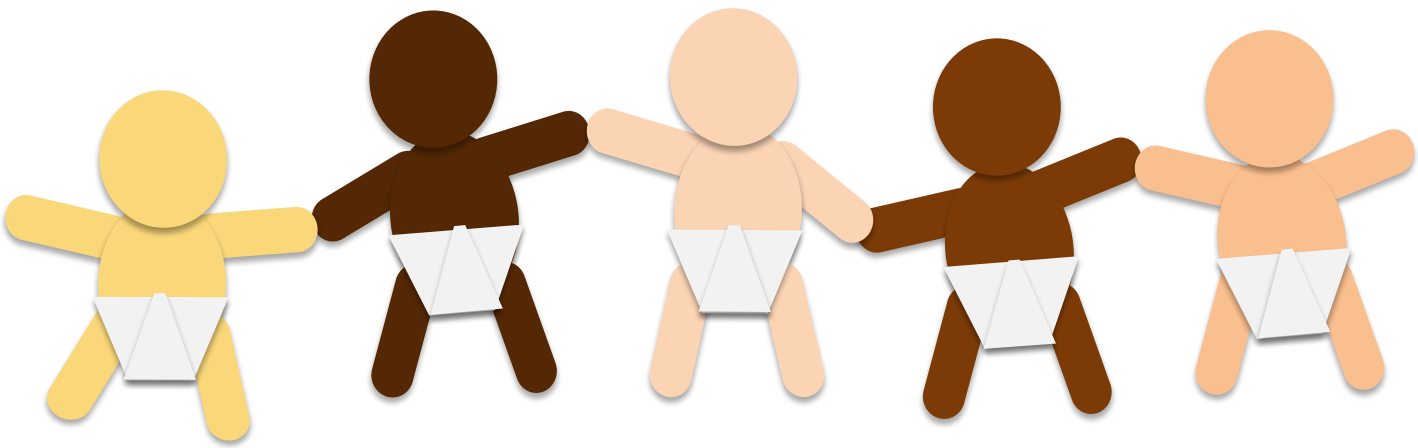
SimBox+
Tele SimBox

Pediatric Burn



Emergency Department/Hospitalist/Resident

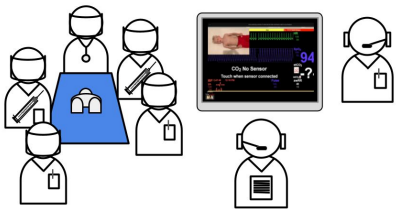
Contents
with links to pages

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

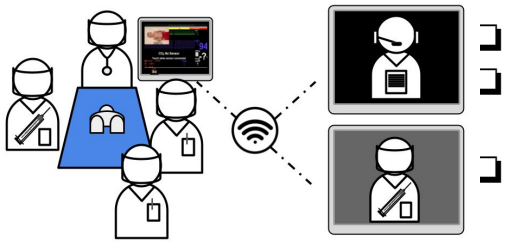
- ❏ Our low-technology simulation series allows your team to engage in the first 5-10 minutes of an emergency scenario.
- ❏ Use your own equipment and resources in your own clinical environment, or in the convenience of a virtual environment to practice non technical skills.

SimBox Original Version

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



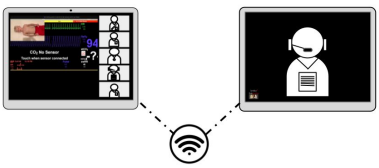
SimBox+ (SimBox Original + tele-facilitator)



- ❏ 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.

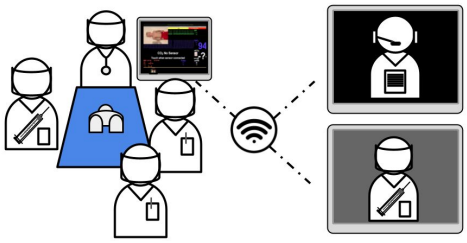
*If using this resource for EM / PEM trainees see Resource page at end of booklet with suggested case augmentation to meet Milestones.
**For additional questions or concerns, arrange a one-on-one tutorial with the project team.

