Pediatric Emergency Medicine Simulation Curriculum: Status Asthmaticus Scenario

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1. Instructor Contact Information

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2. Description of Scenario

Scenario Overview
This scenario teaches learners to recognize and manage pediatric status asthmaticus.

The scenario is simulation-based, designed for manikin-based simulation equipment, with an integrated team communication focus.

Learners will participate in a simulation scenario and be asked to identify the signs and symptoms of pediatric status asthmaticus and its management (See Appendix A).

At the end of training, the learners should be able to recognize the seriousness of the situation and recruit a full resuscitation team. The primary complication for the team to recognize is respiratory distress (hypoxia, inadequate ventilation, tachypnea, increased respiratory effort).

Educational Rationale on How the Scenario Generalizes to Real-Life Circumstances
Status asthmaticus continues to be a major cause of morbidity and mortality worldwide. Status asthmaticus is characterized by airway inflammation, excessive airway mucous production and/or plugging and bronchospasm and leading to airflow obstruction. This can result in a progression from respiratory insufficiency to respiratory failure.\[^{3,4,5}\]

Medical providers must recognize children in status asthmaticus early when they are more likely to respond favorably to treatment. Early initiation of therapy, including inhaled beta 2-agonists, systemic glucocorticoids, ipratropium bromide, supplemental oxygen, and additional medications as needed, may prevent respiratory failure.

The goal of this scenario is to provide the learner with an opportunity to manage life threatening pediatric status asthmaticus, where the correct steps need to be taken in a limited period of time.

Key elements include the primary survey, eliciting critical history (common asthma triggers- respiratory infections, allergies or exposures), recognizing the need to call for team assistance early in an event, recognizing status asthmaticus (hypoxia, tachypnea, inadequate ventilation, increased respiratory effort- nasal flaring, retractions and use of accessory muscles) and treating status asthmaticus.

Duration of Training Session: 1 hour

Frequency of Scenario: Goal is to have each learner experience this scenario approximately once/year. We have a non-mandatory curriculum that offers a different scenario every 2 weeks. This particular scenario is offered approximately 4 times a year to try to ensure that all our learners are exposed at least once.

Number of Trainees per Session: 5 to 10
3. Target Trainees

Primary: Pediatric and emergency medicine residents, fellows, faculty and nurses
Secondary: N/A
4. Prerequisite Knowledge and Skills

**Required background knowledge:**

- Signs and symptoms of status asthmaticus
- Knowledge of asthma treatment medications (including inhaled beta 2-agonists, systemic glucocorticoids, supplemental oxygen, and additional medications - e.g. epinephrine, magnesium or terbutaline)
- TeamSTEPPS communication terminology (See Appendix B)

**Required background skills expected in trainees prior to receiving training in the target scenario:**

- Assessment of breathing and circulation
- How to provide supplemental oxygen
5. Goals and Objectives

**Goal 1: Recognition of Status asthmaticus**
The learner will demonstrate recognition of status asthmaticus in a safe and professional manner.
(ACGME Competencies: Medical Knowledge, Patient Care, Interpersonal and Communication Skills, Professionalism, Systems-based Practice)

**Objective 1a - Initial patient assessment**
The learner will be expected to discuss what s/he would look for in an initial physical examination (primary survey e.g. airway, breathing, circulation, disability, exposure) and history (SAMPLE - Signs and symptoms, Allergies, Medications, Past medical history, Last meal, and Events) of any pediatric patient s/he is evaluating.

**Objective 1b – Appropriate monitoring**
The learner should apply basic monitoring standards for a patient in respiratory distress (cardiorespiratory monitors, pulse oximetry, blood pressure, and temperature). S/he should obtain a patient weight or accurate estimate (e.g. Broselow-Luten Tape).

**Objective 1c - Identification of status asthmaticus**
The learner should identify signs of status asthmaticus in history (triggers- upper respiratory infection, previous history of asthma, use of asthma medications) and in physical exam (tachypnea, increased work of breathing- nasal flaring, retractions, wheezing, hypoxia).

**Goal 2: Management of Status asthmaticus**
The learner will treat status asthmaticus in a safe and professional manner.
(ACGME Competencies: Medical Knowledge, Patient Care, Interpersonal and Communication Skills, Professionalism, Systems-based Practice)

**Objective 2a - Management of status asthmaticus with supplemental oxygen**
The learner should apply supplemental oxygen using face mask. Goal is to improve oxygen delivery to tissues.

**Objective 2b - Management of status asthmaticus with inhaled beta 2-agonists, systemic glucocorticoids, ipratropium bromide and additional medications**
The learner should administer inhaled beta 2-agonists, systemic glucocorticoids, ipratropium bromide, supplemental oxygen, and additional medications (e.g. magnesium sulfate or terbutaline) as needed.

