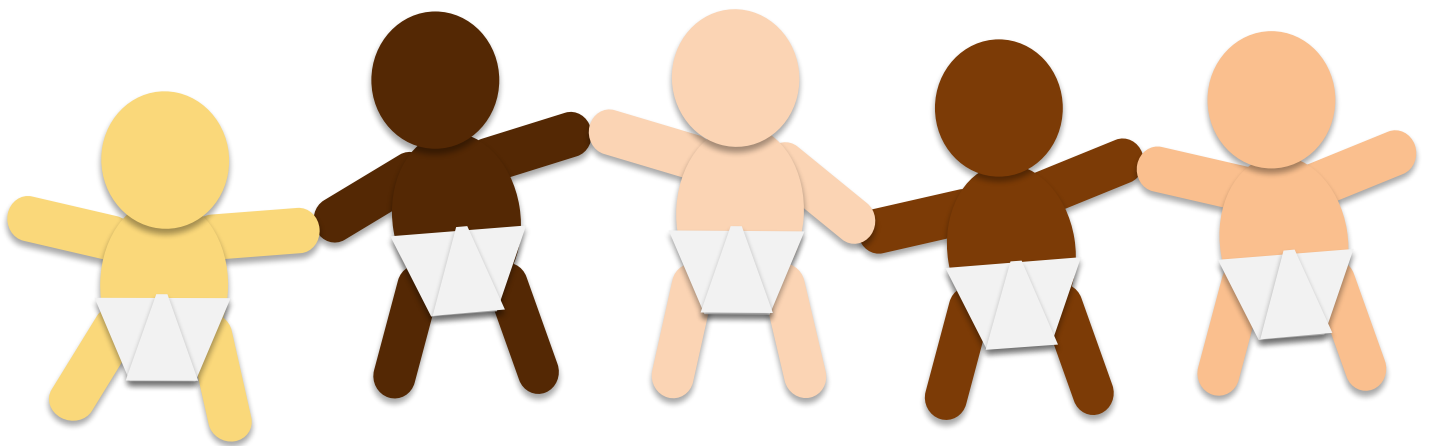


SimBox+ *Tele* SimBox

Newborn Resuscitation



Emergency Department/Hospitalist/Resident



PREPARATION

SimBox Background	Page 3
Tips/Tricks	Page 4
Case Objectives / Summary	Page 5

SCENARIO

Case scenario script and progression	Page 6
Case Checklist	Page 9

FACILITATION AND DEBRIEFING RESOURCES

Prebriefing Script	Page 10
Debriefing Script	Page 11

CASE SPECIFIC RESOURCES

Teaching content	Page 12
Educational Resources	Page 13
TeamSTEPPS Communication Tools	Page 15
Pediatric Vital Signs and Assessment Tips	Page 16
EM / PEM Milestones	Page 17
Resources	Page 18

FEEDBACK

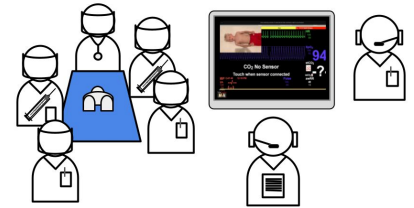
Survey	Page 19
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Thank you for your interest in SimBox low fidelity learning tools!

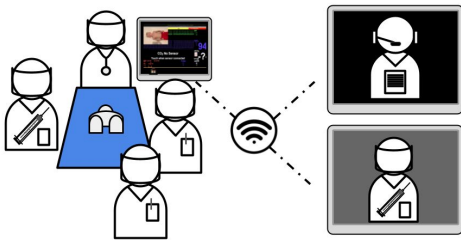
- ❑ Our low fidelity simulation series allows your team to engage in the first 5-10 minutes of an emergency scenario.
- ❑ Use your own equipment and resources in your own clinical environment, or in the convenience of a virtual environment to practice non technical skills.

SimBox Original Version

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



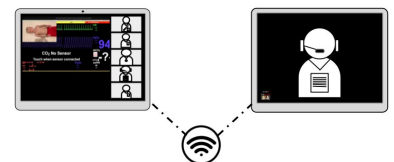
SimBox+ (SimBox Original + tele-facilitator)



- ❑ 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 Survey.