TeleSimBox is a tool meant for you to use as you see fit, based on your own comfort and experience facilitating sims.

The video has a structured, narrated prebrief and debrief and the booklet includes suggested scripts, learning objectives, a prebrief and debrief, case-specific checklists & resources. These can be optional for advanced learners, but are recommended for novice facilitators.

Feel free to run through the video and the facilitator guide prior to the session, and use as many of the resources as you want!

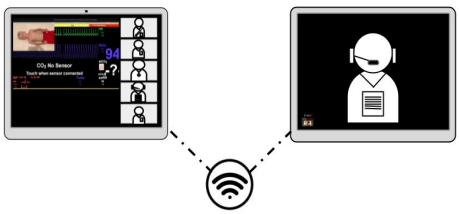
Trial sharing the video prior to the first session.



Use gallery view & ask the participants to name themselves with the assigned role.

Tele-tips

If you use the pre-narrated prebrief and debrief, make sure to make statements and comments to complement the video.



Ask observers to mute the audio and turn off the video for the simulation.

During the simulation, scroll through the monitor video based on the participants' actions.

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 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 patient with emphasis on the following objectives:

1. Apply Crisis Resource Management and teamwork in a pediatric 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 patient.
3. Determine the appropriate destination for transfer.

Overall Scenario Schema

Prebrief: Use narrated video + sample script or your own script

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 18 month old male is brought to the Emergency Department with a scald burn.

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

Telesim Co-facilitator prompts are indicated in these boxes

15 mins

Debrief: Use the narrated video + sample script or pause the video and use your own script

10 mins

Option: re-run scenario

Scenario script:

"You will hear a brief EMS dispatch and then see a two minute countdown clock as you prepare for the arrival of the patient."

Link to ED Pediatric Burn Video

Facilitator states: "ED, ED this is an ALS unit, coming in with a 18 month old boy with significant burns that he got after pulling hot water off the stove over himself. We will arrive in 2 minutes."

2 minute warning

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

"The patient has arrived. You have put on the appropriate PPE (mask and gloves). The patient is crying and screaming in pain. His clothes appear wet and you can see large blisters on his exposed skin."

Time 0 (min 7)

- Team places patient monitors, pulse oximeter, BP cuff, temp probe
- Estimates weight
- Assesses ABCDEs
- Begins to carefully remove all clothes

"Airway is patent. Breath sounds are equal bilaterally. Femoral pulses are 2+ and CRT 2 sec. He is alert and moving all limbs. We are trying to remove all his clothes, but he is crying inconsolably. He has severe scald burns on his chest, abdomen, and anterior surface of his left arm and both legs. His weight is 10 kg."

1 (min 8)

HR 160
Sats 99% RA

- Asks to remove the patient's diaper too (if not done)
- Asks RN for access and verbalizes need to start fluid resuscitation at 125 mL/hr
- Checks BP and temperature

"He is still screaming in pain, IV placement and BP measurement attempted and unsuccessful. Is there anything we can give him for his pain right away?"

2 (min 10)

HR 170
RR 24
Sats 99% RA
BP -/-
T 37

- Team verbalizes illness state: Patient with extensive scald burns
- Orders 1 mcg/kg IN fentanyl
- Asks to cover patient with dry, clean sheet
- Performs secondary survey

SAMPLE history

Signs/ symptoms: "He was in the living room watching TV. I was in the kitchen making lunch. I stepped away from the kitchen for less than a minute to let the dog outside. All of a sudden I heard crying coming from the kitchen and he was standing by the stove soaking wet. He must have pulled the pot with boiling noodles in it down from the stove top on top of himself."

Allergies/ Medications: None.

Medical history: None, born full term, up to date on immunizations.

Last meal: Pancakes for breakfast approximately 4 hours prior to the incident.

"1 mcg/kg IN fentanyl given. Patient seems much more comfortable now. His BP is 100/60, and his HR is now 150. We were able to get an IV. Secondary survey with no new significant findings."