**Objective 2c - Equipment setup**
The learner should be able to set up the equipment required to treat a patient in status asthmaticus: supplemental oxygen, inhalational medication delivery, and intravenous access equipment.

**Goal 3: Teamwork and Communication Skills**
The learner will become more skilled in the management and leadership of emergency personnel including physicians, nurses, and ancillary personnel.
(ACGME Competencies: Medical Knowledge, Patient Care, Interpersonal and Communication Skills, Professionalism, Systems-based Practice)
5. Goals and Objectives

**Objective 3a – Team structure and leadership**\(^{(C,D)}\)
The learner will be exposed to a full-scale manikin-based simulation, in which the learners are faced with a life threatening emergency due to status asthmaticus. They will be expected to clearly identify and maintain a team leader and team member roles.

**Objective 3b – Communication skills**\(^{(C,D)}\)
The learner will be required to direct available resources to manage anaphylactic shock. The team will be expected to *brief* at the beginning of the scenario and *huddle* during the scenario. The goal of *briefing* and *huddling* is to create a shared mental model, so that the team is on the same page regarding working diagnoses, treatment priorities and plan of care. S/he will coordinate, direct and communicate with a resuscitation team using directed call-out and check-back.
6. Instructor Notes

These are general “tips”. Everything in this section is included because at one time or another, we forgot to do it. The result was a suboptimal learning experience.

a. Environmental Set Up (See Section 10)
   - Try to re-create the location, look, and feel of the participants’ work environment.
   - Place simulator in a gown, diaper, etc. in order to maximize realism.

b. Pre-Simulation Introduction
   - Share a “learning contract” with participants. An example of some elements you may include: “We believe each of you is intelligent, well-trained, and doing their best” (adapted from the Center for Medical Simulation, Cambridge, MA). “We recognize this is a fictitious environment. We ask you to stretch your imagination, go beyond your comfort zone and help promote each others’ learning”.
   - Share ground rules with participants (e.g. “Treat others with respect, maintain confidentiality”).
   - Share the agenda (e.g. “We will begin with a 15 min simulation followed by a 30 min debrief.”).
   - Orient your participants (e.g. Review capabilities of simulator being used. Review location/availability of equipment/supplies. Identify facilitator to whom requests/questions should be directed during the simulation).
   - Review safety issues (e.g. correct use of defibrillator).
   - Review principles of teamwork and communication – TeamSTEPPS (See Appendix B). Review expectations of team leaders and members: take time to plan before a patient arrives (brief) and “get the team on the same page” (huddle).

c. Scenario Notes
   - A “trigger” is a critical time or event that signifies the start or end of a Stage in the scenario. These are the critical steps that help the scenario progress. Please review these prior to conducting your session.
   - Prompts. Sometimes learners get stuck- miss a physical exam finding, critical piece of history or don’t know/fail to implement a critical action that’s needed to help the team meet a learning objective or advance to the next stage. When this happens, the facilitator, who is actively monitoring the team’s progress, may choose to ask a question, state a que or have a third party “drop a critical hint” to mobilize the team towards meeting the objectives. The instructor needs to balance “keeping the team from failing to met the learning objectives” with the team’s opportunity to work through a problem. Careful not to shift it from self-discovery to a lecture!

d. Debriefing (See Appendix C)
   - Remember: Try to have participants step away from the simulator, into a different space (e.g. chairs in a circle or separate room). This physical cue helps participants shift from “doing” - a clinical focus to “reflecting” - a learning focus.
   - Remind participants that the debriefing time is intended to focus on the group’s performance.

e. Learner considerations
   - Over time, we have discovered that each group of learners’ needs vary. Thus, we have included a range of potential objectives, which can be tailored to suit different learner groups. E.g. for our less experienced clinical providers, we focus more on the medical
6. Instructor Notes

decision making goals. For our more advanced providers, we focus more on the team work and communication goals.

- If you are instructing more experienced learners, consider “titrating” the learning objectives. E.g. for learners that have limited medical knowledge, ordering the IV magnesium will be all that we require to move them from Stage 2 to Stage 3. For experienced providers, they need to administer at least 2 doses of albuterol, place an IV, order steroids, IV magnesium and be preparing to intubate, recruiting all the additional personnel and equipment they will need, before we will advance from Stage 2 to Stage 3.

- If you are instructing more experienced learners, consider “titrating” the scenario’s signal to noise ratio. E.g. for resident learner groups, we will run the scenario as written. For those with more experience, we might add more “noise”. This could be an actor playing the role of a parent who gives insufficient history, is crying or questioning the team (providing a distraction).

