



ISIS Resource

Pediatric Emergency Medicine Simulation Curriculum: Anaphylaxis Scenario

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2. Description of Scenario

Scenario Overview

This scenario teaches learners to recognize and manage pediatric anaphylaxis.

The scenario is simulation-based with an integrated team communication focus.

Learners will participate in a simulation scenario and be asked to identify the signs and symptoms of anaphylaxis 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 and manage is respiratory distress with imminent respiratory failure.

Educational Rationale on How the Course Generalizes to Real-Life Circumstances

Anaphylaxis is a potentially fatal disorder which can mimic other illnesses initially and rapidly progress if not treated. Anaphylaxis is characterized by acute onset of skin or mucosal changes (e.g. hives, pruritus, flushing, swelling) AND respiratory compromise (e.g. wheezing, dyspnea, stridor etc), reduced blood pressure or end organ dysfunction (e.g. syncope).⁵

Medical providers must recognize children in anaphylaxis early. Medical providers must initiate systemic treatment rapidly to prevent further decompensation and cardiopulmonary failure. Treatment should occur concomitantly with intramuscular epinephrine, additional respiratory support including oxygen and consideration of endotracheal intubation, and cardiovascular support with normal saline boluses.

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

Key elements include the primary survey, eliciting critical history (potential allergen exposure), recognizing the need to call for team assistance early in an event, recognizing anaphylaxis (skin or mucous membrane changes, respiratory distress or failure, hypotension, and end organ dysfunction) and treating anaphylaxis (intramuscular epinephrine, rapid isotonic crystalloid administration, systemic H1 and H2 blockade and steroids) .

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 anaphylaxis
- Anatomy and medications related to endotracheal intubation
- Knowledge of medications to treat anaphylaxis: epinephrine IM, systemic H1 and H2 blockade, steroids, isotonic fluids
- 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
- How to provide endotracheal intubation
- How to provide rapid administration of isotonic crystalloid fluids

5. Goals and Objectives

Goal 1: Recognition of Anaphylaxis

The learner will demonstrate recognition of anaphylaxis in a safe and professional manner. (ACGME Competencies: Medical Knowledge^A, Patient Care^B, Interpersonal and Communication Skills^C, Professionalism^D, Systems-based Practice^E)

Objective 1a - Initial patient assessment^[A, B, C, D]

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^[A, B, C]

The learner should apply basic monitoring standards for a patient in shock (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 anaphylaxis^[A, B, C]

The learner should identify signs of anaphylaxis in history (allergen exposure, skin/mucous membrane changes, respiratory changes, rapid progression) and in physical exam (skin/mucous membrane changes, respiratory distress/failure, hypotension, gastrointestinal irritation, end organ dysfunction).

Goal 2: Management of Anaphylaxis

The learner will treat anaphylaxis in a safe and professional manner. (ACGME Competencies: Medical Knowledge^A, Patient Care^B, Interpersonal and Communication Skills^C, Professionalism^D, Systems-based Practice^E)

Objective 2a - Management of anaphylaxis with intramuscular epinephrine^[A, B]

The learner should administer intramuscular epinephrine. Pediatric dosing for Epinephrine, using concentration of 1:1,000 is 0.01 mg/kg intramuscular (max dose 0.5 mg). May be repeated every 5-15 min as needed for recurrent symptoms. Note that auto-injectors may also be used: pediatric EpiPen JR is a .15 mg dose and the adult EpiPen is a .3 mg dose.

Objective 2b - Equipment setup^[A, B]

The learner should be able to set up the equipment required to treat a patient in anaphylaxis: supplemental oxygen, intramuscular and intravenous/intraosseous access equipment.

Objective 2c - Demonstrate understanding of the relevant anatomy^[A, B]

The learner should be able to identify pediatric anatomy necessary for intramuscular, intravenous or intraosseous access.

Objective 2d - Technical skills^[A, B]

The learner should position the patient for intramuscular and intravenous/ intraosseous access. Using appropriate clean/sterile technique, the learner should administer intramuscular medications and insert either an intravenous or intraosseous line. Intravenous fluids should be administered rapidly.

5. Goals and Objectives

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: *Interpersonal and Communication Skills*^C, *Professionalism*^D, *System-based Practice*^E)

Objective 3a – Team structure and leadership^[C, D, E]

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 anaphylactic shock. They will be expected to clearly identify (verbally or with visual cues) and maintain a team leader (orders, priorities verbally stated by team leader) and team member roles (questions, information directed to team leader).

Objective 3b – Communication skills^[C, D, E]

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)⁴. “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 cue 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 meet 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

- Each group of learners’ needs will vary. Thus, we have included a range of potential objectives, which can be tailored to suit different learner groups. E.g. for our less

6. Instructor Notes

experienced clinical providers, we focus more on the medical 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, one dose of epinephrine IM 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 epinephrine, place an IV, ordered steroids, diphenhydramine, ranitidine, fluids and be preparing to intubate 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 less history, is crying or questioning the team.
- 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.