3
(min 12)

HR 150
RR 24
Sats 99 % RA
CRT 2 sec
BP 100/60

- Team notes improvement in tachycardia and normal BP with appropriate pain management
- Asks for POC glucose
- Calculates the total body surface area (TBSA) burned
- Calculates the rate of resuscitation fluids using the "3 mL/kg LR x % TBSA burn PLUS D5LR or D5 1/2NS maintenance" formula

"LR started. POC glucose is 107. Do we need to cover these burns?"

4
(min 14)

HR 150
RR 22
Sats 99 % RA
CRT 2 sec
BP 100/60

- Team dresses burns in dry, clean, sterile dressings
- Reassesses ABCDE
- Informs the social work team
- Discusses what is the most appropriate destination for transfer (eg pediatric burn center) & contacts burn team

"We have covered the burns with dry, sterile dressings. He is calm and comfortable. Accepting team is ready for handoff."

Advanced learner option: Recognition and management of electrolyte disturbances and/or need for an advanced airway.

Wrap up
(min 16)

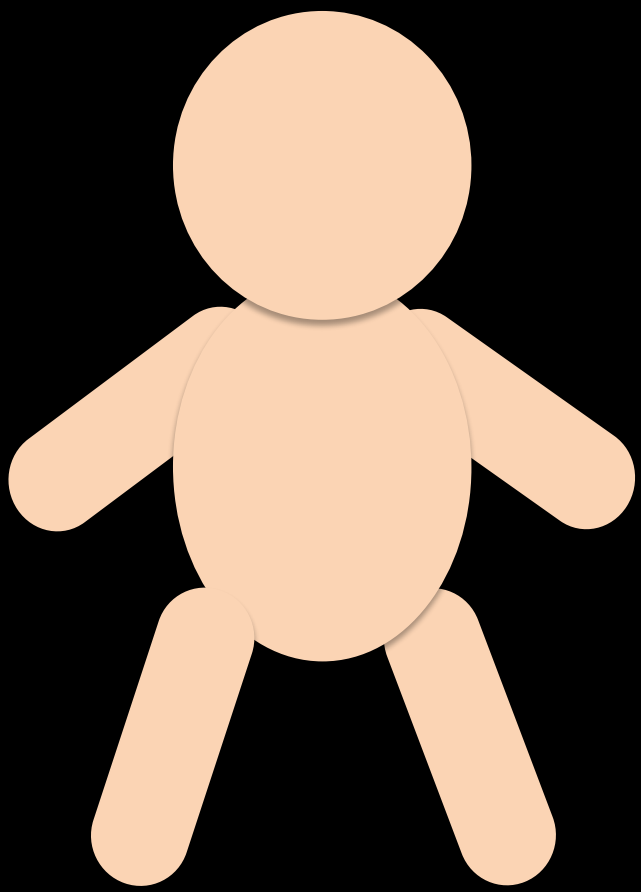
HR 130
RR 22
Sats 99 % RA
CRT 2 sec
BP 100/60
T 37

- Team handoffs to the receiving Transfer/ Pediatric Burn/ ICU team
- Formulates pain & fluid management plan for transport
- Updates family and answers their questions
- Prepares for transfer

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

Estimating our patient's burn area:

Front



Back

SimBox 3.0

SimBox 3.0

TASK		DONE CORRECTLY	NOT DONE CORRECTLY	NOT DONE
Team-centered care	Verbally assemble the necessary staff, equipment, and resources to care for a pediatric burn 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).			
	Involve social work for parental support early.			
Medical knowledge	Perform an efficient primary and secondary survey.			
	Prioritize early and efficient pain management, using intranasal fentanyl or other parenteral medications, when no IV access has yet been established.			
	Appropriately estimate TBSA in a pediatric burn patient to guide fluid resuscitation and proper destination for transfer.			
Psychomotor	Demonstrate appropriate wound management (removing clothing/diaper, using dry, sterile dressings).			
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. These questions are not meant to replace your team's discussion, but can help to steer the debriefing session.

CLASSIFY BURNS BY DEPTH OF INJURY

SUPERFICIAL: Dry, red. Blanches with pressure. Epidermis only.