- Participants. The most realistic and richest learning experiences occur when all the participants are performing their “normal” roles. E.g. physician functions as physician, nurse as a nurse, respiratory therapist as a respiratory therapist. If your learner group does not contain the full spectrum of “normal team members”, you may have to either ask some participants to function in different roles or provide “actors” to fill the necessary roles. Recognize that realism is going to be lost and learning opportunities missed. E.g. If the group is all physicians, none of your learners may have drug measuring/administration experience. As an instructor, you will need to make decisions on how much you want them to do to “get credit” and be able to advance to the next Stage in the scenario. Is it enough to be able to order the drug? Do they need to find the vial? Draw it up? Administer it to the simulator? Your answer should be driven on helping your learners to achieve the learning objectives.

- This scenario is part of the Pediatric Emergency Medicine Simulation Curriculum. The curriculum includes didactic sessions, skills sessions, and patient based education on topics ranging from septic shock to resuscitation skills to communication and teamwork. In addition, it includes several simulation scenario modules, presented on a rotating basis. We are in the process of submitting all of the scenario modules to MedEdPORTAL.

- Impact of the curriculum. We have studied our Pediatric Emergency Medicine Simulation Curriculum as a whole, and are in the process of submitting our results for publication. We have observed that over the course of a year, our learners’ performance (in medical decision making, technical skills and teamwork) improves. There is a dose response (greater exposure, better performance).
7. Common Errors and Prevention Strategies

Common Errors and Prevention Strategies:

a. **Failure to recognize status asthmaticus**
   
   **Strategy:** Review signs of status asthmaticus: history (triggers - upper respiratory infection, previous history of asthma, use of asthma medications), physical exam (tachypnea, increased work of breathing - nasal flaring, retractions, wheezing and hypoxia).

b. **Failure to treat status asthmaticus**
   
   **Strategy:** Review treatment for status asthmaticus - inhaled beta 2-agonists, systemic glucocorticoids, ipratropium bromide, supplemental oxygen, and additional medications (e.g. magnesium sulfate or terbutaline) as needed.

c. **Failure to provide supplemental oxygen**
   
   **Strategy:** Review goal of supplemental oxygen: to improve oxygen delivery and meet metabolic demand, preventing progression to respiratory failure. Review equipment available for oxygen administration.

d. **Failure to achieve timely intravenous or intraosseous access**
   
   **Strategy:** Review anatomy, equipment and process for insertion of IV/IO. Review goal to achieve IV/IO access prior to respiratory failure.

e. **Inefficient teamwork**
   
   **Strategy:** Review need to *brief* (discuss team roles) prior to a critical situation and *huddle* (ad-hoc planning to re-establish situation awareness) during a crisis.

f. **Inefficient communication: lack of call-out**
   
   **Strategy:** Review importance of directed communication: “Survey physician - What’s the airway status?”

g. **Inefficient communication: lack of check-back**
   
   **Strategy:** Review use of closed-loop communication:
   
   Team Leader: “Give albuterol, 20mg nebulized over 60 min”.
   
   Medication Preparation Nurse: “albuterol, 20 mg nebulized over 60 min”.
   
   Team Leader: “Correct”.

h. **Inefficient communication: lack of closed loop communication**
   
   **Strategy:** Review use of closed loop communication
   
   After completion of normal saline bolus as ordered above
   
   Medication Administration Nurse: “albuterol 20 mg nebulized complete”
7. Common Errors and Prevention Strategies

General strategies to solve the problems

- Increase knowledge base: assigned reading, lectures, teamwork and communication training
- Debriefing focused to re-evaluate critical thinking and structure planning of actions
- Teaching points based on errors
- Regular simulation training to avoid previous mistakes
8. Cognitive Training

Key methods for delivering cognitive training include the following:

- Status asthmaticus Learner Handout (See Appendix D).
# 9. Skill Training

## Skills Training Scenario:

**Patient**

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>18 Months</td>
</tr>
<tr>
<td>Weight</td>
<td>10 kg</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
</tr>
</tbody>
</table>

**Scenario:** The triage nurse is bringing back an “ill-appearing” child. S/he has obtained vitals and placed the child on monitors. The patient is initially fully clothed. The patient is in moderate respiratory distress. Anticipated interventions include primary assessment and initiation of asthma medications. The patient then develops worsening respiratory distress. Anticipated interventions include supporting ABC’s, IV access and advanced asthma management. The patient stabilizes after escalating therapy.

## Medical Management Learning Objectives:

1. Obtaining a SAMPLE history
2. Assessing airway and breathing
3. Recognize progressive respiratory distress
4. Recognize status asthmaticus
   a. Signs:
      i. respiratory distress
      ii. wheezing
      iii. diminished aeration
5. Treat status asthmaticus
   a. Bronchodilators
   b. Systemic Steroids: oral, IV
   c. Escalating therapy:
      i. Epinephrine
      ii. Magnesium
      iii. Terbutaline
      iv. Heliox

## Team Management Learning Objectives:

Directed, closed-loop communication
1. Communication directed at specific individuals
2. Individuals communicate when action is complete
3. Individuals in assessment roles continuously communicate with team leader

## Scenario Intro:

**ED:** Kyle is an 18 month old boy. His mom brought him in today because he’s having trouble breathing.

Triage Vitals Signs:
- T 37.5
- HR 145
- RR 45
- BP 101/64
- SaO2 90%
- RA wt 12 kg

**Facilitator Notes:**

Give team intro outside the simulation area.