7. Common Errors and Prevention Strategies

Common Errors and Prevention Strategies:

a. Failure to recognize anaphylaxis.

Strategy: Review signs of anaphylaxis: skin/mucous membrane changes (hives, rash, pruritus, swelling), vomiting, respiratory distress (stridor, tracheal tug, wheezing, retractions, increased work of breathing), hypotension and inadequate end organ perfusion (altered mental status).

b. Failure to treat anaphylaxis.

Strategy: Review treatment for anaphylaxis: intramuscular epinephrine, oxygen, isotonic crystalloid fluids, histamine 1 antagonist (e.g. diphenhydramine), histamine 2 antagonist (e.g. ranitidine) and steroids.

c. Failure to provide supplemental oxygen.

Strategy: Review goal of supplemental oxygen: to improve oxygen delivery and meet metabolic demand, preventing progression to cardiac arrest. This is not dependent on measured oxygen saturation. 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 PALS goal of IV or IO access within 90 seconds of cardiopulmonary failure. In this scenario, patient is not arresting, however at risk for rapid decompensation.

e. Failure to rapidly administer intravenous or intraosseous isotonic crystalloid fluids.

Strategy: Review goal of administration of isotonic crystalloid fluids, 20 mL/kg boluses over 5-20 min until blood pressure is restored and tissue perfusion improved. Review equipment available to achieve this (e.g. pressure bag, 3-way stop-cock and 60 mL syringe, etc).

f. 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.

g. Inefficient communication: lack of call-out

Strategy: Review importance of directed communication:
"Survey physician- What's the airway status?"

h. Inefficient communication: lack of check-back

Strategy: Review use of closed-loop communication:
Team Leader: "Give Normal saline, 200mL, IV push over 10 min".
Medication Preparation Nurse: "Normal saline, 200 mL, IV push over 10 min".
Team Leader: "Correct".

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

7. Common Errors and Prevention Strategies

- Regular simulation training to avoid previous mistakes

Background Information for Instructors

- This scenario is one case in a larger curriculum, the Pediatric Emergency Medicine Simulation Curriculum. The curriculum, as a whole, has been studied in pediatric resident led resuscitation teams and shows improved team performance. A manuscript is currently in submission with more details.
- General tip: learners improve- and sustain those improvements- when they practice, practice and practice. If your goal is to improve your learners' ability to perform pediatric emergency medicine skills, we believe it's critical to develop sustainable opportunities for your learners to develop their skills over time. Behavioral change comes slowly.

8. Cognitive Training

Key methods for delivering cognitive training include the following:

- Anaphylaxis Learner Handout (See Appendix D).

9. Skills Training

Skills Training Scenario:

Patient

Age: 24 Months

Weight: 15 kg

Gender: Male

Scenario: The triage nurse is bringing back an “ill-appearing” child. S/he has not obtained vitals: the patient is initially fully clothed and not on monitors. The patient is initially in severe respiratory distress. Anticipated interventions include primary assessment, initiation of anaphylaxis medications, and IV access. The patient then develops respiratory failure. Anticipated interventions include supporting ABC’s, endotracheal intubation and anaphylaxis treatment. The patient stabilizes after the third dose of epinephrine *or* intubation.

Learning Objectives:

1. Recognize anaphylaxis
 - a. Initial patient assessment
 - i. SAMPLE history, initial physical
 - b. Appropriate monitoring
 - ii. Heart & respiratory, oximetry, blood pressure, temperature
 - c. Identification of anaphylaxis
 - iii. Signs: progressive respiratory distress- increased work of breathing (stridor, tugging, abdominal breathing, tachypnea), diminished aeration, agitation
 - iv. Hives, vomiting, hypotension
2. Manage anaphylaxis
 - a. Primary management
 - i. Epinephrine (1:1000) 0.01 mg/kg IM
OR EpiPen Jr (15-29 kg) 0.15 mg IM
 - b. Secondary management
 - i. Diphenhydramine 1-1.5 mg/kg IV/PO
 - ii. Ranitidine 1.5 mg/kg IV
 - iii. Steroids: Methylprednisolone 2 mg/kg IV or Dexamethasone 0.6 mg/kg IV/IM/PO
 - iv. Oxygen 100%
 - v. IV fluid bolus: Normal Saline 20 mL/kg, p.r.n. hypotension

Learning Objectives continued:

- c. Equipment set-up
 - i. Oxygen, intramuscular, intravenous or intraosseous access
- d. Demonstrate anatomy
 - i. Identify anatomy for IM, IV or IO
- e. Demonstrate technical skills for IM, IV or IO placement
3. Teamwork skills
 - a. Team structure and leadership
 - i. Determine and indicate team leader and member roles
 - b. Communication skills
 - i. Brief prior to starting the scenario
 - ii. Huddle as needed during the scenario
 - iii. Utilize directed communication
 - iv. Utilize check-back for closed loop communication

9. Skills Training

Scenario Intro:

ED: Jimmy is a 24 month old boy. He was well until 4 days ago when he developed rhinorrhea, cough, and less energy. After attending a party, he developed a blotchy rash on his face and neck. His lips became puffy. While driving to the ED he vomited twice.

Facilitator Notes:

Give team intro outside the simulation area. Patient is initially clothed, no triage vitals, not on monitors.

PMH: *(If asked)*

Developed a rash after eating peanut butter once. Uncle and grandma allergic to nuts.
 Medications- none
 NKDA
 Immunizations UTD
 Multiple family members with food allergies

Prelude: 0-3 min

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.

Stage 1: Initial Assessment: 3-5 minutes

HR	145
SaO2	98% RA
P	88/52
RR	34
Temp	37.5

Technologist Information	Teaching Objectives	Instructor Information
Soft crying Stridor Abdominal breathing, retractions After 2 min in this Stage → Go to Stage 2	Primary Assessment <ul style="list-style-type: none"> ▪ ABCDE Recognize anaphylaxis Treat anaphylaxis <ul style="list-style-type: none"> ▪ Oxygen ▪ Epinephrine IM ▪ IV/IO access 	<p><u>Exam (If asked):</u> Agitated, crying, severe respiratory distress CR 4 sec Blotchy red rash on face, neck, and trunk. Lips swollen No hepatosplenomegaly</p> <p><u>Responses:</u> Any labs- “pending”</p>

9. Skills Training

Stage 2: Respiratory Failure, anaphylaxis: 5-13 minutes, maximum

HR	→188
Spo2	→84%
BP	52/22
RR	→5
Temp	37.5

Technologist Information	Teaching Objectives	Instructor Information
<p>HR ramps to 188 over 1 min Sat ramps to 84 over 1 min RR ramps to 5 over 1 min BP same through Stage</p> <p>Tongue swelling! For each dose of epi: reduce amount of stridor and tongue swelling.</p> <p>After third dose of epinephrine or endotracheal intubation or 6 min in this Stage → Go to Stage 3</p>	<p>Recognize respiratory failure due to upper airway obstruction</p> <p>Treat respiratory failure</p> <ul style="list-style-type: none"> ▪ Oxygen/position ▪ BMV ▪ Endotracheal intubation ▪ Intubation medications ▪ Recruit additional expertise as available <p>Treat anaphylaxis</p> <ul style="list-style-type: none"> ▪ Epinephrine IM, repeat doses or Epinephrine IV infusion ▪ Intravenous fluid boluses 	<p>Exam (If asked): Unresponsive to pain mottled hands and feet, CR 5 sec Blotchy red rash on face, neck, and trunk Lips swollen no hepatosplenomegaly</p> <p>Responses: 1st dose epi- mild ↓ in rash and stridor 2nd dose epi- ↓ lip/tongue swelling, rash, and stridor 3rd dose epi- cont ↓ in symptoms</p> <p>Normal saline 20 mL/kg boluses, each rapidly administered bolus increases blood pressure</p> <p>If attempt intubation with 4.0 or larger- cannot pass tube. 3.5 or smaller ok. If attempt nasal airway: no effect on airway obstruction. If attempt oral airway: vomit.</p> <p>This patient has a potentially difficult airway. Team should consider recruiting additional expertise.</p>

9. Skills Training

Stage 3: Resolution: 13-15 minutes maximum

HR	158
Spo2	94%
BP	68/44
RR	30- or rate of bagging (if paralyzed)
Temp	37.5

Technologist Information	Teaching Objectives	Instructor Information
clearer breath sounds- end exp wheeze stridor resolved strong pulses rash resolved decreased swelling After 2 min in this Stage → end scenario	Objectives: Reassess/support ABCDE's Treat anaphylaxis <ul style="list-style-type: none"> ▪ Histamine 1 antagonist (e.g. diphenhydramine) ▪ Histamine 2 antagonist (e.g. ranitidine) ▪ Steroids ▪ Intravenous fluids 	Exam (If asked): Strong pulses, mottling resolving Intermittent upper airway obstruction No rashes Withdraw to pain

Below are examples of learning objective based statements & questions you may use to debrief the team. Please see Appendix C- Debriefing Overview for general recommendations on overall debriefing format.