SUPERFICIAL PARTIAL-THICKNESS: Blisters. Moist, red, weeping. Blanches with pressure. Extends into papillary dermis.

DEEP PARTIAL-THICKNESS: Blisters, easily unroofed. Wet or waxy dry. Variable color. Does not blanch with pressure. Includes more of the dermis.

FULL THICKNESS: Waxy white to gray to charred and black. Dry and inelastic. No blanching with pressure. All of dermis involved.

FOURTH DEGREE: Extends through the subcutaneous fat into the facia and/ or muscle.

HOW ARE BURNS IN CHILDREN DIFFERENT THAN ADULTS?

Infants and young children have a smaller body surface area (BSA) than adults, but are often exposed to the same offending agent (tap water, a hot drink, clothing iron), and thus sustain a proportionately larger TBSA burn than an adult.

A 7 kg child has a tenth of the weight of a 70 kg adult but a third of their TBSA. This relatively large body surface area results in both a greater surface exposure to the environment and a greater evaporative water loss per kg than adults. Therefore, children require more IV fluid per kg during resuscitation.

Infants less than 6 months have limited muscle mass, so cannot generate as much heat by shivering. Temperature regulation in this age group depends much more on environmental temperature control.

Children under age 2 years have thinner skin and are more prone to full thickness burns at lower temperatures or shorter duration of contact than adults.

WHEN TO TRANSFER A CHILD TO A BURN CENTER?

- Partial thickness burns >10% of TBSA.
- Full-thickness burns.
- Burns of the face, hands, feet, genitalia, perineum or major joints.
- Inhalation, electrical or chemical injuries.
- Significant pre-existing medical disorders, concontaminant trauma or need for special social, emotional or rehabilitative intervention.
- Burned children in hospitals without qualified personnel or equipment for the care of children.

PEDIATRIC BURN 🔥 MANAGEMENT

Primary Survey

🔥 Airway/ Breathing

- Think of airway edema & smoke inhalation injury.
- Assess for CO poisoning by calculating the carboxyhemoglobin.
- Use humidified oxygen and treat bronchospasm with β-agonists.

🔥 Circulation

- Initiate fluids early if > 20% TBSA (partial thickness or deeper).
- Preferred IV fluid is Lactated Ringer's (LR).
- Burns <20% TBSA do not require burn resuscitation.
- Do not bolus unless hypotensive.
- Start IVF during the primary survey:
  - <5 y/o: 125 mL/h
  - 6-13 y/o: 250 mL/h
  - >14 y/o: 500 mL/h

🔥 Disability

- Altered mental status? Think hypoxia, hypoglycemia or non- burn related cause.

🔥 Exposure

- Stop the burning process.
- Remove all clothing, diapers, shoes, jewelry.
- Examine for any associated, pre-existing or covert injuries; Burn injuries may mask less painful but more lethal injuries.
- Cover the wounds with dry clean linens and dressings.
- Take warming measures to conserve body temperature. Remember to cover the head to help maintain heat, and use warm/thermal blankets.
- Topical antibiotic ointments are not indicated if you will transfer to a burn center.
- Do not apply ice or cold cold solutions, as it may result in hypothermia and cold injury to the burned surface
- Burn debridement should be done at a Burn Center.

SimBox 3.0

Secondary Survey

🔥Fluid Resuscitation

Total fluid volume to be repleted over first 24h:
≥30kg: 2 mL/kg LR x %TBSA Burn.
<30kg: 3 mL/kg LR x % TBSA burn PLUS D5LR or D5 1/2NS at maintenance rate.

- Give half over the first 8 hours.
- Give the other half over the next 16 hours.
- Subtract any fluids given already.
- Use LR for resuscitation fluids.
- Only for second and third degree burns.
- Titrate based on response and UOP; insert Foley catheter.

E.g. 20 kg child with 40% TBSA Burn:
Total fluid resuscitation in first 24h: 3 mL x 20 kg x 40 = 2.400 mL.
2.400 mL / 2 = 1.200 mL to be given over the first 8 hours, so the calculated initial rate will be 1.200 mL/ 8h= 150 mL/h.