**Patient is clothed**

**Further HPI (if asked):**

He was well until 2 days ago when he developed rhinorrhea and cough. Yesterday, he started working harder to breathe and wheezing. Overnight, his mom gave him an albuterol neb. Today, he’s worse.

No choking episodes, No fevers, last ate 4 hours ago

**PMH / Medications/ Allergies/ Family History: (If asked)**

Wheeze x3 episodes prior, no hospitalization
### 9. Skill Training

**Prelude: 0-3 minutes**

Give team the scenario intro outside the simulation area. You may answer any questions (if asked) which include the past medical history (PMH). Give them up to three minutes to plan: decide on roles, priorities, organizational elements before entering the simulation area.

**Act 1: Moderate Respiratory Distress: 3-5 minutes**

<table>
<thead>
<tr>
<th>HR</th>
<th>145</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spo2</td>
<td>93%</td>
</tr>
<tr>
<td>BP</td>
<td>90/58</td>
</tr>
<tr>
<td>RR</td>
<td>45</td>
</tr>
<tr>
<td>Temp</td>
<td>37.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Crying</th>
<th>Teaching Objectives</th>
<th>Instructor Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crying</td>
<td>Primary Assessment</td>
<td>Exam (If asked): Alert, cries occasionally, reaching for mom, nasal flaring, retractions</td>
</tr>
<tr>
<td>Wheezing bilaterally</td>
<td>Recognize and Treat status asthmaticus</td>
<td>Capillary Refill 2 seconds</td>
</tr>
<tr>
<td>Abdominal breathing</td>
<td></td>
<td>No hepatosplenomegally</td>
</tr>
<tr>
<td>Retractions</td>
<td></td>
<td>Responses: Any labs- “pending”</td>
</tr>
<tr>
<td>Nasal flaring</td>
<td></td>
<td>CXR – en route</td>
</tr>
<tr>
<td>Oxygen saturations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>increase to 98% on</td>
<td></td>
<td></td>
</tr>
<tr>
<td>oxygen or albuterol</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After 2 min</td>
<td>Go to Act 2</td>
<td></td>
</tr>
</tbody>
</table>

**Act 2: Worsening Respiratory Distress: 5-10 minutes, maximum**

<table>
<thead>
<tr>
<th>HR</th>
<th>174</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spo2</td>
<td>88%</td>
</tr>
<tr>
<td>BP</td>
<td>112/65</td>
</tr>
<tr>
<td>RR</td>
<td>72</td>
</tr>
<tr>
<td>Temp</td>
<td>37.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Technologist Information</th>
<th>Teaching Objectives</th>
<th>Instructor Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>HR ramps to 174 over 1 min</td>
<td>Recognize progressive respiratory distress</td>
<td>Exam (If asked): Pt appears more anxious, nasal flaring, retractions</td>
</tr>
<tr>
<td>Sat drops to 88 over 1 min</td>
<td>Escalation of therapy: Increased albuterol</td>
<td>Capillary Refill 2 seconds</td>
</tr>
<tr>
<td>RR ramps to 72 over 1 min</td>
<td>OR</td>
<td>Responses:</td>
</tr>
<tr>
<td>Worse retractions, less wheezing</td>
<td>If increases albuterol</td>
<td></td>
</tr>
</tbody>
</table>

**Eczema**

MEDS: albuterol prn
Immunizations UTD
NKDA
Multiple family members with asthma
### 9. Skill Training

<table>
<thead>
<tr>
<th>Change</th>
<th>Additional</th>
<th>Instructor Information</th>
</tr>
</thead>
</table>
| IV Magnesium | IV access | If requests blood gas  
| IM epinephrine | Blood gas | ABG: 7.2 / 42 / 120 on  
| IV terbutaline | CXR | 100% oxygen  
| | | VBG: 7.24 / 50 / 43 on  
| | | 100% oxygen  
| | | CXR – “en route” |

#### Act 3: Resolution: 10-12 minutes, maximum

| HR | 155 |
| Spo2 | 96% |
| BP | 110/60 |
| RR | 42 |
| Temp | 37.5 |

#### Technologist Information

- Improved oxygen saturation after escalation of therapy
- After 2 min in Act 3 → end scenario

#### Teaching Objectives

- Reassess/support ABCDE’s
  - Continue continuous albuterol
  - Consider IVF

#### Instructor Information

**Exam (If asked):**

Pt more comfortable  
CR 2 sec

**Responses:**

End scenario after 2 min in this phase.