Examples of debriefing for different Learning Objectives		
Estimating Weight		
Debriefing Script	Reference Material	Instructor Notes
I noticed that you (<i>quickly/took a while</i>) to estimate the pt's weight. This is (<i>great/concerning</i>) because the situation changed rapidly- and weight is critical to pediatric medication dosing. <ul style="list-style-type: none"> • How did you estimate the patient's weight? • What do you think about the potential for error with that system? 	Estimate weight early. Use standard pediatric weight estimator if possible (e.g. Broselow-Luten Tape)	

9. Skills Training

Recognize respiratory failure due to upper airway obstruction		
Debrief Script	Reference Material	Instructor Notes
<p>I noticed that this patient had stridor, facial rash/lip swelling/increased work of breathing/then bradypnea and hypoxia. Alarming, because these are signs of respiratory failure secondary to upper airway obstruction.</p> <ul style="list-style-type: none"> • Were there diagnoses other than upper airway obstruction that were considered? • Can you tell me more about that? 	<p>Respiratory failure due to upper airway obstruction</p> <ul style="list-style-type: none"> ▪ Stridor ▪ Facial/tongue swelling ▪ Increased respiratory muscle use ▪ Decreased ventilation ▪ Hypoxia, Altered mental status 	
Treat respiratory failure due to upper airway obstruction		
Debrief Script	Reference Material	Instructor Notes
<p>I noticed you <i>acted quickly/took a while</i>) to treat their respiratory failure. This is <i>(great/could be even better)</i> because it's important to provide rapid support for oxygenation and ventilation.</p> <ul style="list-style-type: none"> • What <i>(helped/hindered)</i> you? 	<p>Respiratory failure treatment</p> <ul style="list-style-type: none"> ▪ Oxygen ▪ Positioning ▪ Airway adjuncts(e.g. suction) ▪ Bag Mask Ventilation ▪ Endotracheal intubation 	
Rapid Sequence Intubation		
Debrief Script	Reference Material	Instructor Notes
<p>I noticed you <i>(rapidly intubated/had delays intubating)</i>. This is <i>(fabulous/concerning)</i> since in anaphylaxis, you can lose an airway quickly.</p> <ul style="list-style-type: none"> • What <i>(helped/hindered)</i> you? <p>I noticed you <i>(used/didn't use)</i> a <i>(premed/sedative/paralytic)</i>. This is <i>(great/concerning)</i> because all 3 would give you your best chance at intubating an already difficult airway.</p> <ul style="list-style-type: none"> • How did you select your medications? 	<p>Rapid Sequence Intubation medications</p> <p>Premedications</p> <ul style="list-style-type: none"> ▪ Atropine (<5 yrs) .02 mg/kg IV <p>Sedation (choose one)</p> <ul style="list-style-type: none"> ▪ Ketamine 2 mg/kg IV ▪ Midazolam 0.1 mg/kg IV/IM ▪ Etomidate 0.3 mg/kg IV <p>Paralytic (choose one)</p> <ul style="list-style-type: none"> ▪ Rocuronium 1 mg/kg IV ▪ Vecuronium 0.1 mg/kg IV ▪ Succinylcholine 1mg/kg IV 	

9. Skills Training

Intubation Technique and Confirmation		
Debriefer Script	Reference Material	Instructor Notes
<p>I noticed you (<i>did/didn't</i>) confirm endotracheal tube placement using (<i>mist/ colorimeter/ chest rise/breath sounds/ xray</i>). This was (<i>great /could be a problem</i>) because it's safer to confirm with 2+ methods.</p> <ul style="list-style-type: none"> • What (<i>helped/hindered</i>) you? 	<ul style="list-style-type: none"> ▪ Visualization ▪ Mist ▪ Colorimeter ▪ Chest rise ▪ Breath sounds ▪ Chest xray 	
Gastric Decompression		
Debriefer Script	Reference Material	Instructor Notes
<p>I noticed you (<i>did/didn't</i>) place a nasogastric tube. That's (<i>great/something to keep in mind</i>) because a full stomach can decrease ventilation and/or put a patient at risk for vomiting or aspiration.</p> <ul style="list-style-type: none"> • What (<i>helped/hindered</i>) you? 	<ul style="list-style-type: none"> ▪ Nasogastric tube or ventilate gastric tube 	
Recognize Anaphylaxis		
Debriefer Script	Reference Material	Instructor Notes
<p>This patient had anaphylaxis: skin (rash, swelling), respiratory (stridor), GI (vomit) and cardiac (hypotension). I (<i>heard/didn't hear</i>) you state anaphylaxis as your working diagnosis. This was (<i>great/potentially a problem</i>) because the goal is to have the whole team on the same page.</p> <ul style="list-style-type: none"> • What other potential diagnoses did you consider? • How did you settle on a working diagnosis? 	<ul style="list-style-type: none"> ▪ Progressive respiratory distress ▪ Increased work of breathing (stridor, tugging, abdominal breathing, tachypnea) ▪ Diminished aeration ▪ Hives ▪ Vomiting ▪ Hypotension 	
Treating Anaphylaxis		
Debriefer Script	Reference Material	Instructor Notes
<p>I noticed you treated the patient with: (x,y,z). This was (<i>good/could have been better</i>) because anaphylaxis can progress quickly!</p> <ul style="list-style-type: none"> • What else did you think about treating with? 	<ul style="list-style-type: none"> ▪ Oxygen- 100% ▪ Epinephrine (1:1,000) 0.01 mg/kg IM, repeat q3-5 min ▪ If using EpiPen: <ul style="list-style-type: none"> ○ EpiPen Jr (15-29 kg) 0.15 mg IM 	

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<ul style="list-style-type: none"> • What (<i>helped/hindered</i>) you? 	<ul style="list-style-type: none"> ○ EpiPen (≥ 30 kg) 0.3 mg IM ▪ Diphenhydramine 1-1.5 mg/kg IV ▪ Ranitidine 1.5 mg/kg IV ▪ Steroids (choose one) <ul style="list-style-type: none"> ○ Dexamethasone 0.6 mg/kg IV ○ Methyl-prednisolone 2mg/kg IV ▪ Normal saline bolus:20 mL/kg IV 	
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Examples for debriefing different Teamwork Learning Objectives

Roles and Responsibilities		
Debriefing Script	Reference Material	Instructor Notes
<ul style="list-style-type: none"> • Let's talk about how you functioned as a team. • It looked like you <i>did/did not</i> have a clear team leader and defined team roles. I think this is <i>great/concerning</i> because clear team roles can help a team function smoothly- improving how quickly interventions take place and reducing errors. <ul style="list-style-type: none"> ○ What did you think about your roles? ○ What worked well? ○ What could have been better? 	<p>Team leader</p> <ul style="list-style-type: none"> ▪ Clear direction, coordination, timely interventions ▪ Foot of patient <p>Airway/Procedure MD</p> <ul style="list-style-type: none"> ▪ Manage airway/c-spine ▪ Head of patient <p>Survey MD</p> <ul style="list-style-type: none"> ▪ Primary, Secondary survey, pulses with CPR, reassess <p>Nursing roles</p> <ul style="list-style-type: none"> ▪ Medication Prep (draw-up meds) ▪ Medication Admin (give meds) ▪ Documenting (time keeper) 	
Brief and Huddle		
Debriefing Script	Reference Material	Instructor Notes
<p>I noticed that your team (<i>did/didn't/took a while to</i>) (<i>brief prior to the patient's arrival/huddle after the initial evaluation</i>). I thought this was (<i>great/could have helped you work better as a team</i>).</p>	<p>The goal of a brief/huddle is to create a shared mental model. Assure all team members know what the working diagnosis is, treatment priorities and next steps in care.</p> <ul style="list-style-type: none"> ▪ Everyone on the team is responsible for making this 	

9. Skills Training

<ul style="list-style-type: none"> • What (<i>helped/hindered</i>) your team from (<i>briefing/huddling</i>)? • How did that impact your team? • What could your team have done differently? • How can you make sure that (<i>does/doesn't</i>) happen again? 	<p>happen. Anyone can ask for a brief/huddle. Brief/huddle is usually led by team leader.</p> <ul style="list-style-type: none"> ▪ If one team member doesn't know what's up or what's next- s/he is probably not alone. 	
Directed call out		
Debriefer Script	Reference Material	Instructor Notes
<p>I noticed that you (<i>did/didn't/intermittently</i>) used (<i>peoples names/roles/eye contact</i>) when (<i>calling out orders/asking for assistance</i>). I thought this was (<i>great/could have been more directed</i>).</p> <ul style="list-style-type: none"> • What did you notice about orders/questions that were asked? • How did this impact your team? • What would you 	<p>Directed call out. A tactical communication skill to assure that important orders/questions are specifically directed to one individual (rather than called out into the air).</p> <p>Example:</p> <ul style="list-style-type: none"> ▪ "Jennifer-What's the airway status?" ▪ "Kim- Give epinephrine .3mg IM" ▪ "Team leader- we lost the pulse" 	
Closed loop communication/Check back		
Debriefer Script	Reference Material	Instructor Notes
<p>I noticed that you used closed-loop communication (<i>consistently/a lot/rarely</i>).Closed-loop communication can be critical for catching errors and assuring that (<i>information/an order/a request</i>) is heard.</p> <ul style="list-style-type: none"> • What did you think about your communication loops? • How did that impact your team? • Has anyone seen problems with this in a patient resuscitation? • Has anyone seen closed loop communication prevent an error? • How could you do it differently next time? 	<p>Closed loop communication/check back is a strategy that requires verification of information. This enables the sender of the message to verify it has been heard, and heard correctly. It enables the receiver to confirm what they heard is correct.</p> <ul style="list-style-type: none"> ▪ Team leader "epinephrine .3 mg IM" ▪ Medication preparation nurse "epinephrine .3 mg IM" ▪ Team leader "correct" 	