Intermediate to Advanced Facilitators

- ☐ Review the case summary and progression.
- ☐ Use the Prebrief / Debrief scripts or use your own.
- ☐ 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 resuscitate a newborn baby with emphasis on the following objectives:

1. Apply Crisis Resource Management and teamwork in the care of a newborn (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 newborn baby.
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

Team Leader
Respiratory Tx

Resident/ MS
Medication RN

Bedside RN
Technician

6-10 mins

Stem: A woman just delivered a baby in the ambulance bay. The newborn baby is wet, mottled, floppy and is making no respiratory effort.

Your team will focus on the resuscitation of the newborn baby.

Telesim Co-facilitator prompts are indicated in these boxes

15 mins

[Link to Debriefing Script](#)

10 mins

Option: re-run scenario

Scenario script:

"I will assign 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."

[Link to Newborn Resuscitation Video](#)

Facilitator states: "ED, ED this is an ALS unit, coming in with a primigravid 22 year old female in labor. She is fully dilated and she may deliver en route. We are 2 minutes out."

2 minute warning

- Team assembles + confirms roles
- Calls for help & prepares equipment

Warm:

- Newborn warmer bed set to 100% heat with scale and timer
- Warm blankets, hat, temperature sensor
- If <32 weeks gestation: plastic bag or wrap, thermal mattress

Clear airway:

- Bulb suction
- 10F or 12F suction catheter attached to wall suction, set at 80- 100 mmHg

Auscultate:

- Stethoscope, cardiac leads & monitor

Ventilate/ Oxygenate:

- Pulse oximeter
- Flowmeter set to 10L/min
- Oxygen blender set to 21% (21-30% if <35 weeks' gestation)
- Term and preterm sized masks
- Positive pressure ventilation (PPV) device (eg T piece resuscitator (ie: Neopuff group), self inflating bag or flow inflating bag with neonatal mask)

Intubate:

- Laryngoscope with size 00, 0 and 1 straight blades
- Stylet
- Endotracheal tubes (sizes 2.5, 3.0 & 3.5)
- Carbon dioxide (CO2) detector
- Measuring tape and/ or ETT insertion depth table
- Waterproof tape or tube securing device, scissors
- Laryngeal mask (size 1) and 5 mL syringe

Access:

- Heel stick sampling kit, including alcohol wipe, lancet portable BLS reader
- PIV needle, tapes and saline flush
- UVC/ UAC insertion supplies

Medications:

- Dextrose 10% (0.1 gm/mL):
 - Bolus: 2 mL/kg of D10W bolus
 - Total daily fluid goal of 60 mL/kg/day
- Normal saline for volume expansion: 10 mL/kg
- Epinephrine 0.1-0.3mL/kg of the 1 mg/10 mL (0.1 mg/mL)
- Other: Ampicillin, Gentamicin, Naloxone, Prostaglandin E1

"The baby was just delivered in the ambulance bay. Umbilical cord is cut and clamped with sterile scalpel by EMS and is noted to have 3 vessels (2 arteries and 1 vein). The infant is not crying and is scooped up by the triage nurse and carried into your resuscitation bay. OB is attending to the mom."

Time 0

- Team starts APGAR timer
- Dries with warm blankets
- Stimulates baby while drying the back
- Estimates weight
- Per NRP algorithm, team asks the following questions:
 - Term?
 - Tone?
 - Crying?

Facilitator states:

"Term? Yes
Tone? Floppy
Breathing/crying: No
Estimated weight: 3 kg"

1

HR <100
RR gasping
Sats not detectable
CRT > 3sec
T cold

- Team verbalizes illness state: Newborn in distress
- Warming maneuvers (replace warm/dry blankets, hat)
- Bulb suction: first mouth, then nose
- Starts PPV (40- 60 bpm) with 0.21 FiO2 and PIP of 20-25
- Confirms HR by auscultation
- Places SpO2 and cardiac monitor, temperature probe

"No chest rise visualized. No air entry can be heard when auscultating the chest. HR still below 100."

2

HR 70
RR gasping, irregular
Sats: not detectable
CRT > 3sec
T cold

- Team verbalizes illness state: No chest rise with PPV
- Anticipates airway management by discussing
"MR SOPA": "MR" before "SOPA"

Mask adjustment (consider 2-handed technique)
Reposition airway (neutral or slightly extended)

Suction mouth and nose (bulb or catheter)
Open mouth (lift jaw forward)
Pressure increase (in 5-10 mmHg increments to max of 40 mmHg)
Alternative airway (ask for ETT and laryngeal mask)

"I can see symmetric chest rise and hear equal air entry after mask adjustment and airway repositioning. Heart rate is rising >100. Tone improving. However the oxygen saturation is still 50% on 0.21 FiO2."