### Debriefing the Team:

#### Medical Management Learning Objectives

<table>
<thead>
<tr>
<th>Obtaining a SAMPLE History</th>
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<tbody>
<tr>
<td><strong>Debriever Script</strong></td>
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</tbody>
</table>
| I noticed that you *did/didn’t* ask for all the parts of a SAMPLE history. I think that’s *great/could be problematic.* These elements of a history are designed to ensure we cover critical historical elements quickly.  
  - What were your priorities in getting the history? |  
| | | |
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**Assessing Airway and Breathing**
## 9. Skill Training

<table>
<thead>
<tr>
<th>Debrief Script</th>
<th>Reference Material</th>
<th>Instructor Notes</th>
</tr>
</thead>
</table>
| I noticed you *did/didn’t* fully evaluate the patient’s airway and breathing. That’s *good/could be improved* to ensure your patient’s not in imminent respiratory failure.  
  • What did you think about his airway and breathing? | ▪ Airway (e.g. ability to move air):  
  o Look for obstruction  
  o Listen for stridor  
  o Feel for air movement  
  o Ask the child to speak / is the pt crying  
  ▪ Breathing  
  o Respiratory rate  
  o Symmetry and quality of breath sounds  
  o Oxygenation  
  o Ventilation |                                                                                   |

**Recognizing Status Asthmaticus**

<table>
<thead>
<tr>
<th>Debrief Script</th>
<th>Reference Material</th>
<th>Instructor Notes</th>
</tr>
</thead>
</table>
| I noticed you *did/didn’t* state he had status asthmaticus. Recognizing this and then stating this to the entire team can help get everyone on the same page.  
  • What signs of status asthmaticus did you see/hear?  
  • What *helped/prevented* you from recognizing? | Status Asthmaticus / Moderate respiratory distress  
  ▪ increased work of breathing  
  o tachypnea  
  o nasal flaring  
  o retractions / abdominal breathing  
  o grunting  
  ▪ wheezing  
  ▪ diminished aeration |                                                                                   |

**Treating Status Asthmaticus**

<table>
<thead>
<tr>
<th>Debrief Script</th>
<th>Reference Material</th>
<th>Instructor Notes</th>
</tr>
</thead>
</table>
| I noticed you treated this patient with: albuterol /ipratropium /steroids /magnesium/terbutaline. That was *great/could have been more efficacious* if you added additional medications.  
  • Why did you choose those medications?  
  • What else could you have tried? | ▪ Oxygen- 100%  
  ▪ Bronchodilators  
  o Albuterol 20mg/hr continuous nebulization  
  o Ipratropium 0.75mg nebulization  
  ▪ Steroids:  
  o Dexamethasone 0.6 mg/kg or  
  o Methylprednisolone 2mg/kg load  
  ▪ Magnesium sulfate 25-75 mg/kg IV, max 2 grams  
  ▪ Terbutaline 10 mcg/kg IV load over ten minutes then continuous infusion of .1-10 mcg/kg/minute |                                                                                   |
### Team Management Learning Objectives

<table>
<thead>
<tr>
<th>Roles and Responsibilities</th>
<th>Debriefer Script</th>
<th>Reference Material</th>
<th>Instructor Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Let’s discuss shift gears and talk about how you functioned as a team.</td>
<td>• It looked like you <em>did/did not</em> have a clear team leader and defined team roles. I think this is <em>great/concerning</em> because clear team roles can help a team function smoothly-improving how quickly interventions take place and reducing errors.</td>
<td></td>
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<tr>
<td></td>
<td>• What did you think about your roles?</td>
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<tr>
<td>Team leader</td>
<td>• Clear direction, coordination, timely interventions</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>• Foot of patient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Airway/Procedure physician</td>
<td>• Manage airway/c-spine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Survey physician</td>
<td>• Primary, Secondary survey, pulses with CPR, reassess</td>
<td></td>
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</tr>
<tr>
<td>Nursing roles</td>
<td>• Medication Preparation (draw-up meds)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>• Medication Administration (give meds)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Documenting (time keeper)</td>
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</tbody>
</table>
10. Equipment Setup

Simulation Environment preparation

Before each simulation, ensure the anticipated resuscitation equipment is available for the team’s use.

Resources

- PALS reference cards, material
- Patient Weight Estimator (e.g. Broselow tape)
- Pediatric Resuscitation Medication references (e.g.: Broselow tape, reference cards)
- Documentation forms

Universal Precautions

- Staff gowns
- Gloves
- Mask and face shields

Medications (consider having all or only a limited number of medications available)

- Adenosine
- Albuterol
- Amiodarone
- Atropine
- Epinephrine 1: 1,000
- Etomidate
- Fentanyl
- Ketamine
- Ipratropium bromide
- Lidocaine
- Magnesium sulfate
- Midazolam
- Normal Saline/Lactated Ringers
- Rocuronium
- Steroids (such as dexamethasone or methyl-prednisolone)
- Succinylcholine
- Terbutaline
- Epinephrine 1:10,000