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-Luten 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
- _____ Amiodarone
- _____ Atropine
- _____ Etomidate
- _____ Fentanyl
- _____ Histamine 1 antagonist (e.g. diphenhydramine)
- _____ Histamine 2 antagonist (e.g. ranitidine)
- _____ Ketamine
- _____ Lidocaine
- _____ Midazolam
- _____ Normal Saline/Lactated Ringers
- _____ Rocuronium
- _____ Steroids (e.g. methylprednisolone or dexamethasone)
- _____ Succinylcholine
- _____ Vecuronium
- _____ 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
- _____ Suction
- _____ Thermometer
- _____ Temperature probe

10. Equipment Setup

_____ Nasal, oral airways, multiple sizes

Equipment Cont'd

_____ 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

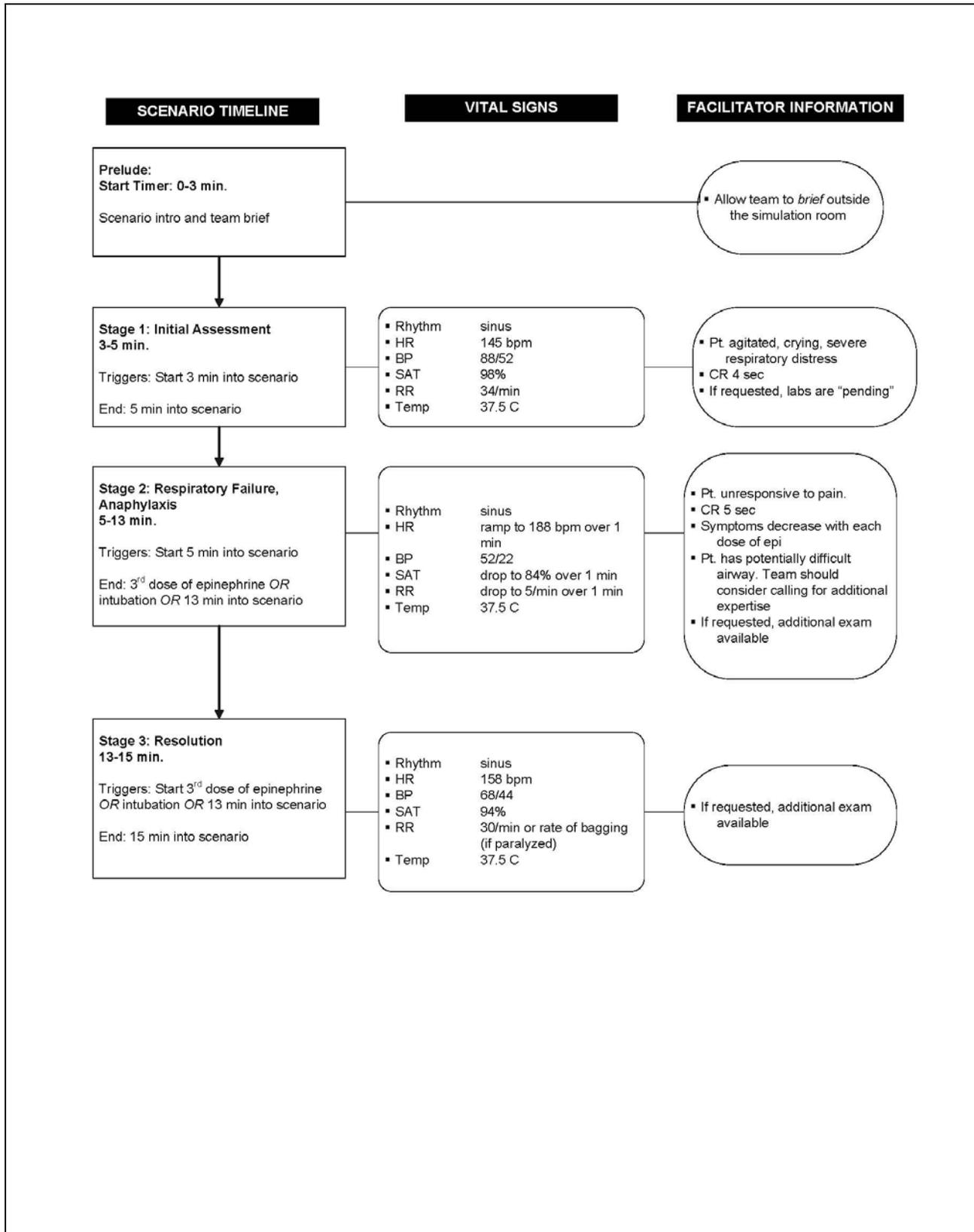
Type(s) of Assessment Methods Used in This Scenario:

- 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

Appendix A	Pediatric Anaphylaxis Scenario Algorithm
Appendix B	Teamwork and Communication (Team STEPPS) References
Appendix C	Debriefing Overview
Appendix D	Learner Handouts
Appendix E	Pediatric Anaphylaxis Medical Management Evaluation/Debriefing Form
Appendix F	Pediatric Anaphylaxis Teamwork and Communication Evaluation/ Debriefing Form
Appendix G	Pediatric Anaphylaxis Simulation Session Evaluation Form
Appendix H	References

