SOAP
Society for Obstetric Anesthesia and Perinatology

Simulation Patient Design (February, 2020)
Amniotic Fluid Embolism (Anaphylactoid Syndrome of Pregnancy) in the L&D OR

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Introduction

Amniotic fluid embolism (AFE), which is now understood as Anaphylactoid Syndrome of Pregnancy, is a rare but potentially catastrophic obstetric emergency. The incidence of AFE ranges from 1.9 to 6.1 cases per 100,000 deliveries based on international reports which include data from the United Kingdom (UK obstetric surveillance system) and United States.[1] Epidemiologic data may overestimate the true incidence of AFE since many studies include misdiagnosed AFE using nonspecific findings, however the rarity does not detract from the severity of an event. An AFE generally presents during labor or soon after delivery (but may be delayed), and is diagnosed based on inclusion of all of the following criteria (SMFM & AFE Foundation working group's criteria)[2]:

I. Sudden onset of cardiorespiratory arrest, OR hypotension (systolic blood pressure <90 mm Hg) with evidence of respiratory compromise (e.g. dyspnea, cyanosis, or peripheral oxygen saturation <90%)
II. Documentation of overt disseminated intravascular coagulation (DIC) using the scoring system of the Scientific and Standardization Committee on DIC of the International Society on Thrombosis and Hemostasis (ISTH), modified for pregnancy:
    a. Platelet count >100,000/mL = 0 points, <100,000 = 1 point, <50,000 = 2 points
    b. Prolonged prothrombin time or international normalized ratio <25% increase = 0 points, 25 to 50% increase = 1 point, >50% increase = 2 points
    c. Fibrinogen level >200 mg/L = 0 points, <200 mg/L = 1 point

    A score ≥3 is compatible with overt DIC. Coagulopathy must be detected before dilutional or shock-related consumptive coagulopathy are attributed to causing hemorrhage.

III. Clinical onset during labor or within 30 minutes of placental delivery
IV. Absence of fever (≥38°C) during labor

Most experts agree that the use of these criteria would clearly exclude any patients who do not have AFE, but may not capture those with atypical AFE.

Risk Factors for AFE: Although the most frequently cited risk factors for AFE appear to be *cesarean delivery, instrumental vaginal delivery, D&E, placental abnormalities (e.g. previa, abruption, accreta), and preeclampsia/eclampsia,* no single risk factor is sufficiently predictive of AFE to state that AFE would or would not have occurred in a particular patient.[3]

Educational Rationale: Teach team skills in recognizing and managing AFE
Target Audience: Anesthesiology, Obstetrics, Nursing, and OR personnel
Learning Objectives: As per Accreditation Council for Graduate Medical Education (ACGME) Core Competencies Upon Completion of this simulation (including the debrief), learners will be able to:

I. Medical knowledge: Recognize clinical signs, symptoms, and describe treatment options for AFE

II. Patient Care: Understand risk factors amongst patient populations as to the predisposition to AFE in order to prioritize management strategies
III. Practice-based learning and improvement: Identify the setting, equipment, and medications necessary to manage an obstetric patient who develops AFE including its sequelae, such as massive obstetric hemorrhage
IV. Interpersonal and communication skills: Designate a team leader who will coordinate the L&D teams to provide optimal care to the patient and maintain ongoing communication about the evolution of the clinical situation with the L&D team
V. Professionalism: Understand and demonstrate mutual respect for team members
VI. System-based practice: Ensure all resuscitation equipment, medications, and protocols are readily identifiable and available in delivery locations including airway management, anesthesia induction/emergency medications, vascular access, massive transfusion; include identification of barriers within the hospital system such as staffing, medication, and equipment/protocols

Questions to Ask After the Scenario:

I. Did the scenario unfold as expected by team members?
If so, what were the contributing factors and if not, what were the barriers?
II. Were opportunities for improvement(s) identified during the scenario?

Assessment Instruments:

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

Equipment Needed and Set-up:

I. Mannequin set-up in an OR using standard cesarean delivery set-up, epidural catheter in place
II. A single 18 gauge IV with fluids running and multiple access ports
III. Standard ASA monitors and anesthetic set-up

Simulation Scenario Set-up:

Mrs. Juniper Abell is a healthy 33 year old G2P1 at 38 weeks with a history of one cesarean delivery (due to breech presentation) and was undergoing a trial of labor after cesarean (TOLAC), however an intrapartum cesarean delivery has been called due to failure to progress and preeclampsia with severe features (severe range blood pressures, now controlled). She has a well-functioning labor epidural and has been cardiovascularly stable. The patient has been transported from her L&D room to the OR.