Equipment

- Simulator in hospital gown, on bed
- Monitor – NIBP, HR, RR, Oxygen saturation, temperature
- Blood Pressure cuff, Heart Rate monitor leads, Oxygen saturation probe, defibrillator cables
- Oxygen hook-up on wall or cylinder
- Bag-mask system, multiple size masks
- O₂ Mask, simple and/or non-rebreather
- Nebulized medication delivery devices
10. Equipment Setup

Equipment Cont’d

- Suction
- Thermometer
- Temperature probe
- Nasal, oral airways, multiple sizes
- Shoulder roll
- Endotracheal tubes - 3.0, 3.5, 4.0, 4.5, 5.0, cuffed or uncuffed, stylets
- Laryngoscope, Miller and Mac blades, multiple sizes
- End-tidal CO2 colorimeter
- Nasogastric tube(s)
- Stethoscopes
- IV/Angiocaths, various sizes
- IO needles, 2 sizes
- Gauze, Tape
- IV tubing
- IV pumps, pressure bags
- Syringes, multiple sizes
- Bedside blood sample processors: glucose, electrolytes, gases
- Specimen tubes
- Crash cart & backboard
- Defibrillator
11. Assessment Methods

Type(s) of Assessment Methods Used in This Scenario:

- ☐ Pre-test Only
- ☐ Pre-test & Post-test
- ☐ Post-test Only

- ☑ Medical Management Evaluation/Debriefing Form (Appendix E)
- ☑ Teamwork and Communication Evaluation/Debriefing Form (Appendix F)
- ☑ Simulation Session Evaluation (Appendix G)
# 12. Appendices

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</tr>
<tr>
<td>Appendix H</td>
<td>References</td>
</tr>
</tbody>
</table>
Appendix A: Scenario Algorithm

**Scenario Timeline**

1. **Prelude:**
   - Start Timer: 0-3 min.
   - Scenario intro and team brief

2. **Act 1: Moderate Respiratory Distress**
   - 3-5 min.
   - Triggers: Start 3 min into scenario
   - End: 5 min into scenario

3. **Act 2: Worsening Respiratory Distress**
   - 6-10 min.
   - Triggers: Start 5 min into scenario
   - End: Escalation of therapy or 10 min into scenario

4. **Act 3: Resolution**
   - 10-12 min.
   - Triggers: Start 10 min into scenario
   - End: 12 min into scenario

**Vital Signs**

- **Act 1:**
  - Rhythm: sinus
  - HR: 145 bpm
  - BP: 90/58
  - SAT: 93%
  - RR: 48/min
  - Temp: 37.5°C

- **Act 2:**
  - Rhythm: sinus
  - HR: 174/90
  - BP: 112/85
  - SAT: drop to 58% over 1 min
  - RR: ramp to 72/min over 1 min
  - Temp: 37.5°C

- **Act 3:**
  - Rhythm: sinus
  - HR: 155 bpm
  - BP: 110/60
  - SAT: 96%
  - RR: 42/min
  - Temp: 37.5°C

**Facilitator Information**

- Allow team to brief outside the simulation room
- CXR en route
- If requested, additional history/exam available
- If requested, labs are "pending"
- CXR en route
- If requested, additional history/exam available
- If requested, blood gas available
- Decreased work of breathing
## Teamwork and Communication (TeamSTEPPS) Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adaptability</td>
<td>The ability to adjust strategies and altering a course of action in response to changing conditions (internal and external).</td>
</tr>
<tr>
<td>Brief</td>
<td>Discussion prior to start that assigns essential roles, establishes expectation, anticipated outcomes and likely contingencies.</td>
</tr>
<tr>
<td>Call-Out</td>
<td>A tactic used to communicate critical information during an emergent event. Helps the team prepare for vital next steps in patient care. (Example: “Airway status?” – “Airway clear”; “Breath sounds?” – “Breath sounds decreased on right”)</td>
</tr>
<tr>
<td>Check-Back</td>
<td>A communication strategy that requires a verification of information. The sender initiates the message; the receiver accepts it and restates the message. In return, the sender verifies that the re-statement of the original message is correct or amends if not. (Example: “Give Benadryl 25 mg IV push” – “Benadryl 25 mg IV push” – “That’s correct”)</td>
</tr>
<tr>
<td>CUS</td>
<td>Signal phrases that denote “I am Concerned, I am Uncomfortable, This is a Safety Issue.” When spoken, all team members will understand clearly not only the issue but the magnitude of the issue.</td>
</tr>
<tr>
<td>Debrief</td>
<td>Brief, informal information exchange session designed to improve team performance and effectiveness.</td>
</tr>
<tr>
<td>DESC Script</td>
<td>A technique for managing and resolving conflict. Describe the specific situation or behavior; provide concrete data. Express how the situation makes you feel/what your concerns are. Suggest other alternatives and seek agreement. Consequences should be stated in terms of impact on established team goals; strive for consensus.</td>
</tr>
<tr>
<td>Huddle</td>
<td>Ad hoc planning to re-establish Situation Awareness; designed to reinforce plans already in place and assess the need to adjust the plan.</td>
</tr>
<tr>
<td>SBAR</td>
<td>A framework for team members to structure information when communicating to one another. S = Situation (What is going on with the patient?) B = Background (What is the clinical background or context?) A = Assessment (What do I think the problem is?) R = Recommendation (What would I do to correct it?)</td>
</tr>
<tr>
<td>Shared Mental Model</td>
<td>An organizing knowledge structure of relevant facts and relationships about a task or situation that are commonly held by team members</td>
</tr>
<tr>
<td>Situation Awareness</td>
<td>The ability to identify, process, and comprehend the critical elements of information about what is happening to the team with regards to the mission. It’s knowing “What is going around you” and “What is likely to happen next”.</td>
</tr>
<tr>
<td>Situation Monitoring</td>
<td>The process of actively scanning and assessing elements of the situation to gain information or maintain an accurate awareness or understanding of the situation in which the team functions.</td>
</tr>
<tr>
<td>Two-Challenge Rule</td>
<td>Assertively voicing concern at least two times to ensure it has been heard.</td>
</tr>
</tbody>
</table>
Appendix C: Debriefing Overview