3

HR >100
RR 40-60
(per PPV)
Sat 50%
CRT 3sec

- Team notes improvement in heart rate with PPV (on monitor and/or by auscultation)
- Notes SpO2 below NRP goal
- Asks for increase in FiO2
- Adds PEEP 5-6 mm Hg if able
- Replaces warm/dry blankets, hat

SAMPLE history

Prenatal history: P1G0001, no maternal medical problems, unknown gestational age, but mother thinks close to term. No prenatal care since 2nd trimester since mother lost her job and insurance. Precipitous delivery. No maternal peripartum fevers or bleeding.

Family history: No known family history of congenital cardiac disease.

Social history: Denies substance use.

4

HR 130
RR 40-60
Sat 85%
CRT 2 sec

"Occasional respiratory effort without PPV but good chest rise with PPV. Saturations improving to 85% on FiO2 of 1. HR>100. Color improving."

- Team discusses NRP algorithm: SpO2 and HR at goal
- Starts weaning FiO2
- Places ETCO2 on mask, if not already placed
- Requests stat blood sugar

"Improved color, tone. Equal air entry and stable sats despite weaning the FiO2. Blood glucose is 30."

5

HR 140
BP 50/30
RR 40-60
Sat 90% on 0.3
FiO2

- Team notes hypoglycemia
- Attempts IV access
- Orders D10W bolus at 2 mL/kg
- Asks for temperature and blood pressure

"IV access in. Administering the D10W bolus. Significantly improved respiratory effort and breathing."

Wrap

- Team leader hands off to receiving NICU/ PICU/ Floor team
- Updates family

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

[Link to resource page: educational content](#)

Video guide

7 min: patient appears
9 min: HR<100, low sats
10 min: HR>100, low sats
12-17 min: HR>100, goal sats

TASK		DONE CORRECTLY	NOT DONE CORRECTLY	NOT DONE
Team- centered care	Verbally assemble the necessary staff, equipment and resources to care for a newborn baby in the ED			
	Demonstrate effective teamwork and communication (i.e. designate leader/roles, directed orders, closed-loop communication, sharing mental model)			
	Demonstrate appropriate PPE			
EM/PEM Milestone	Add the specific case milestone for trainees here			
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)			
EM/PEM Milestone	Add the specific case milestone for trainees here			
Medical knowledge	Describe the neonatal resuscitation protocol (NRP)			
	Escalate care per NRP protocol to manage neonatal respiratory distress and hypoxemia requiring PPV			
	Identify hypothermia and practice warming maneuvers			
	Diagnose hypoglycemia, obtain access and administer dextrose containing fluids			
	Demonstrate handoff of care at the end of the case			
EM/PEM Milestone	Add the specific case milestone for trainees here			

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.

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.

DESCRIBE SIGNS/ SYMPTOMS OF SHOCK IN A NEONATE

- Learners should approach a sick neonate in a standardized fashion.
- Airway, breathing, and circulation should be assessed immediately.
- Interventions such as airway repositioning/ adjuncts, BMV and CPR should be started concurrently, if required.
- After A, B, C have been addressed, the patient should be evaluated for disability and exposed for a thorough head to toe exam and a blood sugar level should be obtained.
- Labs/imaging should be ordered and antibiotics and fluids administered in a timely fashion.
- Learners should consider the different types of shock and how to treat each condition.

CONSTRUCT A DIFFERENTIAL DIAGNOSIS FOR PERSISTENT HYPOXEMIA IN THE NEWBORN



The differential diagnosis of a persistently cyanotic and hypoxic neonate despite appropriate NRP is broad and includes, but is not limited to:

- Neurologic: hypoxic-ischemic encephalopathy (HIE), intraventricular hemorrhage (IVH), seizures, stroke.
- Respiratory: respiratory distress syndrome, meconium aspiration syndrome (MAS), pneumonia, pneumothorax, pleural effusion, persistent pulmonary hypertension of the newborn (PPHN), pulmonary hypoplasia secondary to a variety of other causes.
- Congenital anomalies: congenital diaphragmatic hernia, congenital cystic adenomatoid malformation (CCAM), tracheoesophageal fistula (TEF).
- Infectious: sepsis - consider in setting of chorioamnionitis, Group B Strep, TORCH infections (toxoplasmosis, syphilis, varicella-zoster, parvovirus B19, rubella, cytomegalovirus, herpes infection).
- Electrolyte disturbance or metabolic abnormality: hypoglycemia in infant of diabetic mother.
- Toxic exposures: maternal narcotic (consider giving naloxone), alcohol or anesthetics.
- Hematologic: fetomaternal hemorrhage (order blood products).
- Congenital heart disease (CHD): cyanotic CHD or ductal-dependent CHD (critical right heart obstructive lesions, critical left heart lesions, and parallel circulations such as transposition of the great arteries TGA). Obtain pre- and post- ductal saturations and consider giving prostaglandin E₁ (PGE) in consultation with a pediatric cardiology and NICU team.

Knowledge:
NRP guidelines

Learners should approach a newborn delivery in a standardized fashion with emphasis on airway and breathing

Team briefing and equipment check

Term?
Tone?
Breathing?

YES

Stay with mother for routine care

- Warm and maintain normal temperature
- Position airway
- Clear secretions (if needed)
- Dry
- Ongoing evaluation

Warm and maintain normal temp

Position airway
Clear secretions (if needed)
Dry
Stimulate

Apnea,
gasp or
HR<100
bpm?

NO

Labored
breathing or
persistent
cyanosis?

YES

PPV

SpO2 monitor
Consider ECG monitor

Position and clear airway
SpO2 monitor
Supplemental O2
Consider CPAP

HR<100
bpm?

YES

Check chest movement
Ventilation corrective steps if needed
ETT/ laryngeal mask if needed

HR<60
bpm?

YES

Intubate if not already done

Chest compressions
100% FiO2
ECG monitor

HR<60
bpm?

YES

IV epinephrine

If HR consistently <60 bpm consider
hypovolemia or pneumothorax

Pre-ductal SpO2 target

1 min	60%- 65%
2 min	65%-70%
3 min	70%-75%
4 min	75%-80%
5 min	80%-85%
10 min	85%-95%

MR SOPA Corrective Steps

M R	Mask adjustment, Reposition Airway
S O	Suction mouth + nose, Open mouth
P	Pressure Increase
A	Alternative airway (ETT/ laryngeal mask)

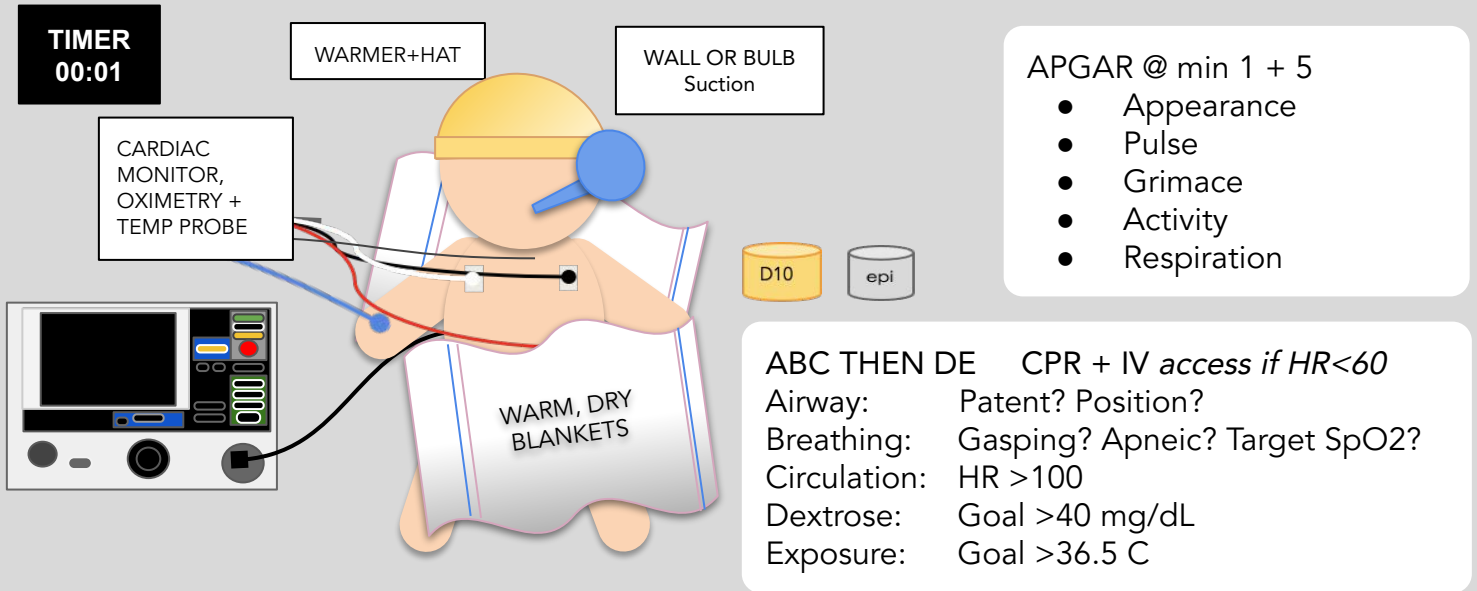
Endotracheal Intubation

GA (wks)	Depth of insertion (at lips)	Wt (g)	ETT size (mm)
23-24	5.5	500-600	Size 2.5 <1,000 or <28 wks
25-26	6.0	700-800	
27-29	6.5	900-1,000	Size 3.0 1,000-2,000 g or 28-34 wks
30-32	7.0	1,100- 1,400	
33-34	7.5	1,500- 1,800	Size 3.5 >2,000 or >34 wks
35-37	8.0	1,900- 2,400	
38-40	8.5	2,500- 3,100	
41-43	9.0	3,200- 4,200	3.5-4.0

Medication	Dose/ Route	Precautions
Epinephrine 1: 10,000 (0.1 mg/mL)	0.1- 0.3 mL/kg IV	Give rapidly and follow with 0.5- 1 mL normal saline flush Repeat every 3 to 5 minutes if HR < 60 with chest compressions
Volume expanders Normal saline O negative blood	10 mL/kg IV	If not responding to resuscitation/ signs of shock/ history of blood loss

Adapted from NRP; Textbook of Neonatal Resuscitation, 7th edition

NEONATAL RESUSCITATION PROGRAM: DRY, SUCTION MOUTH, STIMULATE!



AIRWAY

Wait to intubate?

- Can WAIT up to 10 minutes



DO

If HR NOT at goal
Doing chest compressions
*No premedication necessary

DON'T

If things are getting better:

- HR is at goal &
- SpO2 not at goal

BREATHING:

Hand on chest to evaluate breathing.

- Continue to bag-mask baby until you notice spontaneous regular respirations that are not from bagging.
- Use End tidal CO2 monitor: rapidly detects sudden changes in ventilation.

CIRCULATION:

Heart rate (HR): EKG leads work best.

*Dry skin before applying.

- Listen to chest and/or palpate umbilical stump (umbilical artery).
- If HR <100 or no chest rise: troubleshoot: MR SOPA.

Cord gas

- Obtain up to 1hr from clamped cord.
- BE <- 10 or pH <= 7.15: consider cooling.

Preparedness Tip

Where is your newborn resuscitation equipment cart?