Secondary Survey (continued)

🔥 Perform a thorough physical examination:
- Evaluate for concomitant injury
- Assess vascular status of extremities and thorax. Circumferential burns may result in vascular compromise and may require escharotomy.

🔥 Treat pain and anxiety:
- IN fentanyl, Tylenol suppository, IM Toradol if no IV access.
- Remember nonpharmacologic interventions: reassurance, soothing, distraction, child life specialists.

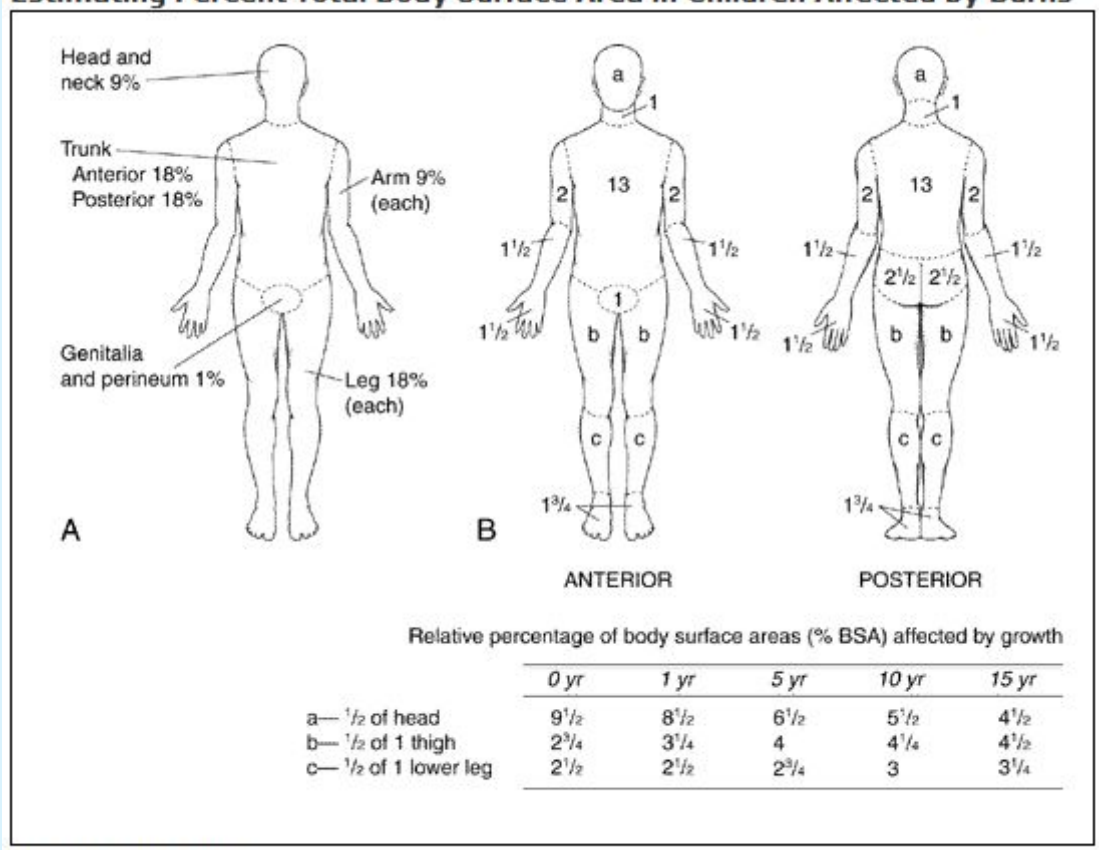
🔥 "AMPLET" Mnemonic:
- Allergies, Medications, Past medical and surgical history, Last intake, Events and Environment, Tetanus (tetanus prophylaxis should be considered for all burns).

🔥 Ask for the circumstances of the injury:
- Non accidental scalds are a common form of abuse.
- Is the story consistent with the injury pattern?
- Does the mechanism match the developmental stage of the child?
- Document: photographs are crucial.
- Reporting of child abuse is mandatory in the US. The child's pediatrician is often a valuable source of information.