Appendix A: Scenario Algorithm



Appendix B: Teamwork and Communication (TeamSTEPPS) References

Term	Definition
Adaptability	The ability to adjust strategies and altering a course of action in response to changing conditions (internal and external).
Brief	Discussion prior to start that assigns essential roles, establishes expectation, anticipated outcomes and likely contingencies.
Call-Out	A tactic used to communicate critical information during an emergent event. Helps the team prepare for vital next steps in patient care. (<i>Example: "Airway status?" – "Airway clear"; "Breath sounds?" – "Breath sounds decreased on right"</i>)
Check-Back	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. (<i>Example: "Give Benadryl 25 mg IV push" – "Benadryl 25 mg IV push" – "That's correct"</i>)
CUS	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.
Debrief	Brief, informal information exchange session designed to improve team performance and effectiveness.
DESC Script	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.
Huddle	Ad hoc planning to re-establish Situation Awareness; designed to reinforce plans already in place and assess the need to adjust the plan.
SBAR	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?)
Shared Mental Model	An organizing knowledge structure of relevant facts and relationships about a task or situation that are commonly held by team members
Situation Awareness	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".
Situation Monitoring	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.
Two-Challenge Rule	Assertively voicing concern at least two times to ensure it has been heard.

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 4 components:

- Introduction
- Discussion of emotions
- 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) Emotional experience discussion

There are a couple of camps regarding discussing emotions. One perspective is that until emotions are dealt with, it’s difficult for adult learners to “move on”: switching gears to process thoughts, actions and opportunities for improvement. Another perspective is that adult learners should process their emotions independently.

Our perspective is the first. If a group or team member is emotionally charged (sad, mad or frustrated) regarding something that did or didn’t happen in a scenario, it’s usually difficult for the individual or the group to be actively engaged, receptive to feedback and able to promote learning, until the emotions are addressed.

An example: a medication error occurs. One team member may think it is all his/her fault. S/he may feel embarrassed, judged, etc. If he/she can verbalize this, other team members may offer different perspectives, which enable the team to process the error together, potentially identifying contributing systems issues. If the emotions aren’t addressed- 3 separate people may feel embarrassed, responsible and not engage in a discussion, failing to identify systems issues which led to the error.

What you might say:

- How did that feel?
- Can you tell me more? Why?

Appendix C: Debriefing Overview

3) Medical management and technical skills

This portion of the discussion focuses on the medical aspects of the scenario. 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 briefly summarize what happened in this scenario?
- How did you reach those conclusions?

4) 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? How have you seen that handled?

4) Summarizing

- *This is your opportunity to ensure the key learning points are highlighted*
- *Try to identify approximately three take-home 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 scenario of pediatric anaphylaxis.
- (b) Signs of anaphylaxis: skin/mucous membrane changes, vomiting, respiratory distress, hypotension, inadequate end organ perfusion.
- (c) Treatment of anaphylaxis: intramuscular epinephrine, oxygen, normal saline boluses, adjunct medications, potential intubation.

Teamwork/ communication examples:

- (d) Recognize need for a full resuscitation team when a patient develops anaphylaxis.
- (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.

Appendix C: Debriefing Overview

General Debriefing 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)

Appendix D: Learner Handouts

Anaphylaxis Learning Objectives

1. Recognize Anaphylaxis

- a. Mucocutaneous (skin- rash, angioedema) work of breathing needing accessory muscles)
- b. Respiratory (upper airway swelling-stridor, lower airway- bronchospasm, increased
- c. Cardiac (vasodilation = hypotension)
- d. GI (vomiting, diarrhea)

2. Manage Anaphylaxis

- a. Position – to open the airway and apply monitors (pulse oximetry, cardiac, blood pressure)
- b. 100% supplemental Oxygen (face mask – simple or non-rebreather)
- c. Rapid vascular access (IV or IO)
- d. Epinephrine
 - i. Epinephrine dosing for anaphylaxis:
 - a. (Concentration 1:1,000) 0.01 mg/kg **IM**
 - b. EpiPen Jr (15-29 kg) 0.15 mg **IM** or EpiPen (>30kg) 0.3 mg **IM**
 - c. May repeat every 3-15 min as needed
 - d. **Warning:** *If epinephrine is given as an IV bolus, rather than IM, it may induce arrhythmias (e.g. ventricular tachycardia or ventricular fibrillation. Note that the IV bolus dosing for resuscitation carries this risk).*
- e. Adjunctive medications
 - i. Diphenhydramine (Histamine 1 blocker) 1-1.5 mg/kg IV
 - ii. Ranitidine (Histamine 2 blocker) 1.5 mg/kg IV
 - iii. Steroids (choose one)
 - a. Dexamethasone 0.6 mg/kg IV OR
 - b. Methyl-prednisolone 2 mg/kg IV load
- f. Normal Saline 20 mL/kg boluses to support blood pressure, as needed
- g. Frequent reassessment
 - i. Evaluate trends in the child's condition
 - ii. Determine response to therapy
 - iii. Plan next treatment interventions



