
Tele SimBox

Pediatric Seizure
Emergency Department/Hospitalist



Authors: SimBox Editorial Team Version 2.0 2020

ED SimBox: Seizure

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ED SimBox: Seizure

Purpose

Thank you for your interest in SimBox low fidelity learning tools!

This series of cases features low fidelity simulations that allow your teams to engage in the first 5-10 minutes of an emergency scenario.

You will 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, SimBox+ vs *Tele*Simbox

There are three ways in which the simulation can be delivered:

SimBox Original:

Low-fidelity manikin + video and tablet-based resources for use *in situ.*

SimBox+ (SimBox **PLUS** a telefacilitator).

SimBox was adapted for use in remote or underserved areas and/or limited access to content or simulation experts, with a remote facilitator.

TeleSimBox:

As a result of the COVID 19 Pandemic, SimBox was adapted to meet the demands for virtual learning platforms, and continuous education for learners of all levels. This version targets non-technical skills.

Best way to use these resources

SimBox or SimBox+

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

***Tele*SimBox**

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

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

Guide

This guide is meant to explain to facilitators with ***varying levels of experience*** how best to use these didactic resources.

Novice Facilitator

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 Survey.

Advanced Facilitator

Use the learning tools included ***or your own*** for Prebrief / Debrief and Educational Resources.

Review this Checklist ***or your own*** adapted 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.

Move scenario along through the ***embedded participant***.

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Case Summary

After this activity, the team will be able to manage the pediatric patient with concern for seizure with emphasis on the following objectives:

1. Team-centered care: verbally assemble necessary staff, equipment and resources to care for a seizing pediatric patient. Demonstrate effective teamwork and communication (i.e. sharing mental model, directed orders, closed loop communication).
2. Family-centered care: obtain appropriate history from family member (SAMPLE), address family concerns, update on care.
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 seizing patient, demonstrate handoff of care at the end of the case.

Overall Scenario Schema

Link to Pre-briefing Script for SimBox/SimBox+

2 mins

Play video to team

Assign or **Coach them to allocate** roles

Team leader | **Airway/survey/ bedside** | **Family liaison**

6-10 mins

Stem: We have a seizing 6 year old male. Was noted to be seizing for approximately 5 minutes by the parents prior to our arrival. No history of trauma or recent illness. No history of seizures. The patient's sats are 88% on 100% NRB, HR 160 and we do not have an IV at this time. We'll be there in 2 minutes.

Telesim co-facilitator prompts are indicated in these boxes

15 mins

Link to Debriefing Script

10 mins

Option: re-run scenario

ED SimBox: Seizure

Scenario script:

"Please assign roles as you would in a typical scene response. You will hear a brief EMS dispatch and then see a two minute countdown clock as you prepare for the arrival of the patient." *CLICK TO **PLAY VIDEO***:

2 minute warning

VIDEO GIVES 120 SECOND COUNTDOWN, THEN PATIENT APPEARS

- Team assembles + confirms roles
- Asks for equipment: monitor, temperature, oxygen, breathing (BVM/CPAP), access (IV/IO), Broselow tape/app, antiepileptic drugs (AEDs)
- Calls for help

The recorded narrator on the video states: "Patient has arrived."

2 minute Prep Ends

- Team confirms patient is on monitors, pulse oximeter, BP cuff, temp
- Notes patient is hypoxemic on 100% NRB

Facilitator states: "Patient is seizing, SpO2 is in the 80s on 100% oxygen through NRB."

+4:45 min

HR 150
BP 90/50
RR 20
SPO2 80%

- Team requests reposition of airway
- Requests airway/breathing intervention (BVM/CPAP)
- Asks RN for access (IV/IO)

Facilitator states: "Seizing, not responsive, no IV, sats improving with BVM/CPAP, CRT 3 seconds, temp 37 degC. I'll get AEDs - confirm medication, dose and route.""

+6:10 min

HR150s-160s
BP 90/50
RR 20
Sat 90%

- Team verbalizes illness state: afebrile seizing patient in respiratory distress
- Estimate weight from Broselow
- Order specific benzo/dose/route of administration

If CPAP vs BVM: state "child is pinking up." If ask for IV: state "cannot get IV, is shaking too much. Is there another way to administer AEDs?"