🔥 There is no need for prophylactic IV antibiotics.

🔥 Labs: CBC, BMP, gas/ glucose, CK, UA.

🔥 Determine the total body surface area (TBSA) burned.



(A) Rule of "nines"
(B) Lund-Browder diagram for estimating extent of burns

U.S. Department of Health and Human Services, Public domain, via Wikimedia Commons

Rule of 9s: Used in adults but is not very accurate in children as the proportion of body surface area made by anatomic parts, especially the head, varies considerably by age.

Lund Browder diagrams

Palm method (fingertip to wrist equals 1% of TBSA)

Superficial burns are NOT included in TBSA.

SimBox 3.0

Content based on the guidelines issued by the American Burn Association

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

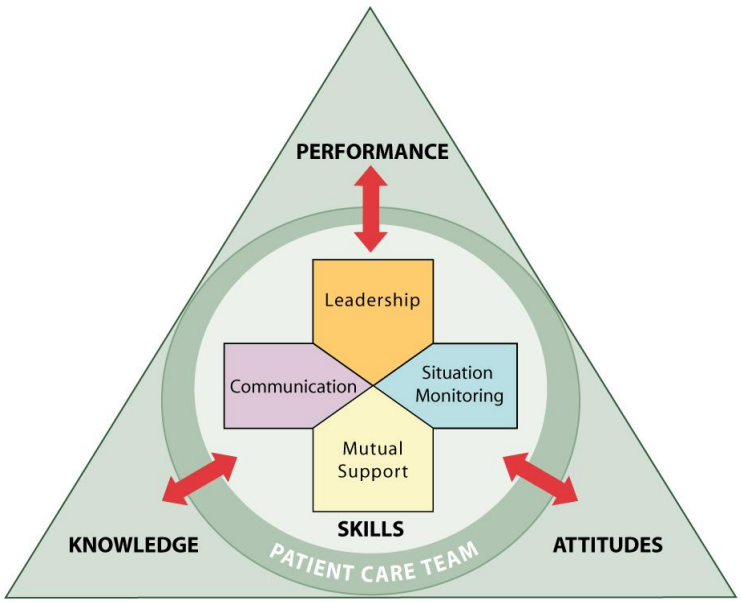
DEBRIEF
Exchange of information to inform team of performance and effectiveness

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

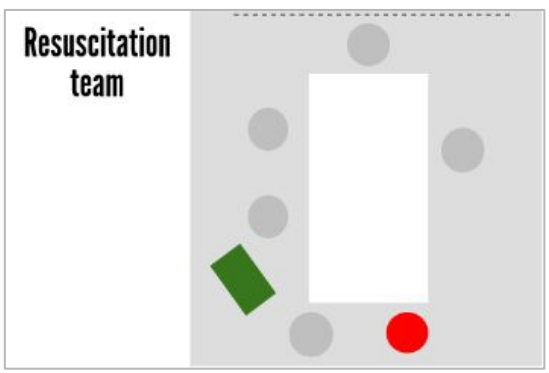
2 CHALLENGE RULE
Information conflict regarding patient safety

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.