Simulation creates the opportunity to debrief. We believe that the focus of each simulation should be the DEBRIEF. Simulation creates the opportunity to examine our medical management, technical skills and teamwork and communication skills. It facilitates discussion about challenges in a safe environment in order to improve the quality of patient care.

Framework for debriefing:

Each debrief should consist of 3 components:

♦ Introduction
♦ Discussion of medical management and technical skills
♦ Discussion of teamwork and communication skills

1) Introduction
This “sets the stage” for debriefing and creates expectations.
What you might say:
- This is an opportunity to reflect and learn, improve our medical care, team work, and communication.
- Everyone should be able to ask questions and share their thoughts.
- Once you leave this session, we encourage open discussion of the concepts, but ask you to not to discuss individual performance.

2) Medical management and technical skills
This portion of the discussion focuses on the medical aspects of the case. It’s usually more comfortable to begin with these “facts”.
What you might say:
- Let’s begin by discussing medical management.
- What did you think was wrong with the patient? Can someone summarize in 3 sentences what happened in this scenario?
- What led you to think that?

3) Teamwork and communication (a. k. a. crew resource management, non-technical skills, human factors)
This portion of the discussion focuses on how the team worked together. It can be emotionally charged and difficult to discuss without feeling personal. The challenge is to try to generalize specifics into themes.
What you might say:
- Let’s talk about how you functioned as a team.
- What did your team do well?
- What could your team do differently next time?
- That is something I see often. Has anyone else experienced that? What have you seen done?
Appendix C: Debriefing Overview

4) Summarizing

- This is your opportunity to ensure the key learning points are highlighted
- Try to identify approximately three take-home medical/technical points and teamwork/communication points.
- You may ask the participants’ to identify take home points or call them out yourself.

Medical management/technical skills examples:
(a) This was a case of pediatric status asthmaticus.
(b) Signs of status asthmaticus: tachypnea, increased work of breathing, wheezing, hypoxia, decreased ventilation.
(c) Treatment of status asthmaticus: inhaled beta 2-agonists, systemic glucocorticoids, ipratropium bromide, supplemental oxygen, and additional medications as needed.

Teamwork/communication examples:
(d) Recognize need for a full resuscitation team when a patient develops uncompensated status asthmaticus.
(e) Designate leadership and team member roles to ensure coordinated team functioning.
(f) Use brief or huddle to create a shared mental model for the working diagnosis and treatment plan.

General Facilitator Goals:
- Try to facilitate the TEAM’s discussion (avoid dominating the conversation)
- Ask open ended questions (avoid yes/no questions)
- Discuss the team performance (not the individual)
### Status Asthmaticus Learning Objectives

1. **Recognize Status asthmaticus**
   a. History suggestive of asthma: upper respiratory infection, previous episodes of asthma, use of asthma medications, exposure to allergens or airway irritants
   b. Tachypnea

2. **Manage Status Asthmaticus**
   a. 100% supplemental Oxygen (face mask – simple or non-rebreather)
   b. Beta 2 agonists (albuterol continuous nebulization up to 20 mg/hr for patients ≥12 months, for first hour)
   c. Ipratropium bromide (250-750 mcg nebulized x 1 for patients less than 20 kg)
   d. Steroids (e.g. methyl-prednisolone 2 mg/kg/IV loading dose)
   e. Magnesium sulfate (25-75 mg/kg IV, max dose 2 grams)
   f. Terbutaline (10mcg/kg IV loading dose over 10 min, followed by .1-10 mcg/kg/min continuous infusion)
   g. Epinephrine 1:1,000 (.01 mg/kg IM, max dose .3 mg)
   h. Rapid vascular access
   i. Monitoring
      i. Pulse oximetry
      ii. Respiratory rate
      iii. Heart rate
   j. Frequent reassessment
      i. Evaluate trends in the child’s condition
      ii. Determine response to therapy
      iii. Plan next treatment interventions