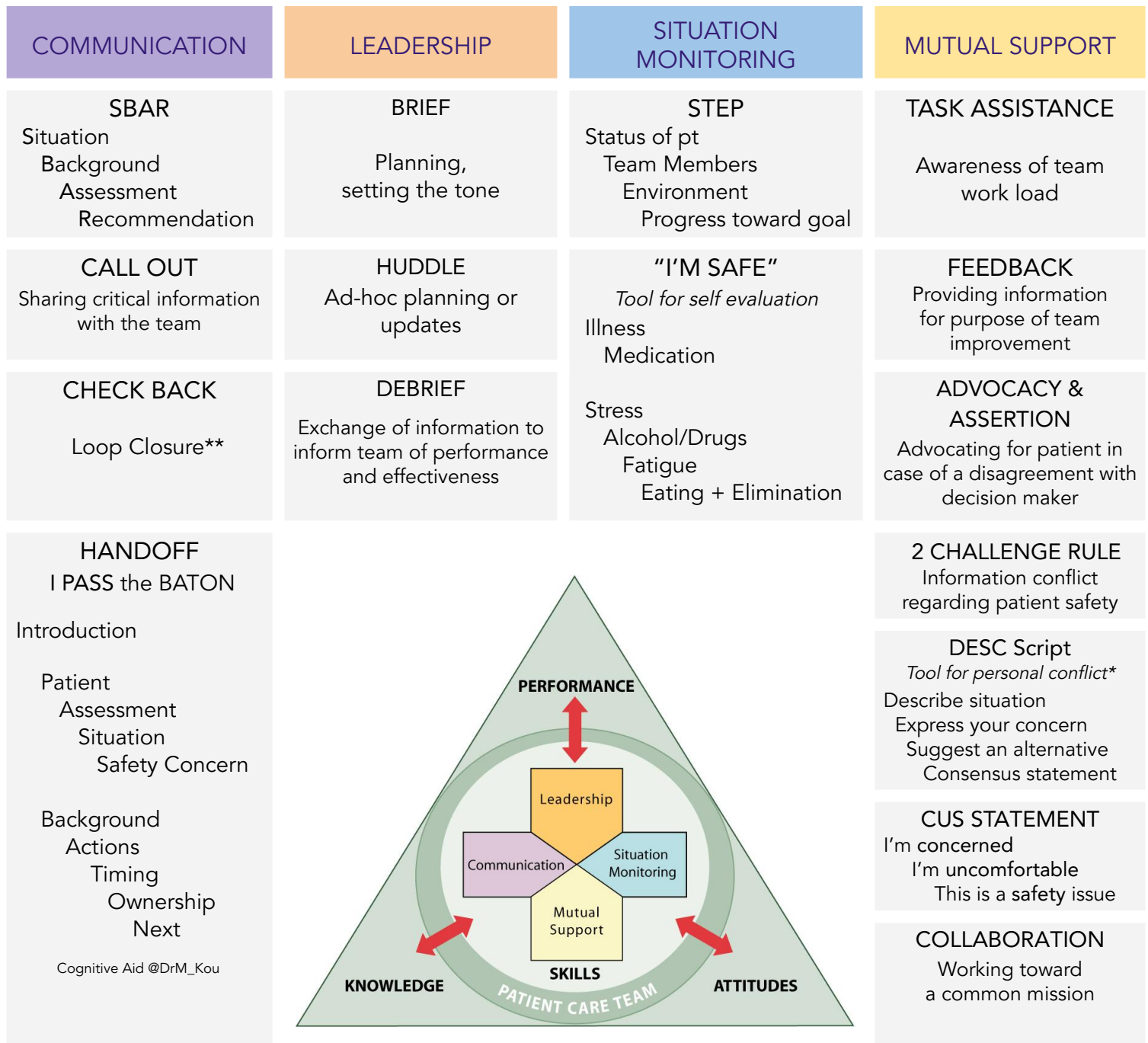
- Keep stocked & locked.

Do you have a warmer?

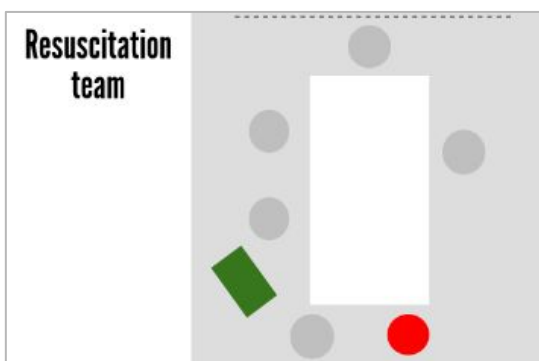
- Practice finding & turning on now!

COMPONENTS OF EFFECTIVE TEAMS: TEAMSTEPPS IN A NUTSHELL

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



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.

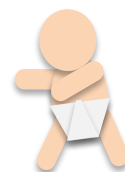
A shared mental model allows a team to anticipate the plan for patient care and what equipment or medications might be needed.



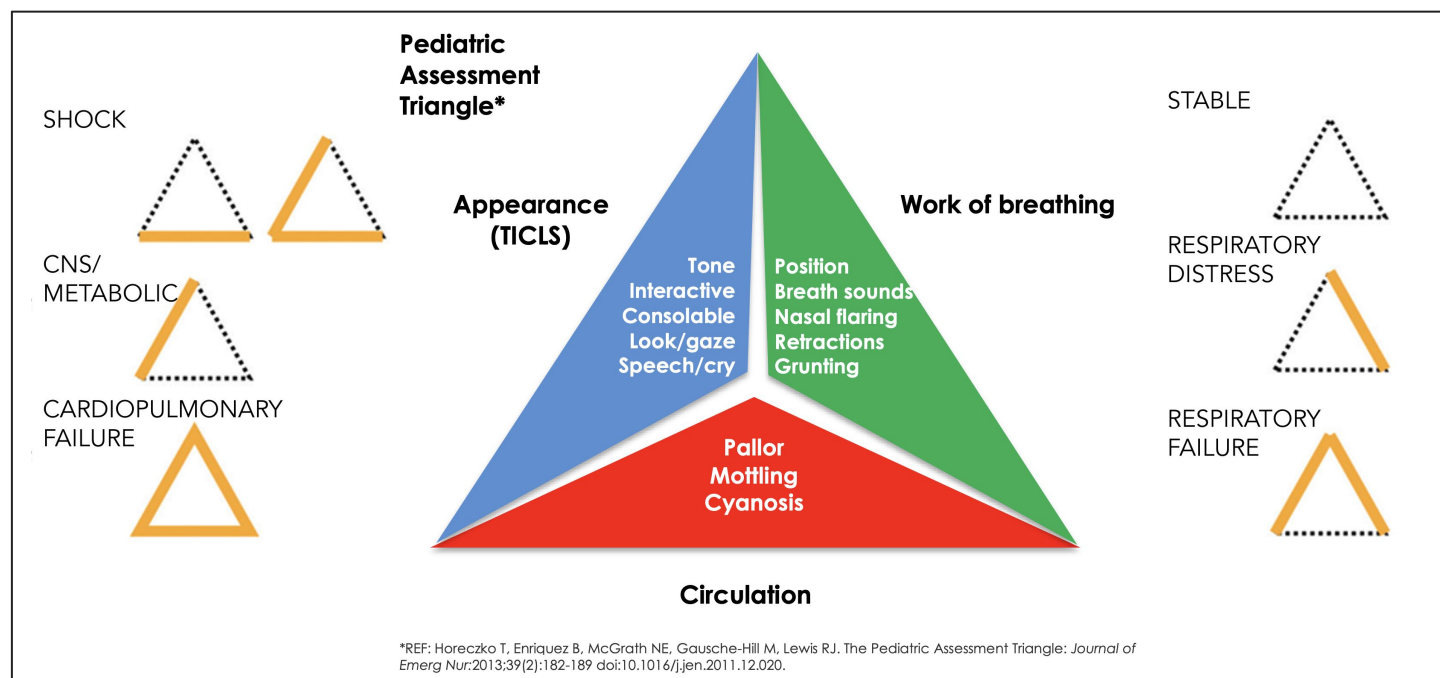
Pediatric Vital Signs/Weight by Age

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

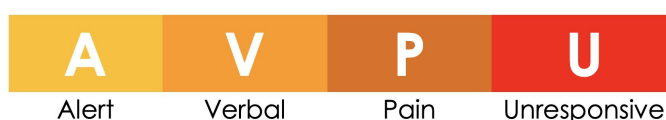
*BP in children is a late and unreliable indicator of shock



Using the Pediatric Assessment Triangle (PAT)



Pediatric Mental Status Assessment: response to stimuli



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 newborn baby.
- Verbalize the first line therapeutic interventions in a newborn baby.
- 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].

PODCAST

Ben Lawton. The ideal paediatric resuscitation, Don't Forget the Bubbles, 2017.
Available at: [The ideal paediatric resuscitation](#)

VIDEOS

Bobbi Byrne, MD, Marya Strand, MD. 3x3 Method for Placing Emergency Umbilical Venous Catheters. Available at: [NRP Neonatal Resuscitation Emergency UVC Epinephrine public](#)

<https://globalhealthmedia.org/portfolio-items/helping-babies-breathe-at-birth//>

[Delivery Room Management for Small Babies](#)

[7th Edition NRP Abrupton Mock Code](#)

[Neonatal Resuscitation Simulation-Nursing Education](#)

[Neonatal Resuscitation adjacent to the OR Covid 19 Precautions](#)

[Emergency - Newborn Resuscitation](#)

[PPV scenario](#)

[PPV and ECC](#)

ALGORITHMS

NPR: Weiner, Gary M., et al, Textbook of Neonatal resuscitation (NRP), 2019.

Helping babies breathe: [Helping Babies Breathe \(HBB\)](#) HBB teaches the initial steps of neonatal resuscitation to be accomplished within

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: Dec 2020

Revised: Jun 2021

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