Simulation Pre-brief:

I. Read the scenario and instruct team members on their role during simulation
II. The participants take their places outside/inside the OR
III. Patient (embedded participant)
IV. Father of the baby at bedside (participant or learner)

Amniotic Fluid Embolism Scenario:

Trigger	Patient Condition	Action	Done	Time	Comments
In OR, cesarean delivery in progress, healthy fetus is delivered	Supine, comfortable (normothermic), awake, oriented, verbally responsive (appropriately)	Obstetrician requests standard first dose uterotonic Nurse assisting scrub tech & tracking time			
Patient complains of shortness of breath & odd sensation (of something not being right)	Restlessness, proceeding to agitation	Anesthesia discusses differential diagnoses Nurse calls for additional nursing assistance			
Patient manifests grand mal seizure and hemodynamic deterioration requiring induction of general anesthesia	Patient intubated	Patient is intubated emergently Large bore IV access obtained Vasopressors as indicated Supportive measures and consider: Atropine/ ondansetron/ketorolac (AOK) protocol[4]			
OB states diffuse oozing and poor hemostasis	Patient looks pale	Arterial line placed, CBC, chemistry, coag screen (including DIC profile), and ABG labs drawn Normothermia ensured Active resuscitation with IV fluids via rapid infuser Massive transfusion protocol initiated			
Monitors indicate PEA	Patient looks blue	ACLS initiated Massive transfusion parameters monitored & managed			
Return of spontaneous circulation (ROSC)	Patient starting to show signs of stability	Cesarean delivery completed by OB Patient transferred to ICU			

Appendix 1

Learner Knowledge Assessment
Labor and Delivery Interdisciplinary Team Simulation

Name of Simulation: _____ Date: _____

OB Nursing Anesthesia Other

Each item has two components. The "before the simulation" column on the left examines your perspective at the beginning of the simulation. The "end of simulation" column on the right is to evaluate your perspective at the completion of the simulation.

1. How would you rate your knowledge of patient risk factors for amniotic fluid embolism?

Before the simulation	End of simulation
1 2 3 4 5 6 7	1 2 3 4 5 6 7
Little/None Knowledgeable	Little/None Knowledgeable

2. How would you rate your knowledge of differential diagnosis of amniotic fluid embolism?

Before the simulation	End of simulation
1 2 3 4 5 6 7	1 2 3 4 5 6 7
Little/None Knowledgeable	Little/None Knowledgeable

3. How would you rate your knowledge of signs and symptoms of amniotic fluid embolism?

Before the simulation	End of simulation
1 2 3 4 5 6 7	1 2 3 4 5 6 7
Little/None Knowledgeable	Little/None Knowledgeable

4. How would you rate your knowledge of treatment options for amniotic fluid embolism?

Before the simulation	End of simulation
1 2 3 4 5 6 7	1 2 3 4 5 6 7
Little/None Knowledgeable	Little/None Knowledgeable

5. How would you rate your overall comfort when confronted with this scenario?

Before the simulation	End of simulation
1 2 3 4 5 6 7	1 2 3 4 5 6 7
Little/None Knowledgeable	Little/None Knowledgeable

Appendix 2

Simulation Activity Evaluation

Date:_____

Designation: Consultant PG Yr 1 2 3 4 Student Nurse Midwife Other

Specialty:_____

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 * N/A= not applicable

Introductory Materials						
Orientation to the simulation	1	2	3	4	5	N/A
Physical Space						
Realism of the simulation space	1	2	3	4	5	N/A
Equipment						
Satisfaction with the set-up	1	2	3	4	5	N/A
Scenarios						
Realism of scenario	1	2	3	4	5	N/A
Ability of scenario to test technical skill(s)	1	2	3	4	5	N/A
Ability of the scenario to test behavioral skills	1	2	3	4	5	N/A
Overall quality of debriefing	1	2	3	4	5	N/A
Did you find this useful?						
To improve clinical practice?	1	2	3	4	5	N/A
To improve teamwork skills?	1	2	3	4	5	N/A
To improve VERBAL communication?	1	2	3	4	5	N/A
To improve nonverbal communication?	1	2	3	4	5	N/A
Faculty						
Quality of instructors	1	2	3	4	5	N/A
Simulation as a teaching method	1	2	3	4	5	N/A

COMMENTS/SUGGESTIONS:

References:

1. Knight M, Berg C, Brocklehurst P, et al. Amniotic fluid embolism incidence, risk factors and outcomes: a review and recommendations. BMC Pregnancy Childbirth. 2012 Feb 10;12:7

2. Clark SL, Romero R, Dildy GA, et al. Proposed diagnostic criteria for the case definition of amniotic fluid embolism in research studies. Am J Obstet Gynecol. 2016;215:408-12

3. Stafford IA, Moaddab A, Dildy GA, et al. Evaluation of proposed criteria for research reporting of amniotic fluid embolism. Am J Obstet Gynecol. 2019;220:285-87

4. Rezai S, Hughes AC, Larsen TB, Fuller PN, Henderson CE. Atypical amniotic fluid embolism managed with a novel therapeutic regimen. Case Rep Obstet Gynecol. 2017;2017:8458375