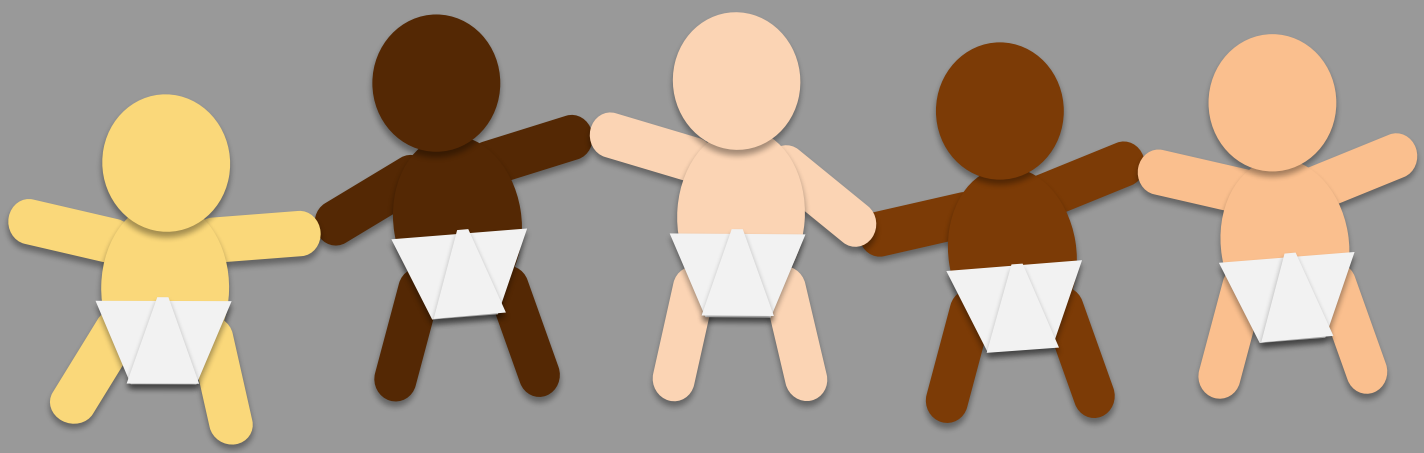
SimBox+
Tele SimBox

Pediatric Seizure
EMS



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EMS SimBox: Seizure

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EMS SimBox: Seizure

Background

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: Telefacilitation tips at the end of this document.
- 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.

EMS SimBox: Seizure

Case Summary

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

1. Apply Crisis Resource Management and teamwork in the care of a seizure patient (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 guide the stabilization or escalation of care for a seizing patient
3. Determine the appropriate destination for transfer

Overall Scenario Schema

Link to Pre-briefing Script for SimBox/SimBox+

2 mins

Play video to team

Assign or **Coach them to allocate** roles

Paramedic	Paramedic	EMT

6-10 mins

Stem: 4 yo male presents with a seizure x 10 min via EMS. No past medical history. Medics responded to scene, child postictal. Arrives in ED and begins seizing upon arrival.

Pt does not have vascular access and keeps seizing. Team must prioritize treatment to manage seizures.

Telesim Co-facilitator prompts are indicated in these boxes

15 mins

Link to Debriefing Script

10 mins

Option: re-run scenario

EMS SimBox: Seizure

Case progression

Scenario script:

"I will assign you each of you 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." ***PLAY VIDEO***: https://youtu.be/D2UCi8TowXg

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), Broselow tape/app, antiepileptic medication
- Calls for help

"Patient is here"

Time 0

- Team confirms patient is on monitors, pulse oximeter, BP cuff, temp
- Performs ABCDEs

"Patient is seizing, SpO2 is in the 80s on 100% oxygen via NRB"

1

HR 150s
BP 90/50
RR 20
Sat 80%

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

"Patient is seizing and is not responsive, still can't get IV, sats improving with BVM and color improving, capillary refill 3 seconds"

2

HR 150s
BP 90/50
RR 20
Sat 90%
EtCO2 32

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

Telesim co-facilitator: " Please confirm medication, dose and route of administration as patient does not have an IV"

3

HR 160s
BP 90/50
RR 33
Sat 90%
EtCO2 32

- Team confirms first BZ to administer
- Orders 2nd dose BZ to have at bedside
- Reassesses ABCs, gathers SAMPLE history

Telesim co-facilitator: "Giving benzodiazepine now" (specific med/dose/route requested)

EMS SimBox: Seizure | Case progression

SAMPLE History

Signs/Symptoms: Generalized seizure began at home ~5 mins PTA, has never done this before. No recent fevers or infectious symptoms **Allergies:** None **Medications**: None **Past 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."

4

HR 170s
BP 90/50
RR 47
Sat 96%
EtCO2 30
Glucose 170

- Reassesses ABCs
- Considers IO or IN/IM as IV access not achieved
- Orders STAT Glucose, BMP, Ca

GO TO 6 FOR ADVANCED LEARNER OPTION

Telesim Co-facilitator "Benzos in" (specific med/dose/route requested)

5

HR 178
BP 106/62
RR 53
Sat 97%

- Team recognizes seizing is slowing
- GO TO WRAP

Telesim Co-facilitator "Patient is still seizing, what else is needed?"

6

HR 178
BP 106/62
RR 53
Sat 97%

ADVANCED LEARNER OPTION:

- Seizures continue
- Team runs through Hs and Ts
- Second line IV seizure management

"Patient looks better, seizure is slowing, SpO2 is back up to 97%"

Wrap

HR 178
BP 106/62
RR 53
Sat 97%

- Leader states: "The child has stopped seizing. Let's re-evaluate ABCDEs
- Hands off patient to the ED team when arrives
- Updates family

After team performs handoff, state "This concludes the simulation" and move to debrief.

Link to resource page: educational content

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

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

Initial seizure management

- Initiate Airway, Breathing, Circulation, cardiorespiratory + BP monitoring
- O_2 10-15 L/min non-rebreather mask + place end tidal capnography
- Monitor for respiratory depression, hypotension, arrhythmias

- Give first line agent: Benzodiazepine (refer to local protocols/below)
- Establish IV line if needed
- Rapid bedside glucose: If less than 60 mg/dL, give 5 mL/kg D10W IV push
  - Then start D10W infusion @5 mL/kg/hr (MAX 250 mL/hr). Recheck glucose in 5 min.

Ongoing seizure

5 min

First Line Agents: Benzodiazepines

If no IV access, give 1st dose of:

- **Midazolam 0.2 mg/kg IM or IN (MAX 10 mg)**
  1 mL/nostril of 5mg/mL solution **OR** one of:
  - Midazolam buccal 0.5 mg/kg (MAX 10 mg)
  - Diazepam rectal 0.5 mg/kg (MAX 20 mg)

If IV access, give 1st dose of:

- **Lorazepam 0.1 mg/kg (MAX 4 mg) IV over 2 min OR:**
  - Midazolam IV 0.1 mg/kg (MAX 10 mg) IV over 2 min

! Reassess ABCs, monitor for respiratory depression
If still seizing:

10 min

Repeat dose of First Line Agent (as above)

- Consider intraosseous (IO) access if failed IV attempts x 2 and persistent seizure
- Prepare second line agent per protocol or medical control

! Reassess ABCs, monitor for respiratory depression
If still seizing:

15 min

Second Line Agents:

Give one of:

- **Fosphenytoin (20 mg PE*/kg in NS, MAX 1000 mg PE*) IV/IO over 10 min OR**
- **Levetiracetam 60 mg/kg/dose (MAX 3000 mg) IV/IO over 15 min OR**
- Phenytoin (20 mg/kg in NS, MAX 1000 mg) IV/IO over 20 min OR
- Phenobarbital (20 mg/kg in NS, MAX 1000 mg) IV/IO over 20 min
- Prepare third line agent

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.

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