3. **Core Resuscitation Skills**
   a. Assess Airway (e.g. ability to move air)
      a. Look for obstruction
      b. Listen for stridor
      c. Feel for air movement
      d. Ask the child to speak / is the pt crying
   b. Assess Breathing
      a. Respiratory rate
      b. Symmetry and quality of breath sounds (wheezing, crackles, coarse sounds)
      c. Oxygenation
      d. Ventilation
### Appendix E: Medical Management Evaluation/Debriefing Form

**Pediatric Status Asthmaticus**

**Medical Management/Technical Skills**

This checklist identifies core medical management /technical skills. It’s hard to discuss more than 3 of these during one debriefing session. We recommend selecting 2-3 of these issues to focus on.

<table>
<thead>
<tr>
<th><strong>Assessment of ABCDE’s</strong></th>
<th>□ Done Well</th>
<th>□ Needs Work</th>
</tr>
</thead>
</table>

Specific comments: __________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

*What did you think of the assessment of the ABCDE’s? What could you do differently?*

<table>
<thead>
<tr>
<th><strong>Recognizing status asthmaticus</strong></th>
<th>□ Done Well</th>
<th>□ Needs Work</th>
</tr>
</thead>
</table>

Specific comments: __________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

*Discuss Points: What are the signs of status asthmaticus? Tachypnea, increased work of breathing-nasal flaring, retractions, abdominal breathing, use of accessory muscles, wheezing, hypoxia, poor ventilation*

<table>
<thead>
<tr>
<th><strong>Managing status asthmaticus</strong></th>
<th>□ Done Well</th>
<th>□ Needs Work</th>
</tr>
</thead>
</table>

Specific comments: __________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

*Discuss Points: What’s the treatment for status asthmaticus? Inhaled beta 2-agonists, systemic glucocorticoids, ipratropium bromide, supplemental oxygen, and additional medications (magnesium sulfate or terbutaline) as needed*
# Appendix F: Teamwork and Communication Evaluation/Debriefing Form

## Pediatric Status Asthmaticus

Teamwork and Communication Evaluation

This checklist identifies core teamwork and communication skills. It’s hard to discuss more than 3 of these during one debriefing session. We recommend selecting 2-4 of these issues to focus on.

<table>
<thead>
<tr>
<th><strong>Leader/Roles Identified &amp; Maintained</strong></th>
<th>□ Done Well □ Needs Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific comments: ______________________</td>
<td>________________________</td>
</tr>
<tr>
<td></td>
<td>________________________</td>
</tr>
</tbody>
</table>

*Discussion Points: What helped/hindered having clear leadership and roles?*

<table>
<thead>
<tr>
<th><strong>Directed Call-Out</strong></th>
<th>□ Done Well □ Needs Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific comments: ______________________</td>
<td>________________________</td>
</tr>
<tr>
<td></td>
<td>________________________</td>
</tr>
</tbody>
</table>

*Discussion Points: How were orders given- “Into the air” or directed at specific individuals? What did that impact you? How could they be delivered more effectively?*

<table>
<thead>
<tr>
<th><strong>Check-Back/Closed loop communication</strong></th>
<th>□ Done Well □ Needs Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific comments: ______________________</td>
<td>________________________</td>
</tr>
<tr>
<td></td>
<td>________________________</td>
</tr>
</tbody>
</table>

*Discussion Points: describe closed loop communication*

<table>
<thead>
<tr>
<th><strong>Shared Mental Model</strong></th>
<th>□ Done Well □ Needs Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific comments: ______________________</td>
<td>________________________</td>
</tr>
<tr>
<td></td>
<td>________________________</td>
</tr>
</tbody>
</table>

*Discussion Points: How did team members share information/working diagnosis/treatment plan ((brief/huddle))?*
**Appendix G: Simulation Evaluation Form**

**Simulation Session Evaluation Form**

<table>
<thead>
<tr>
<th>Instructor: ___________________________</th>
<th>Date: ______________</th>
</tr>
</thead>
</table>

**Case Presented:** Status Asthmaticus

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>This simulation case provided is relevant to my work.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>The simulation case was realistic.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>This simulation case was effective in teaching basic resuscitation skills.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>This simulation case was effective in teaching status asthmaticus management skills.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>The debrief was a safe environment.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>The debrief promoted reflection and team discussion.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

Can you list/describe 1 or more ways this simulation session will change how you do your job?

Comments: