Compensated Shock Due to Sepsis

# Curricular information

**Target group**: Healthcare providers caring for pediatric patients **Number of Participants**: 2-3 participants including a parent role **Simulation time**: 15 minutes **Debriefing time**: 30 minutes

## Learning objectives

* Uses a systematic approach in evaluating an infant
* Identifies signs and symptoms of compensated distributive shock, specifically septic shock
* Performs correct treatment for compensated septic shock
* Identifies need for early treatment with antibiotics

## Scenario progression

A 9-month-old baby girl was admitted to the hospital yesterday with a diagnosis of urinary tract infection. Her parents have now asked for a check-up, as their daughter has become increasingly irritable during the morning. The girl presents with tachycardia at 178/min, and a respiration rate of 38/min. She has warm extremities with flushed skin, a temperature of 39.8o C, and strong peripheral pulses. She appears alert and oriented, but irritable. Capillary refill time in lower extremities is brisk at 2 seconds; blood pressure is 75/40 mm Hg. An inspection of her diaper shows a dark, malodorous urine.

The participants are expected to identify compensated, distributed shock due to sepsis. They should support oxygen saturation and administer a fluid bolus which will stabilize vital signs and lower her temperature. They should also obtain urinary and blood samples for analysis and review lab results from the same morning which has just arrived. They should recognize signs of infection and administer broad-spectrum antibiotics.

## Debriefing

When the simulation is over, it is recommended that a facilitator-led debriefing be completed to discuss topics related to the learning objectives. The Event Log in Session Viewer provides suggested debriefing questions. Central discussion points could be:

* Signs and symptoms of distributive shock
* Differences between compensated and hypotensive shock due to sepsis
* Treatment of compensated septic shock

## References

Ian K. Maconochie, Allan R. de Caen, Richard Aickin, Dianne L. Atkins,Dominique Biarent, Anne-Marie Guerguerian, Monica E. Kleinman, David A. Kloeck,Peter A. Meaney, Vinay M. Nadkarni, Kee-Chong Ng, Gabrielle Nuthall, Ameila G. Reis,Naoki Shimizu, James Tibballs, Remigio Veliz Pintos, on behalf of the Pediatric Basic Life Support and Pediatric Advanced Life Support Chapter Collaborators: 2015 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations Part 6: Pediatric basic life support and pediatric advanced life support, in *Resuscitation*, 95 (2015) e147–e168, at <http://dx.doi.org/10.1016/j.resuscitation.2015.07.044>

# Setup and preparation

## Equipment list

Medical supplies:

* Advanced airway equipment
* Airway adjuncts (oropharyngeal airways, nasopharyngeal airways)
* Bag-mask device
* Blood pressure cuff
* Color-coded length-based resuscitation tape
* Continuous waveform capnography
* Bassinet
* Defibrillation pads
* Defibrillator/automated external defibrillator (AED)
* ECG electrode cables
* General medication administration supplies
* Glucometer
* Infusion pump and tubing
* IV/IO start supplies
* Oxygen delivery devices
* Oxygen supply source
* Pulse oximeter probe
* Respiratory nebulizer
* Stethoscope
* Suction device, tubing, catheter (tonsil tip), and canister
* Thermometer
* Universal precautions equipment

Medications and fluids:

* Albuterol
* Antibiotics
* Antihistamine
* Corticosteroids
* Dobutamine
* Dopamine
* Epinephrine
* Lactated Ringer’s
* Milrinone
* Nitroglycerin
* Norepinephrine
* Normal saline
* Rapid sequence intubation medications
* Sedatives/analgesics

Props:

* Bassinet
* Dark yellow liquid and malodorous substance for simulating urine
* Hospital clothes for infants and a diaper

## Preparation before simulation

* Set up the room to look as a normal pediatric patient room with all equipment ready and a patient monitor connected to LLEAP or SimPad
* Dress the simulator in pediatric hospital clothes and a diaper with dark, malodorous urine, and place the simulator in a bassinet
* Moisten the simulators forehead to simulate sweat
* Print out the patient chart and have it available for the participants during simulation

## Learner Brief

*The learner brief should be read out loud to the learners before the simulation starts.*

Pediatric ward, 10:15 am

You have been called to the room of a 9-month-old baby girl who was hospitalized and treated for a urinary tract infection yesterday morning. Her parents have called for a check-up, as their daughter has become increasingly warm and irritable. Please, go and see the patient.

Before the simulation starts, please orient yourself to the simulation room and the available equipment. *(Remember to make the patient chart available to the participants during simulation)*

# Customization of the Scenario

The scenario may form the basis for creating new scenarios with other or additional learning objectives. Making changes to an existing scenario requires careful consideration of what interventions you expect the learners to demonstrate, and what changes you will need to make to learning objectives, progression of scenario, programming and support material. It is, however, a quick way to increase your pool of scenarios because you can reuse much of the patient information and several elements in the scenario programming and support material.