SAMPLE History

Signs/Symptoms: Generalized seizure began at home ~5 mins prior to arrival, has never done this before. No recent fevers or infectious symptoms.
Allergies/meds: None.
Medical history: Uneventful birth 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, Dad. No concern for accidental or non-accidental trauma.
Last meal: Usual cereal for breakfast ~2 hrs prior.
Events: No obvious triggering events.

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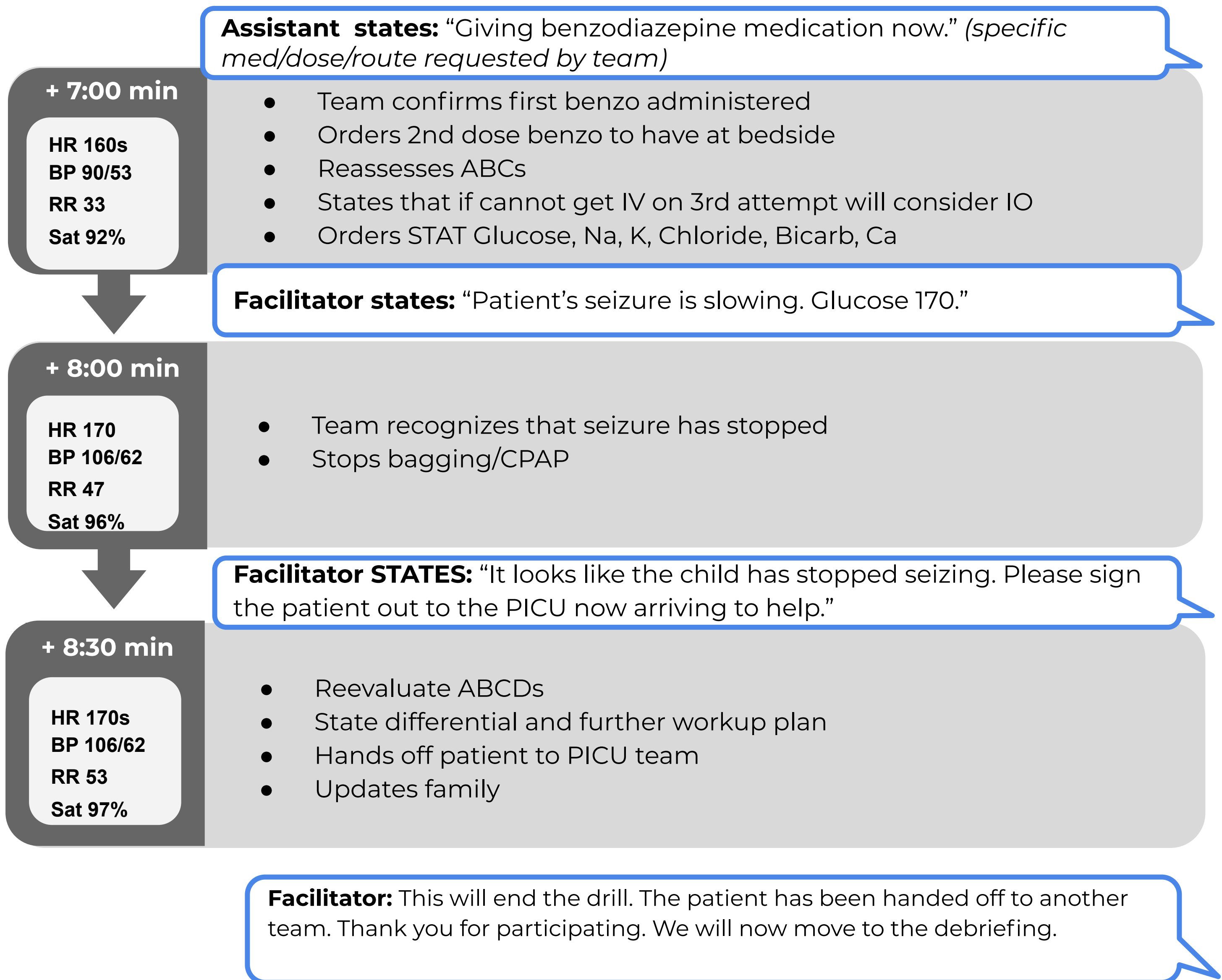
Case Progression



Facilitator: This will end the drill. The patient has been handed off to another team. Thank you for participating. We will now move to the debriefing.