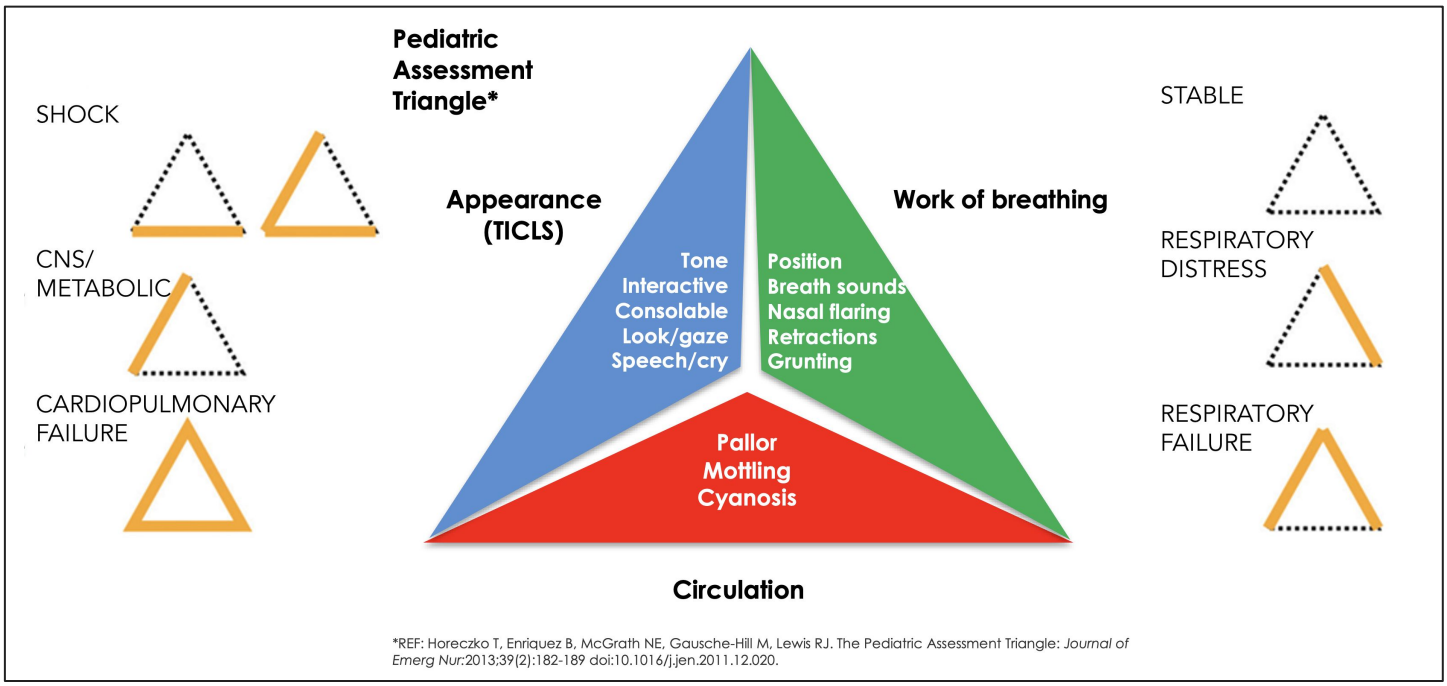
A shared mental model allows a team to anticipate the plan for patient care and what equipment or medications might be needed.

Pediatric Vital Signs/Weight by Age

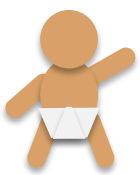
Age	Weight (kg)	Pulse	Resp	Systolic BP*
Newborn	3	100-180	30-60	60-70
6 mos	7	100-160	30-60	70-80
1 yr	10	100-140	24-40	72-107
2	12	80-130	24-40	74-110
3	15	80-130	24-40	76-113
4	16	80-120	22-34	78-115
5	18	80-120	22-34	80-116
6	20	70-110	18-30	82-117
8	25	70-110	18-30	86-120
10	35	60-100	16-24	90-123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

Shaw KN & Bachur RG. (2021). Burns. In Fleisher & Ludwig's Textbook of Pediatric Emergency Medicine. Wolters Kluwer.

Subcommittee on Advanced Trauma Life Support (ATLS) of the American College of Surgeons (ACS), Committee on Trauma, 1987-1988. (1989). Advanced trauma life support course for physicians. Chicago, Ill. :Committee on Trauma, American College of Surgeons.

Prevention – American Burn Association

Videos:

Burns 101 Assessment

"Fluid Resuscitation for Burn Injuries" by Robert Sheridan, MD for OPENPediatrics

Literature:

Burn Care for Children | Pediatrics In Review

Pediatric burn injuries treated in US emergency departments between 1990 and 2006

Critical care of the burn patient: the first 48 hours

Pain Management in Pediatric Burn Patients: Review of Recent Literature and Future Directions

Note:

Written and/or verbal consent was obtained for the use of the videos and pictures included in this booklet and respective video.

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:

Case-Specific Facilitator Survey

Participant Survey

Posted: May 2022

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