

Simulation Patient Design
Anaphylaxis in an obstetric patient in the labor and delivery suite
University of Iowa
December 14, 2021

Introduction:

Current estimates of incidence suggest that maternal anaphylaxis occurs in approximately 1.6 in 100,000 pregnancies.[1-3] Antibiotic administration in pregnancy, including the use of prophylactic antibiotics up to one hour prior to delivery by caesarean section and the use of prophylactic antibiotics for maternal group B streptococcal carriage in labor, are known causes of anaphylaxis during pregnancy.

Although rare, anaphylaxis during pregnancy can be associated with significant adverse outcomes for both mother and the fetus. There are published guidelines for the management of anaphylaxis in adults however there is little information about how anaphylactic shock in pregnancy should be managed in order to optimize the outcome for both mother and baby.

Curricular Information:

Educational Rationale:

This multidisciplinary team simulation is designed to give learners the opportunity to apply their knowledge of team skills in managing anaphylactic shock in pregnancy.

This simulation is designed to take place in situ in the Labor and Delivery suite of the Obstetric department which will enable the identification of existing system deficiencies, in addition to knowledge gaps, correcting them, and improving patient outcomes.

Target Audiences: Nursing, OB, Anesthesiology, and L+D support staff

Learning Objectives: Core Competencies

Upon completion of this simulation (including the debrief) learners will be able to:

- *Medical knowledge:* Learners will be able to recognize signs, symptoms and specific management of Anaphylaxis.
- *Patient care:* Apply the ABCDE approach to assessing and treating a participant with anaphylaxis, stop the offending drug/exposure, use of emergency equipment, to treat the mother and bring best results for the fetus.
- *Practice-based learning and improvement:* Demonstrate the appropriate use of drugs, route of administration and dosing when managing Anaphylaxis in pregnancy.
- *Interpersonal and communication skills:* Call for help, communicate with team members, (anesthesiologist, obstetrician, nurse) use closed loop communication, and SBAR to update team members.

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- *Professionalism:* Each team will be able to demonstrate mutual respect for the expertise of other teams. Discuss the importance of leadership and communication among teams.
- *Systems-based practice:* At the end of the simulation, all team members will be able to identify existing barriers within the system (such as shortages of equipment, personnel) that needs change in order to improve patient outcome.

Specific Learning Objectives:

- Recognize symptoms and signs of anaphylaxis in a parturient
- Discuss the pathophysiological changes that occur with anaphylaxis.
- Determine the precipitating factor(s) and halt offending drug/exposure.
- Implement appropriate treatment strategies of anaphylaxis, particularly as they apply to pregnant patients.

Assessment Instruments:

1. Learner Knowledge Assessment form (Appendix1)
2. Simulation Activity Evaluation form (Appendix 2)

Simulation set-up and equipment needed:

Equipment:

Pregnant Mannequin/Actor

Audio-Visual Equipment

Running IV infusion labeled Cephalosporin/Penicillin

As this is a simulation in situ, other equipment needed should be available at the site. If unavailable, the deficiency should be uncovered during the simulation.

Simulation/ Mannequin set up

The mannequin will be set up in one of the Labor and delivery suites. She will have a running IV, with a port through which medications can be given. There will be an actor/confederate playing the role of the patient's family member, present in the room. The person plying the voice of the mannequin will be by the head of the mannequin but not visible to the participants.

Each participant is given the opportunity to visit the simulation room and familiarize themselves with the mannequin and its surroundings prior to the actual start of the simulation.

The simulation starts with one of the learners, in the role of the patient's nurse is at her bed side. The nurse at bedside will be given the case stem. The patient is at base line

state in the scenario. The scenario progresses to phase 1, with the patient complaining of feeling sweating and lightheaded. Patient's blood pressure drops.

This will unfold the simulation. Following appropriate treatment of anaphylaxis, the mother's vital signs will return to normal. The simulation maintains the FHR at 100 in order that the team is not triggered to do an emergent CD. However, the team may take the patient to the OR anticipating further deterioration of the patient. If the anaphylaxis has been managed appropriately up to this point the simulation may be concluded with the patient returning to baseline.

Following the simulation there is a debriefing session with the participants led by the content experts of nursing, obstetrics, pediatrics, and anesthesia.

Time Duration:

Set-up	20 min
Preparation	10 min
Simulation	10 min
Debrief	15-20 min

Case Stem

26yr old female Ms Williams, at 38 weeks in her first pregnancy is in labor. She has no significant past medical history. She was found to be GBS positive and now has IV antibiotics running which was started 5 minutes ago. She has no known allergies. She has an epidural in place for labor. However, she was complaining of pain, so the anesthesiologist just bloused her epidural. She is comfortable now.

Scenario development

The scenario will start with the OB nurse taking care of Ms Williams, being at the bedside of the patient.

State	Trigger	Patient Condition	Action
Base line		Patient awake, Patient responsive, Patient has a pulse Epidural Catheter in place HR 90, NSR	

		BP 100/85 RR 12 SpO2 98% on RA FHR-140 beats/min	
Phase I	Patient complains that she feels sweaty, and lightheaded	Patient awake, Patient responsive, Patient has a pulse Monitor shows: HR 105, Tachycardia BP 80/40 RR 16 SpO ₂ 92% on Oxygen FHR- 120 beats/minute	Recognize hypotension and difficulty breathing and support Airway, Breathing and Circulation. Position patient in Left lateral tilt, to optimize uteroplacental blood flow
Phase II	Patient complains of chest tightness and is itchy.	Patient awake, Patient responsive, Patient has a pulse , Monitor shows: HR 110 beats/minute BP- 60/40 RR- 20/minute SpO ₂ - 88% FHR- 100 beats/minute	OB nurse will page, or call for help may recognize anaphylaxis treatment may include: stopping the antibiotic. Airway management with increased oxygen Administration of bronchodilators and/or intubation Administer Epinephrine (0.5-1.0mg, 250mL NS) OR: Glucocorticoids, Benadryl (H1 blocker), Guanidine (H2 blocker). Rapid fluid administration (500-1000mL, NS/LRS) Anaphylaxis
Phase III	Patient complains	Patient awake,	OB nurse will page,

	of difficulty to breath and unable to speak	<p>Patient responsive, Patient has a pulse Monitor shows: HR 110 beats/minute BP- 60/40 RR- 20/minute SpO2- 88% FHR- 100 beats/minute</p>	<p>or call for help may recognize anaphylaxis treatment may include: stopping the antibiotic. Airway management with increased oxygen Administration of bronchodilators and/or intubation Administer Epinephrine (0.5- 1.0mg, 250mL NS) OR: Glucocorticoids, Benadryl (H1 blocker), Guanidine (H2 blocker). Rapid fluid administration (500- 1000mL, NS/LRS) Anaphylaxis</p>
Base line	Patient's breathing has improved.	<p>Patient awake, Patient responsive, Patient has a pulse Epidural Catheter in place</p> <p>HR 90, NSR BP 100/85 RR 12 SpO2 98% on RA FHR-140 beats/min</p>	<p>May call for antihistamine administration (exp. Chlorpheniramine) may call for corticosteroid administration (exp. 100-500mg Hydrocortisone IV) may call for monitoring in the ICU</p>

References:

1. McCall, S.J., J.J. Kurinczuk, and M. Knight, *Anaphylaxis in pregnancy in the United States: risk factors and temporal trends using national routinely collected data*. *The Journal of Allergy and Clinical Immunology: In Practice*, 2019. **7**(8): p. 2606-2612. e3.
2. McCall, S.J., et al., *The incidence, characteristics, management and outcomes of anaphylaxis in pregnancy: a population-based descriptive study*. *BJOG: An International Journal of Obstetrics & Gynaecology*, 2018. **125**(8): p. 965-971.
3. Simons, F.E.R. and M. Schatz, *Anaphylaxis during pregnancy*. *Journal of allergy and clinical immunology*, 2012. **130**(3): p. 597-606.

Interdisciplinary Team Simulation - Date: _____

Nursing Anes OB Other

Fac/Fel Res Stud Staff

Each item has two components. "Before the simulation" column (left side) examines your perspective at the start and "End of Simulation" column (right side) examines your perspective after completion of the simulation. Think carefully about your responses and answer accordingly.

1 How would you rate your ability to recognize signs and symptoms of anaphylaxis in a pregnant patient?

BEFORE THE SIMULATION							END OF SIMULATION						
1	2	3	4	5	6	7	1	2	3	4	5	6	7
Little/no					Very		Little/no					Very	
ability					accomplished		ability					accomplished	

2. How would you rate your ability as a team member to formulate/execute a plan to manage anaphylaxis in a pregnant patient?

BEFORE THE SIMULATION							END OF SIMULATION						
1	2	3	4	5	6	7	1	2	3	4	5	6	7
Little/no					Very		Little/no					Very	
ability					accomplished		ability					accomplished	

3. How would you rate your ability to determine the dose and route of administration of epinephrine in a pregnant patient with anaphylaxis?

BEFORE THE SIMULATION							END OF SIMULATION						
1	2	3	4	5	6	7	1	2	3	4	5	6	7
Little/no					Full ability		Little/no					Full ability	
ability					Full ability		ability					Full ability	

4. How would you rate your ability to access medication and equipment to manage such a patient in the labor and delivery unit?

BEFORE THE SIMULATION							END OF SIMULATION						
1	2	3	4	5	6	7	1	2	3	4	5	6	7
Little/no					Very		Little/no					Very	
ability					accomplished		ability					accomplished	

5. How would you rate your ability to use closed loop communication and SBAR with team members during an obstetric emergency?

BEFORE THE SIMULATION							END OF SIMULATION						
1	2	3	4	5	6	7	1	2	3	4	5	6	7
Little/no					Very		Little/no					Very	
ability					accomplished		ability					accomplished	

Any additional comments/insights on what you have/have not learnt:

Appendix 2

Assessment forms: Quality of the simulation

SPECIALITY: ANES OB NURSE STUDENT OTHER

YEARS IN PRACTICE:

Please rate the following aspects of this training program using the scale listed below:

1 = poor 2= suboptimal 3 = adequate 4 = good 5 = excellent Use “N/A” if

you did not experience or otherwise cannot rate an item.

INTRODUCTORY MATERIALS

Orientation to the simulator	1	2	3	4	5	N/A
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PHYSICAL SPACE

Realism of the simulator space	1	2	3	4	5	N/A
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EQUIPMENT

Satisfaction with the mannequin	1	2	3	4	5	N/A
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SCENARIOS

Realism of the scenarios	1	2	3	4	5	N/A
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Ability of the scenarios to test technical skills	1	2	3	4	5	N/A
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Ability of the scenarios to test behavioral skills	1	2	3	4	5	N/A
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Overall quality of the debriefings	1	2	3	4	5	N/A
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FACULTY

Quality of instructors	1	2	3	4	5	N/A
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Simulation as a teaching method	1	2	3	4	5	N/A
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COMMENTS