Conclude simulation and move to debrief.
[Link to resource page: educational content]

TASK		Done correctly	Not done correctly	Not done
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)			
	Verbalize the first line therapeutic interventions of a seizing patient (benzodiazepines)			
	Demonstrate handoff of care at end of case			

Tips to establish 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" - *CMS, Boston MA*

Introduce team and Prebrief

Welcome your team, make introductions: "This simulated resuscitation is to practice our team's response to an emergency. We will spend about 15 minutes 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

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 demo:
Know your role and task designation with 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

In case of a safety concern during the simulation, state "Let's take a safety pause." If a real event happens that is **not** part of the simulation, state "This is not a simulation." Disclose if video recording.

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."

Defuse
1-2 minutes

Solicit emotions and reactions
"Reactions?"; "Let's take a moment to gather our thoughts."

Summary
1-2 minutes

Clarify facts
"Can a teammate share a short summary of the case?"; "Were there other thoughts?"

Discover
7-8 minutes

Explore Performance
"What went well?"
"What could be improved?"
Use observations of learner experiences to highlight strengths of the team and individuals, while asking learners for their thoughts, observations and reflections. Then provide specific areas of opportunity for improvement.

Deepen
1-2 minutes

Provide focused feedback and identify patient care priorities
Elicit any other outstanding issues or concerns

Take-Home points
1-2 minutes

Identify take-home points to apply to future practice : Round the room reflections and thanks for participation

Ref: PEARLS Debrief Framework .+ The 3D model of debriefing. *Semin Perinatol*. 2011;35(2):52-58

ED SimBox: Seizure

Debriefing Prompts

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

Goal: demonstrate a team based approach to care of a seizing patient	***How did your team prepare for the arrival of the seizing patient?*** Crisis & Crew Resource Management: Assign roles, designate team leader, share mental model and practice closed loop communication
Skill: **1. Perform a systematic assessment/reassessment of the seizing patient** **2. Prioritize treatment** **3. Manage medication side effects that lead to cardio pulmonary deterioration**	***1. How does your team perform a systematic assessment of an ill pediatric patient?*** **PAT** Pediatric Assessment Triangle Appearance **TICLS**: **t**one, **i**nteractivity, **c**onsolability, **l**ook/gaze, **s**peech/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 anatomic differences. **ABC** vs **CAB** (in adult patient) **SAMPLE mnemonic: s**igns/**s**ymptoms, **a**llergies, **m**edications, **l**ast meal, **e**vents preceding ***2. 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. ***3. What is your first priority in this patient?*** Airway. ***When the breathing slowed/became irregular and the patient was still hypoxic on 100% NRB, what maneuvers worked?*** Performing BVM (rate 30-50) ***What are ways to give benzodiazepine medication without IV/IO access?*** IN/buccal/IM,PR ***How did you get access?*** PALS recommends 3 PIV attempts in 90 secs prior to getting IO. Proximal tibia is preferred location for IO
Knowledge: Describe common seizure activity in pediatric patients Describe at least 3 causes of seizure	***1. 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. ***2. What mnemonic is useful in remembering seizure etiologies?*** **VITAMINS**: **V**ascular, **I**nfection, **C**erebral malaria, **T**rauma/**T**oxicology, **A**utoimmune, **M**etabolic, **I**diopathic, **N**eoplasm, **S**yndromes
Attitudes: Utilize team communication skills. Discuss the importance of family centered care/interactions	***How is a shared mental model helpful to the team?*** ***Was there closed-loop communication between team members?*** ***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.

TeamSTEPPS Approach

<table>
<tr><th colspan="4">Components of effective teams (as developed in TeamSTEPPS) Table @DrM_Kou</th></tr>
<tr><th>Communication</th><th>Leadership</th><th>Situation Monitoring</th><th>Mutual Support</th></tr>
<tr>
<td>SBAR:
Situation
Background
Assessment
Recommendation</td>
<td>Brief:
Planning, setting tone</td>
<td>STEP:
Status of pt
Team Members
Environment
Progress toward goal</td>
<td>Task assistance:
awareness of team work load</td>
</tr>
<tr>
<td>Call out:
sharing critical information with the team</td>
<td>Huddle:
Ad-hoc planning</td>
<td rowspan="2">I'M SAFE:
• Illness
• Medication
• Stress
• Alcohol/Drugs
• Fatigue
• Eating and Elimination</td>
<td>Feedback:
providing information for purpose of team improvement</td>
</tr>
<tr>
<td>Check back:
Loop Closure</td>
<td>Debrief:
Exchange of information to inform team of performance and effectiveness</td>
<td>Advocacy and assertion:
advocating for patient in case of a disagreement with decision maker</td>
</tr>
<tr>
<td rowspan="4">Handoff:

I PASS the BATON

Introduction
Patient
Assessment
Situation
Safety Concern

Background
Actions
Timing
Ownership
Next</td>
<td colspan="2" rowspan="4">@DrM_Kou
PERFORMANCE
Leadership
Communication
Situation Monitoring
Mutual Support
KNOWLEDGE
SKILLS
ATTITUDES
PATIENT CARE TEAM</td>
<td>Two challenge rule: information conflict regarding patient safety</td>
</tr>
<tr><td>DESC Script:
Tool for personal conflict*
Describe situation
Express your concern
Suggest an alternative
Consensus should be stated</td></tr>
<tr><td>CUS: I'm concerned
I'm uncomfortable
This is a safety issue</td></tr>
<tr><td>Collaboration: working toward a common mission</td></tr>
</table>

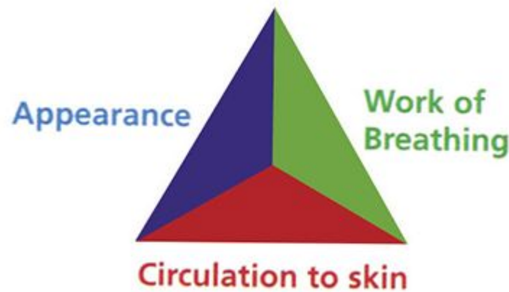
https://www.ahrq.gov/professionals/education/curriculum-tools/cusptoolkit/modules/implement/teamworknotes.html

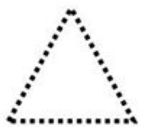
Pediatric Vital Signs/Weight by Age

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	**40**	60-100	16-24	90-127
14	**50**	60-100	16-24	90-132
15+	**55+**	60-100	14-20	90-135

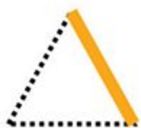
BP* in children is a late and unreliable indicator of shock

Pediatric Assessment Triangle (PAT)





= STABLE



= *RESPIRATORY DISTRESS*

= *RESPIRATORY FAILURE*

= *SHOCK*

= *CNS / METABOLIC*

= *CARDIO-PULMONARY FAILURE*

Pediatric Mental Status

A- Alert
V- Responsive to verbal
P- Responsive to painful
U- Unresponsive

ED SimBox: Seizure

Resources

VITAMINS: Seizure Etiology

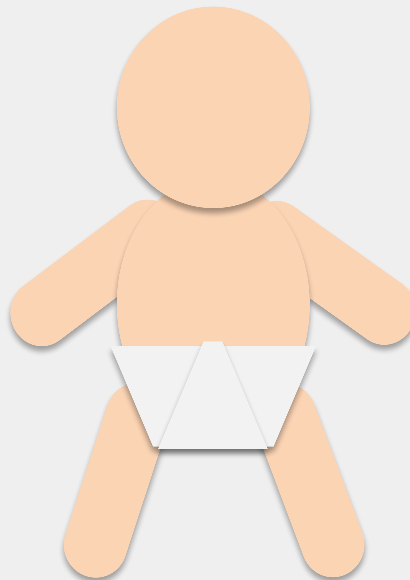
VITAMINS

Seizure Etiology

- **V VASCULAR** – Stroke, post stroke, AV malformations
- **I INFECTION** – Meningoencephalitis, Lyme disease, TB meningitis, brain abscess, HIV related, cerebral malaria
- **T TRAUMA / TOXICOLOGY** – Non-accidental trauma, brain injury (hemorrhage), toxicologic (prescription and non-prescription, recreational drugs, opioid withdrawal)
- **A AUTOIMMUNE** – SLE, CNS vasculitis
- **M METABOLIC** – Hepatic encephalopathy, uremia, hypoglycemia, low Na, Ca, Mg, porphyria
- **I IDIOPATHIC** – Epilepsy
- **N NEOPLASM** – Primary or secondary brain tumor
- **S SYNDROMES** – Tuberous sclerosis, Down syndrome, Sturge Weber syndrome, Von Hipple Lindau syndrome, other neurodevelopmental syndromes

ELIZABETH SANSEAU MD, MAYBELLE KOU MD, ILENE CLAUDIUS MD

REFERENCE: HTTPS://COMMONS.WIKIMEDIA.ORG/WIKI/FILE:VITAMIN_B12_CAPSULE.JPG



Stepwise Approach to Seizure Management

ABCDE's
Airway
Breathing
Circulation
Disability/Dextrose
(Anti)Epileptic drugs

How to Optimize Airway & Breathing

Open airway
- Jaw thrust
- Chin tilt
- Shoulder roll
- Suction PRN
- Accessories: nasopharyngeal

Assist breathing
- Bag mask ventilation (BVM)
- Continuous positive airway pressure (CPAP)
- Intubate/ventilate

Anti- Epileptic Drugs (No IV Access)

Administer first line AED t = 5 mins; Benzodiazepine (BZ) Q5 min x 2

- Midazolam 0.3 mg/kg Buccal max 10 mg
- Midazolam 0.2 mg/kg IN/IM max 10 mg
- Diazepam 0.5 mg/kg PR max 50 mg

Anti- Epileptic Drugs (IV/IO Access)

- Midazolam 0.1 mg/kg max 5 mg
- Lorazepam 0.1 mg/kg max 4 mg

Administer 2nd line AED t + 15 mins if still has SZ activity after 2nd BZ dose

- Levetiracetam 40-60 mg/kg (max 2500 mg)
  OR
- Phenytoin/Fosphenytoin 25 mg/kg
  OR
- Valproic Acid 40 mg/kg

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

ETIOLOGY

- **V**ascular: stroke, AV malformation
- **I**nfection: meningitis, Lyme, TB, brain abscess, HIV-related
- **T**rauma: hemorrhage, toxicologic
- **A**utoimmune: SLE, CNS vasculitis
- **M**etabolic: hypoglycemia, low Na|Ca|Mg encephalopathy
- **I**diopathic
- **N**eoplasm
- **S**yndromes: Tuberous sclerosis, Rhetts, Sturge Weber, VHL

SYMPTOMS

- Convulsions
- Incontinence (urine or stool)
- 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

Shoulder Roll

Use rolled towel under shoulders to achieve neutral neck

Chin Lift

Use two fingers under chin to lift

Suction

Suction secretions from nose and oral cavity

Assist Breathing

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 200 mg/kg IV/IO over 10 min OR**
- **Levetiracetam 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

SECOND LINE

Levetiracetam

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

Phenytoin Fosphenytoin

blocks voltage-dependent neuronal sodium channels; watch PR interval

Phenobarbital

bind GABA(A) receptor, extending duration of GABA-mediated 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

OVERVIEW

Ben Lawton. The First Afebrile Seizure, Don't Forget the Bubbles, 2014. Available at:
https://doi.org/10.31440/DFTB.4794

Thanos Konstantinidis. Febrile seizures, Don't Forget the Bubbles, 2014. Available at:
https://dontforgetthebubbles.com/febrile-seizures/

VIDEOS & PODCASTS

Elma Raissi. Febrile Seizure. Peds Cases, 2015. Available at:
https://www.pedscases.com/febrile-seizures

Michelle Bischoff. Status Epilepticus in Children. Peds Cases, 2010. Available at: https://pedscases.com/status-epilepticus-children

Michelle Bischoff. Seizure Types and Epilepsy. Peds Cases, 2010. Available at: https://pedscases.com/seizure-types-and-epilepsy

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:
https://trekk.ca/search?q=status+epilepticus&events=events&teams=teams&external_resources=external_resources

We want to hear how this went for you and thank you for your feedback. Please go online and click on either participant or facilitator survey: https://www.acepsim.com OR use QR code: Take out your mobile device, open camera, get QR code in front of camera, a link should pop up, click on that link.

Posted: April 2020
Revised: May, Dec 2020
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