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Appendix D: Learner Handouts

3. Core Resuscitation Skills

Endotracheal intubation:

Medications

- a. Premedications
 - i. Atropine 0.02 mg/kg IV (consider if <5 to prevent bradycardia/secretions)
- b. Sedative (choose one)
 - i. Ketamine 2mg/kg IV
 - ii. Midazolam 0.1 mg/kg IV
 - iii. Etomidate 0.3 mg/kg IV
- c. Paralytic (choose one)
 - i. Rocuronium 1mg/kg IV
 - ii. Vecuronium 0.1 mg/kg IV
 - iii. Succinylcholine 1 mg/kg IV

RSI pearls:

- d. Anticipate: set up your equipment- all of it! Laryngoscope, tube, stylet, suction, bag-mask ventilation, colorimeter, personnel needs
- e. A partial airway is better than NO airway!
 - i. Resist the urge to charge ahead with no meds and incomplete set up if you have a partial airway. If they vomit/have laryngospasm you can quickly go from a little airway to NO airway. YIKES!

Intubation technique and confirmation

- f. Pre-oxygenate (best you can with 100% oxygen)
- g. Administer RSI meds (premed, sedative, paralytic) give time for the paralytic to “work”
- h. Laryngoscope in non-dominant hand: lift (watch the teeth) lower jaw up towards the ceiling
- i. Look for the cords!
- j. Pass the ETT through the cords...talk to your team...“I see the cords! I need the ETT tube!”
- k. Confirm placement with at least 2 methods: colorimeter, chest rise, auscultation, chest XR for placement
- l. Place an nasogastric tube/ventilate gastric tube to decompress stomach



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Appendix E: Medical Management & Skills Evaluation/Debriefing Form

Pediatric Anaphylaxis

Medical Management/Technical Skills

This instructor tool identifies potential medical management /technical skill based learning objectives. Instructors may use this to “capture their thoughts” on a team’s performance during a simulation, then use it to help guide their debriefing of the team. We recommend selecting no more than 2-3 of these issues to focus on during a given debrief.

Assessment of ABCDE’s

Done Well

Needs Work

Specific comments: _____

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

Recognizing anaphylaxis

Done Well

Needs Work

Specific comments: _____

Discuss Points: What are the signs of anaphylaxis?- skin/mucous membrane changes (hives, rash, swelling), vomiting/diarrhea, respiratory distress (stridor, wheezing, increased work of breathing), hypotension, inadequate end organ perfusion

Managing anaphylaxis

Done Well

Needs Work

Specific comments: _____

Discuss Points: What’s the treatment for anaphylaxis? Supplemental oxygen, rapid administration of IM epinephrine, IV/IO isotonic fluids, adjunctive medications (histamine 1 & 2 antagonists-diphenhydramine and ranitidine, steroids, albuterol)

Obtaining endotracheal intubation

Done Well

Needs Work

Specific comments: _____

Discussion Points: Preparation of all equipment? Selection of medications? Preparation of all personnel? Confirmation?

Appendix F: Teamwork & Communication Evaluation/Debriefing Form

Pediatric Anaphylaxis

Teamwork and Communication Evaluation

This instructor tool identifies potential teamwork based learning objectives. Instructors may use this to “capture their thoughts” on a team’s performance during a simulation, then use it to help guide their debriefing of the team. We recommend selecting no more than 2-3 of these issues to focus on during a given debrief.

Leader/Roles Identified & Maintained Done Well Needs Work

Specific comments: _____

Discussion Points: What helped/hindered having clear leadership and roles? (Did team leader use verbal/visual cues to establish leadership? Did team leader say all orders/ priorities? Did team members’ direct questions/info to team leader?)

Directed Call out Done Well Needs Work

Specific comments: _____

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

Check back/Closed loop communication Done Well Needs Work

Specific comments: _____

Discussion Points: describe closed loop communication

Shared Mental Model Done Well Needs Work

Specific comments: _____

Discussion Points: How did team members share information/working diagnosis/treatment plan ((brief/huddle)?

Appendix G: Simulation Evaluation Form

Simulation Session Evaluation Form

Facilitator: _____

Date: _____

Scenario Presented: **Pediatric Anaphylaxis**

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. This simulation scenario provided is relevant to my work.	1	2	3	4	5
2. The simulation scenario was realistic.	1	2	3	4	5
3. This simulation scenario was effective in teaching basic resuscitation skills.	1	2	3	4	5
4. This simulation case was effective in teaching anaphylaxis management skills.	1	2	3	4	5
5. The debrief was a safe environment.	1	2	3	4	5
6. The debrief promoted reflection and team discussion.	1	2	3	4	5

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

How could we improve this session?

Comments:

Appendix H: References

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