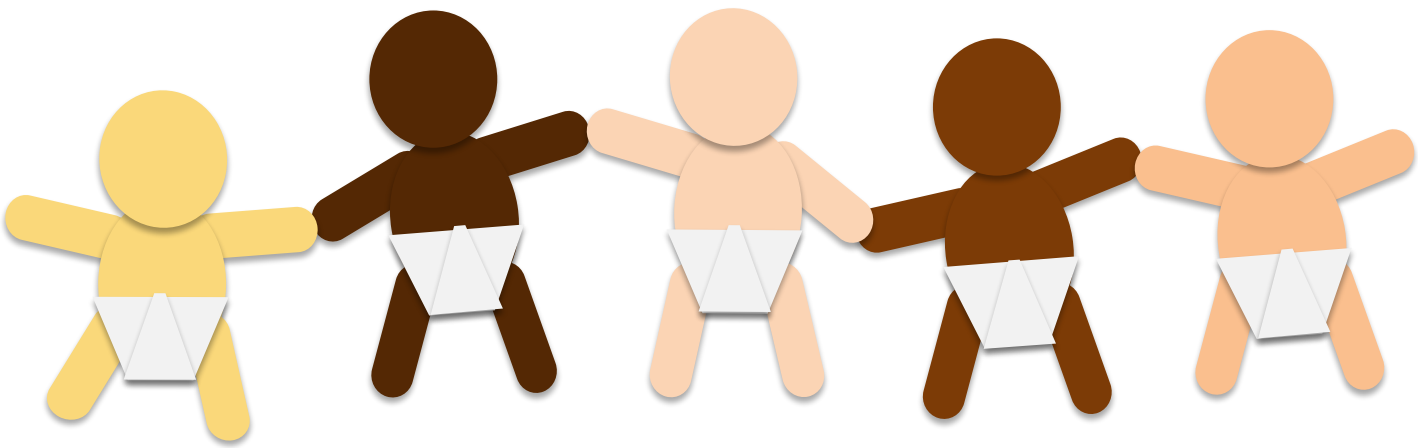
SimBox+
Tele SimBox

Pediatric Trauma



Emergency Department/Hospitalist/Resident

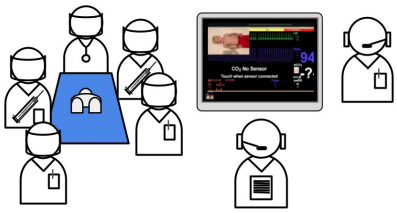
Contents
with links to pages

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

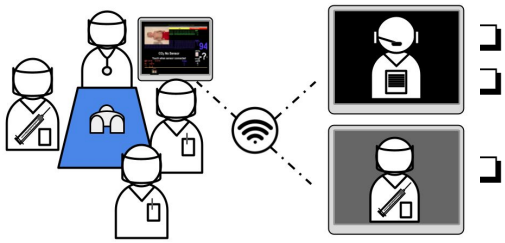
- ❏ Our low-technology simulation series allows your team to engage in the first 5-10 minutes of an emergency scenario.
- ❏ Use your own equipment and resources in your own clinical environment, or in the convenience of a virtual environment to practice non technical skills.

SimBox Original Version

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



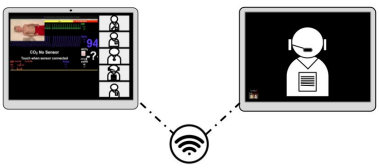
SimBox+ (SimBox Original + tele-facilitator)



- ❏ 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

- ❑ 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

- ❑ Review the case summary and progression.
- ❑ Use the Prebrief / Debrief scripts or use your own.
- ❑ Review the 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 resuscitate a pediatric trauma patient with emphasis on the following objectives:

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

Overall Scenario Schema

Link to Pre-briefing Script for SimBox/SimBox+

2 mins

Assign or Coach them to allocate roles.
Adapt roles based on the participating team:

Team Leader	Airway	Bedside Survey
Respiratory Tx	Bedside Nurse	Medication Nurse
Parent Liaison	Pharmacy	Recorder

10 mins

Stem: A 7 year old girl is brought to the Emergency Department after a fall from the monkey bars.

Your team will focus on the resuscitation of a pediatric trauma patient.

Telesim Co-facilitator prompts are indicated in these boxes

15 mins

Link to Debriefing Script

10 mins

Option: re-run scenario

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 Trauma Video

Video states: "ED, ED this is an ALS unit, coming in with a 7 year old girl who fell off the monkey bars about 30 minutes ago. Unwitnessed fall, unclear if she lost consciousness. She is awake and alert, but complains of diffuse abdominal pain. Her saturations are 99% on room air, her heart rate 120 and she has good pulses. We are working on a blood pressure. We will be there in 2 minutes."

2 minute warning

- Team assembles + confirms roles
- Asks for equipment: Broselow tape/ app, monitors, POCUS, access, medications
- Dons PPE (hard stop)
- Calls for help

Video states: "The patient has arrived."

Time 0 (min 7)

- Team places patient on monitors
- Estimates weight
- Begins primary survey

Facilitator states: "Patient states that her abdomen hurts a lot. She is able to stand for a weight, which is 23 kg. Mom just arrived to the bedside."

1 (min 8)

HR 130
RR 20
Sats 99% RA
CRT 4 sec
BP -/-

- Team performs the primary survey:
  - A- Airway patent, C-spine immobilized with collar
  - B- Breath sounds and chest wall movement equal bilaterally
  - C- Femoral pulses 1+, CRT 4 sec, normal heart sounds
  - D- GCS 15 (or Alert if using AVPU), PERRLA, moves all limbs
    Team asks for POC dextrose
  - E- Normothermic. Bruise to the left flank
- Asks RN for IV access

SAMPLE history

Signs/ symptoms: "She was climbing on the monkey bars. I turned around to look at my other daughter, and apparently she fell. I did not see her hit the ground, but another parent told me she landed on her stomach with her left hand underneath her. They said that she hit her head too, but cried immediately and did not lose consciousness."

Allergies/ Medications: None

Medical history: None, up to date on immunizations

Last meal: PBJ sandwich and juice approximately 1 hour prior to the incident

2
(min 10)

HR 150
RR 20
Sats 98% RA
CRT 4 sec
BP 80/46
T 36C/ 97 F

- Team performs secondary survey:
  - No scalp/ facial bruising or tenderness
  - No tenderness to palpation of the cervical, thoracic, lumbar spine or clavicles
  - Abdomen is rigid and tender throughout
  - Extremities are cold and slightly mottled
  - No tenderness to palpation of the extremities or the pelvis
- Team orders labs: iSTAT/ gas, CBC, CMP, PT/ INR & PTT, type and screen

"Labs sent and IV placed in the right AC. POC glucose is 90. The patient is still complaining of severe abdominal pain. Is there anything we can give her?"

3
(min 12)

HR 150
RR 20
Sats 99% RA
CRT 4 sec
BP 80/49

- Team verbalizes illness state: Patient in hypovolemic/ hemorrhagic shock; concern for blunt abdominal trauma and splenic laceration
- Places non-rebreather mask
- Recognizes need for blood products, based on institution protocol
- Orders warm 20 mL/ kg fluid bolus, via push and pull
- Asks for second IV
- Performs FAST
- Orders bedside CXR, +/- abdominal/ pelvic XR
- Orders IV morphine 0.1 mg/kg

"20 mL/kg NS bolus given via push & pull. Repeat blood pressure is 80/49. Second IV is in. Will administer the morphine in a second. What do we think about the FAST?"

4
(min 14)

HR 130
RR 20
Sat 98% RA
CRT 3 sec
BP 99/63

- Team notes persistent hypotension and free fluid in the abdomen
- Orders second 20 mL/kg NS bolus or administers blood products if available
- Makes NPO
- Orders abdominal CT
- Discusses with Surgery/ Pediatric Surgery

"Second 20 mL/kg NS bolus given via push & pull, her HR and BP seem to be improving. Her pain is better too."

Wrap up
(min 16)

HR 110
RR 20
Sat 98% RA
CRT 2 sec
BP 110/69

- Team notes improving HR and BP
- Updates the family
- Reviews blood test results and Xrays
- Considers starting maintenance fluids
- Hands off to the admitting team
- Prepares for transfer to the CT scanner

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

Link to resource page: educational content

PRE-ALERT CHECKLIST

- ❑ Activate Trauma Team
- ❑ Introduce team + assign key roles
- ❑ Don PPE
- ❑ Check equipment +monitors: warmed crystalloids + blankets, medications
- ❑ Obtain weight + dosages cognitive aid
- ❑ Notify CT/ OR and blood bank

HEMODYNAMIC INSTABILITY

HYPOTENSION in pediatric hemorrhagic shock is a LATE FINDING → PEA ARREST.

- poor perfusion, tachycardia
- decreased mental status + pain response

CONSIDER EARLY BLOOD TRANSFUSION
MTP 1:1:1 | Consider TXA

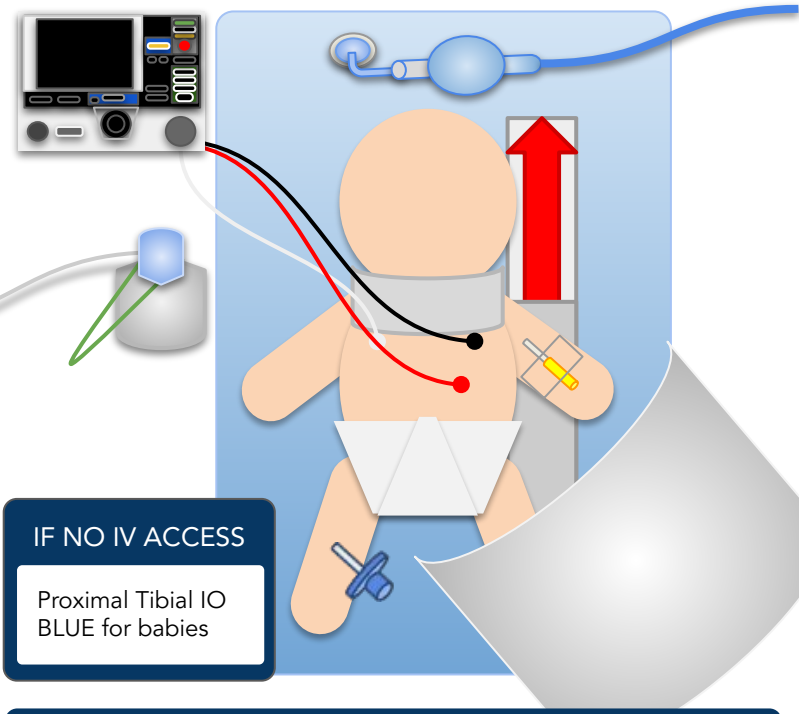
ATLS: A B C D E | F G H I

PRIMARY SURVEY

Airway: shoulder roll, c-spine precautions
Breathing: oxygenate, ventilate if needed
Circulation: access, control hemorrhage
Disability: neuro exam, ✓ Dextrose
Expose + control Environment (warmer)

SECONDARY SURVEY

Full set of vitals + e **F**AST
Glucose + give comfort measures, pain control, allow Child Life presence
Head to toe examination: log roll early and remove backboard/restraints
History: SAMPLE
Imaging + labs: +βHcg post menarche



IF NO IV ACCESS

Proximal Tibial IO
BLUE for babies

LEVEL OF CONSCIOUSNESS — AVPU

Alert | Voice | Pain | Unresponsive

KEY ANATOMICAL DIFFERENCES:

Normal vital signs vary with age:

- Larger head, short neck → high c-spine injuries, atlantoaxial instability
- Airway is small and anterior, tongue is relatively large, prone to obstruct
- Larger organs relative to size → solid organ injury with blunt trauma
- Body surface area → hypothermia prone
- Skeletal immaturity → plastic deformities

MULTIPLE BLUNT TRAUMA & INSTABILITY

Perform rapid assessment to r/o hemorrhagic or obstructive shock: consider eFAST.

- extracranial (intracranial in neonates with open skull sutures)
- intrathoracic/intra-abdominal injuries
- femur fractures

ARE PEDIATRIC SUBSPECIALISTS AVAILABLE AT YOUR FACILITY?

Involve consultants early and arrange early transfer if no resources for pediatric care

NOT ALL TRAUMA ARRIVES VIA EMS. UPGRADE ACCORDINGLY

FAST:

ED Pedi Trauma Video guide

7 min: patient appears
8 min: HR 130
10 min: HR 150, BP 80/46
12 min: HR 150, BP 80/49
14 min: HR 130, BP 99/63
16 min: HR 110, BP 110/69

Blood test results:

Hgb 9/ Hct 27
CBC, PLT normal
CMP with AST 200, ALT 250
Lipase unremarkable
PT/ INR, PTT unremarkable
Type and screen sent

TASK		DONE CORRECTLY	NOT DONE CORRECTLY	NOT DONE
Team-centered care	Verbally assemble the necessary staff, equipment and resources to care for a pediatric trauma patient.			
	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	Describe how an efficient primary and secondary survey are performed.			
	Verbalize the diagnosis of shock.			
	Demonstrate an organized approach to managing hypovolemic/ hemorrhagic shock.			
Psychomotor	Complete a FAST exam.			
Communication	Demonstrate handoff of care at the end of the case.			

Prebriefing Script

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."
Center for Medical Simulation, Boston MA

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

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."

Defuse
1-2 min

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

Discover
7-8 min

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

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.

Deepen
1-2 min

Identify patient care priorities. Then provide focused feedback and specific areas of opportunity for improvement. Elicit any other outstanding issues or concerns.

Summary
1-2 min

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

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

PRIORITIZE SYSTEMATIC EVALUATION AND EARLY INTERVENTION

How did you prioritize the interventions for this tachycardic child with a dropping blood pressure?

- Primary and Secondary surveys with adjuncts.

What is your first priority in this patient?

- As airway and breathing were unremarkable, Circulation & perfusion was important in determining stability and an important treatment priority.
- Once identified, deal with a problem BEFORE moving onto the next step of your assessment (i.e "find" and "intervene").

CONSTRUCT A DIFFERENTIAL DIAGNOSIS FOR TACHYCARDIA IN A PEDIATRIC CRITICALLY ILL PATIENT

List the primary determinants of cardiac output:
CO = HR x SV (preload, afterload, contractility)

List potential causes of tachycardia in pediatric patient:

- Pain/Anxiety
- Fever/Infection
- Hypovolemia
- Hypoxemia
- Metabolic/Endocrinologic (DKA, hypoglycemia or other electrolyte imbalance, thyrotoxicosis)
- Cardiac (arrhythmia, myocarditis)
- Medication/Ingestion

List major areas of internal hemorrhage:

- Chest, Abdomen, Retroperitoneum, Pelvis, Long Bones
- Potentially intracranial in an infant with an open fontanelle

Once tension pneumothorax has been eliminated as a cause of shock, hypotension following injury must be considered to be hypovolemic in origin until proven otherwise (other causes of non-hemorrhagic shock in a trauma patient are cardiac tamponade, cardiogenic shock, neurogenic shock, septic shock)

DEMONSTRATE FAMILY CENTERED CARE

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 during resuscitation. This does not lead to increased malpractice.
- A social worker or other provider should be assigned to stay with the family through the difficult time.

COMPONENTS OF EFFECTIVE TEAMS: TEAMSTEPPS IN A NUTSHELL

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

COMMUNICATION

SBAR
Situation
Background
Assessment
Recommendation

CALL OUT
Sharing critical information with the team

CHECK BACK
Loop Closure**

HANDOFF
I PASS the BATON

Introduction

Patient
Assessment
Situation
Safety Concern

Background
Actions
Timing
Ownership
Next

Cognitive Aid @DrM_Kou

LEADERSHIP

BRIEF
Planning, setting the tone

HUDDLE
Ad-hoc planning or updates

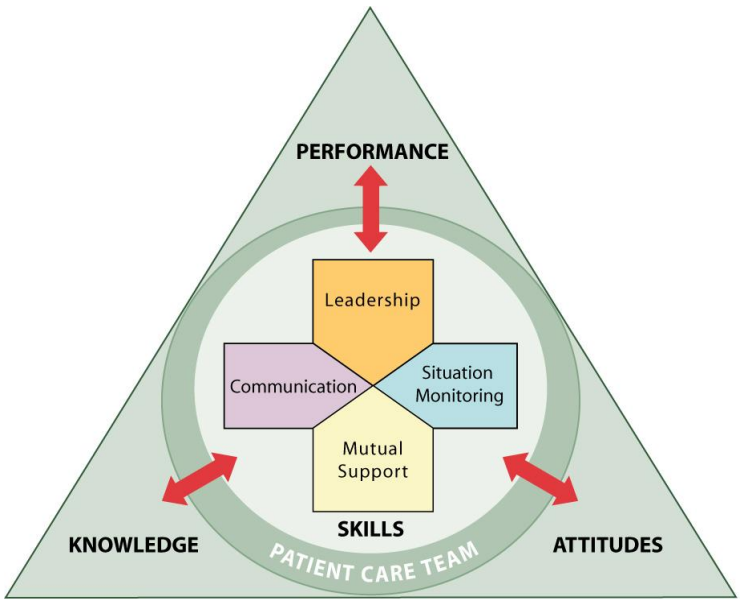
DEBRIEF
Exchange of information to inform team of performance and effectiveness

SITUATION MONITORING

STEP
Status of pt
Team Members
Environment
Progress toward goal

"I'M SAFE"
Tool for self evaluation
Illness
Medication

Stress
Alcohol/Drugs
Fatigue
Eating + Elimination



MUTUAL SUPPORT

TASK ASSISTANCE
Awareness of team work load

FEEDBACK
Providing information for purpose of team improvement

ADVOCACY & ASSERTION
Advocating for patient in case of a disagreement with decision maker

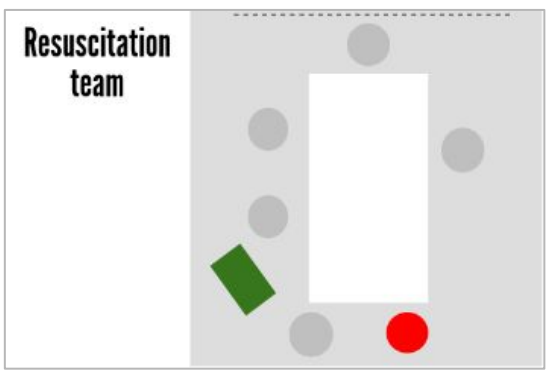
2 CHALLENGE RULE
Information conflict regarding patient safety

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

COLLABORATION
Working toward a common mission

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.

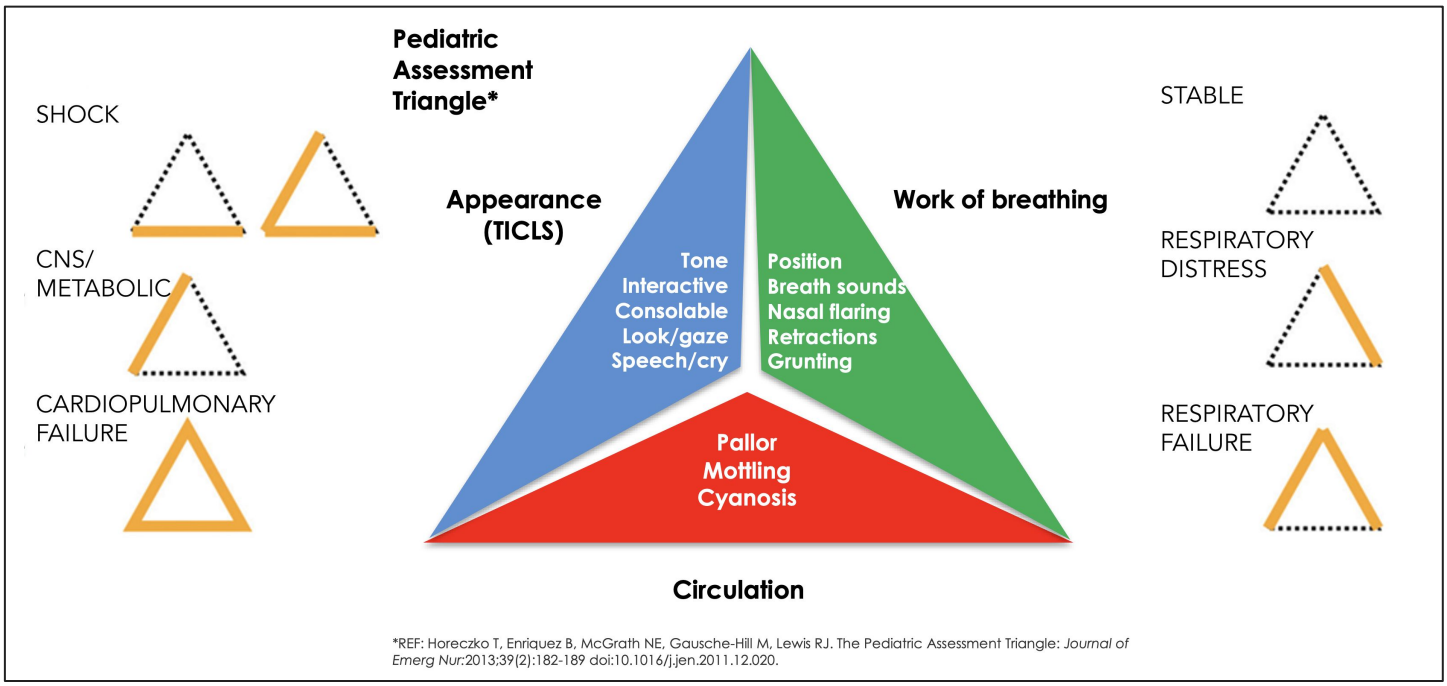
A shared mental model allows a team to anticipate the plan for patient care and what equipment or medications might be needed.

Pediatric Vital Signs/Weight by Age

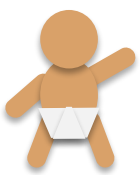
Age	Weight (kg)	Pulse	Resp	Systolic BP*
Newborn	3	100-180	30-60	60-70
6 mos	7	100-160	30-60	70-80
1 yr	10	100-140	24-40	72-107
2	12	80-130	24-40	74-110
3	15	80-130	24-40	76-113
4	16	80-120	22-34	78-115
5	18	80-120	22-34	80-116
6	20	70-110	18-30	82-117
8	25	70-110	18-30	86-120
10	35	60-100	16-24	90-123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

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

Using the Pediatric Assessment Triangle (PAT)



*REF: Horeczko T, Enriquez B, McGrath NE, Gausche-Hill M, Lewis RJ. The Pediatric Assessment Triangle: *Journal of Emerg Nur*:2013;39(2):182-189 doi:10.1016/j.jen.2011.12.020.



Pediatric Mental Status Assessment: response to stimuli

A	V	P	U
Alert	Verbal	Pain	Unresponsive

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 for a pediatric trauma patient.
- Verbalize the first line therapeutic interventions.
- 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

- Saron Henry: ATLS 10th edition offers new insights into managing trauma patients | The Bulletin
- Jeremiah Smith, Sean Fox. Approach to Pediatric Trauma. Clerkship Directors in Emergency Medicine. Available at: Trauma
- I-PASS, a Mnemonic to Standardize Verbal Handoffs
- Trauma Service : Primary and secondary survey by the Royal Children's Hospital of Melbourne

VIDEOS & PODCASTS

- Breanne Paul, Melissa Chan. Pediatric Trauma. Peds Cases, 2018. Available at: Pediatric Trauma | PedsCases
- "Initial Trauma Evaluation" by David Mooney for OPENPediatrics
- Push-Pull Method for Pediatric Fluid Administration.

ALGORITHMS

- Trauma Resuscitation Clinical Pathway — Emergency Department | Children's Hospital of Philadelphia
- TREKK Multiple Trauma, 2020. Available at: Multiple Trauma

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

Posted: Jan 2022

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