For inspiration, here are some suggestions to how this scenario can be customized:

|  |  |
| --- | --- |
| **New learning objectives** | **Changes to the scenario** |
|  |  |
| Include learning objectives on team training | This scenario could also focus on team dynamics and communication. Remember to add your additional events in the programming for logging team-related actions. |
| Include learning objectives on treatment of hypotensive shock | The severity of the patient condition could be changed to hypotensive shock which persists despite fluid boluses, demanding further treatment with vasoactive drugs to resolve the shock. Remember to change programming and scenario progression to match the new scenario. |
| Include learning objectives on immediate treatment | Immediate correct treatment can be trained in this scenario by adding timed deterioration of the baby if prompt interventions are not performed. Remember to change programming and scenario progression to match the new scenario. |

# Patient Chart

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Patient name:** Anna Alexopoulos **Gender:** Female **Allergies:** No known allergies **DOB:** 18/XX-XXXX | | | | | | | |
| **Age:** 9 months **Height: 68** cm **Weight:** 7 kg **MRN:** 00153630 | | | | | | | |
| **Diagnosis:** Urinary tract infection **Adm date:** Yesterday morning | | | | | | | |
| **Facility:** Pediatric unit **Advance directive:** No  **Isolation precautions:** None | | | | | | | |
|  | | | | | | | |
| |  | | --- | | **Past Medical History**  The infant was admitted for a urinary tract infection yesterday morning where antibiotic treatment was started. She has not responded to the treatment with a definite improvement until now and is being kept for observation. | | | | | | | | |
|  | | | | | | | |
| **Notes** | | | | | | | |
| **Date/Time** |  | | | | | | |
| Yesterday 06:30 | Patient admitted to unit from ED. Antibiotics administered. Vital signs obtained /RN | | | | | | |
|  |  | | | | | | |
|  |  | | | | | | |
|  | | | | | | | |
| **Provider Orders** | | | | | | | |
| Diet: Infant formula nutrition | | | | | | | |
| Administer antibiotics times 3 daily | | | | | | | |
| Vital signs every 4 hours | | | | | | | |
| Asses hydration status every 4 hours | | | | | | | |
| Record intake and output | | | | | | | |
| Obtain labs every morning | | | | | | | |
|  | | | | | | | |
|  | | | | | | | |
| **Medical Administration Record** | | | | | | | |
| **Date/Time** |  | | | | | | |
| Yesterday 07:00 | Antibiotics\* | | | | | | |
| Yesterday 12:00 | Antibiotics | | | | | | |
| Yesterday 19:00 | Antibiotics | | | | | | |
| Today 06:00 | Antibiotics | | | | | | |
|  |  | | | | | | |
|  |  | | | | | | |
|  | \*Edit the type and dose of antibiotics per local protocol | | | | | | |
|  | | | | | | | |
| **Vital Signs** | | | | | | | |
| **Date/Time** |  | | | | | | |
| Today, 08:00 | **BP:** 79/56 mm Hg **HR:** 132/min **RR:** 21/min **SpO2:** 98% **Temp:** 38.0oC (98.6oF) | | | | | | |
|  | **BP:**  **HR:** **RR:** **SpO2:** **Temp:** | | | | | | |
|  |  | | | | | | |
|  | | | | | | | |
| **Lab results** | | | | | | | |
| **Date/time** | **Today 06:20** | | | | | | |
| **Venous blood analysis** | | | | | | | |
| **Complete blood count** | | | | | | | |
| Hb (10.3-12.4 g/dL) | | 12.2 |  |  |  |  |  |
| HCT (31-37.2%) | | 33.5 |  |  |  |  |  |
| WBC (6.2-14.5 x 109) | | **22** |  |  |  |  |  |
| Platelets (219-465 x 109) | | **490** |  |  |  |  |  |
| **Basic metabolic panel** | | | | | | | |
| Na+ (135-145 mEq/L) | | 141 |  |  |  |  |  |
| K+ (3.5-5.8 mEq/L) | | 4.1 |  |  |  |  |  |
| Cl- (91-111 mEq/L) | | 99 |  |  |  |  |  |
| HCO3- (19-24 mEq/L) | | 22 |  |  |  |  |  |
| BUN (8-28 mg/dL) | | 25 |  |  |  |  |  |
| Creatinine (0.6-1.2 mg/dL) | | 1.1 |  |  |  |  |  |
| Glucose (60-110 mg/dL) | | 80 |  |  |  |  |  |
| **Miscellaneous** | | | | | | | |
| INR (1-1.4) | | 1.2 |  |  |  |  |  |
| PTT (26.5-35 s) | | 29.8 |  |  |  |  |  |
| CRP (<10 mg/L) | | **156** |  |  |  |  |  |
| D-dimer (<0.40 mcg/L) | | 0.31 |  |  |  |  |  |
| CK-MB (0-4.9 mg/mL) | | 4.5 |  |  |  |  |  |
| Troponin nT (< 0.15 mcg/L) | | 0.11 |  |  |  |  |  |
| Lactate (150-300 units/L) | | **487** |  |  |  |  |  |
|  | |  |  |  |  |  |  |
|  |  | | | | | | |