SIMULATION

Precipitous Birth

Jennifer Yee, DO* and Andrew King, MD*

*The Ohio State University Wexner Medical Center, Department of Emergency Medicine, Columbus, OH

Correspondence should be addressed to Andrew King, MD at andrewking3@osumc.edu, Twitter: @akingermd

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ABSTRACT:

Audience: This scenario was developed to educate emergency medicine residents on the management of a precipitous birth in the emergency department (ED). The case is also appropriate for teaching of medical students and advanced practice providers, as well as reviewing the principles of crisis resource management, teamwork, and communication.

Introduction: Patients with precipitous birth require providers to manage two patients simultaneously with limited time and resources. Crisis resource management skills will be tested once baby is delivered, and the neonate will require assessment for potential neonatal resuscitation.

Objectives: By the end of this simulation session, the learner will be able to: 1) Recognize impending delivery, 2) identify abnormal maternal vital signs and potential associated pathologies (eg: hypertension in preeclampsia), 3) discuss the evaluation and management of postpartum bleeding, 4) discuss the principles of neonatal resuscitation, 5) appropriately disposition the patients, and 6) effectively communicate with team members and nursing staff during resuscitation of a critically ill patient.

Method: This session was conducted using high-fidelity simulation, followed by a debriefing session and lecture on precipitous birth management and neonatal evaluation.

Topics: Medical simulation, precipitous birth, neonatal management, neonatal resuscitation, obstetrics, pediatrics.

USER GUIDE

List of Resources:

Learner Audience:
Medical students, interns, junior residents, senior residents

Time Required for Implementation:
Instructor Preparation: 30 minutes
Time for case: 20 minutes
Time for debriefing: 30 minutes

Recommended Number of Learners per Instructor:
Four per instructor.

Topics:
Medical simulation, precipitous birth, neonatal management, neonatal resuscitation, obstetrics, pediatrics.

Objectives:
By the end of this simulation session, the learner will be able to:

1. Recognize impending delivery
2. Identify abnormal maternal vital signs and potential associated pathologies (eg, hypertension in preeclampsia)
3. Discuss the evaluation and management of postpartum bleeding
4. Discuss the principles of neonatal resuscitation
5. Appropriately disposition the patients
6. Effectively communicate with team members and nursing staff during resuscitation of a critically ill patient

Linked objectives and methods:
Precipitous deliveries in the emergency department are low frequency and potentially high-acuity scenarios that require prompt expectant management and crisis resource management. A pregnant woman in the emergency department with a completely dilated, effaced cervix should be set up for imminent delivery.[1] Delivery complications and mortalities are more frequent in the emergency department, including conditions such as eclampsia, abruptio placentae, and premature rupture of membranes.[2] Emergency department nursing and resident resources may be limited, as well as equipment and time. If either patient is not managed attentively, diagnoses may be missed which could lead to increased morbidity and mortality, such as post-partum hemorrhage or neonatal respiratory arrest. This simulation scenario allows learners to rehearse their precipitous birth and crisis resource management skills in a safe-learning environment, and then receive summative feedback and discuss treatment strategies with their peers and content experts.

Recommended pre-reading for instructor:

- We recommend that instructors review literature regarding precipitous delivery management. Suggested readings include materials listed below under the "References/suggestions for further reading" section below.

Results and tips for successful implementation:

- This simulation was written to be performed as a high-fidelity simulation scenario, but also may be used as a mock oral board case. The scenario was based on an actual patient case.
- The case was written for emergency medicine residents in a freestanding or community emergency department without obstetric services, but the case scenario may be conducted with a combination of emergency medicine and obstetrics/gynecology (OB/GYN) residents in a location outside of the labor and delivery ward, such as a hospital lobby or parking lot.

References/suggestions for further reading:

1. Silver DW, Sabatino F. Precipitous and difficult deliveries. *Emerg Med Clin North Am.* 2012;30(4):961-975. doi: 10.1016/j.emc.2012.08.004
2. Desai S, Henderson SO. Labor and delivery and their complications. In: Marx JA, Walls RS, Hockberger RM, et al. eds. *Rosen's Emergency Medicine: Concepts and Clinical Practice.* 8th ed. Philadelphia, PA: Elsevier; 2013:2331-2351.
3. Frasure S. Emergency delivery. In: Tintinalli JE, Stapczynski J, Ma O, Yealy DM, Meckler GD, Cline DM, eds. *Tintinalli's Emergency Medicine: A Comprehensive Study Guide.* 8th ed. New York, NY: McGraw-Hill; 2016:652-661.

INSTRUCTOR MATERIALS

Case Title: Precipitous Delivery Case Scenario

Case Description & Diagnosis (short synopsis): 32-year-old G4P3 female who is 36 weeks pregnant presents by private vehicle saying "The baby is coming!" Her water broke on the way to the hospital. She had contractions for twelve hours, but thought they were Braxton-Hicks. Baby will be delivered and will need to be warmed, dried, and stimulated. Mom will deliver placenta without complication. Mom and baby will then be transferred to a hospital with obstetric (OB) capabilities.

Equipment or Props Needed:

High fidelity simulation mannequin with birthing capabilities and placenta

- Laerdal SimMom has manual or autonomic birthing capabilities. A birthing baby and placenta are included, as well as a post-partum hemorrhage module.
- Gaumard's Noelle mannequin has autonomic birthing capabilities, and includes a birthing fetus and placenta.
- If a birthing simulation mannequin is not available, a standardized patient may be used with a towel covering her until it is time for the baby to be born. A neonatal mannequin may then be used.

Neonatal high or low fidelity mannequin

- Laerdal SimNewB is a high-fidelity mannequin

Angiocaths = 18g, 20g, 22g
Oxygen = Nasal cannula, face mask, non-rebreather mask
Umbilical catheter kit
Positive pressure mask for neonates
Cardiac monitor
Pulse oximetry
Bag-valve mask
Intravenous (IV) pole
Normal saline (1L x2)
Medications = oxytocin
Clamps for umbilical cord
Scalpel for cutting umbilical cord
Red biohazard bag for placenta
Clean blankets
Neonatal warmer with preductal neonatal pulse ox
Broselow tape

INSTRUCTOR MATERIALS

Bulb suction
Erythromycin ointment

Confederates needed:
Primary nurse

Stimulus Inventory:
None

Background and brief information: Friend brings patient into small community freestanding emergency department.

Initial presentation: 32-year-old G4P3 female who is 36 weeks pregnant presents by private vehicle saying "The baby is coming!" Her water broke on the way to the hospital. She had contractions for twelve hours, but thought they were Braxton-Hicks. She is unsure of her Group B streptococcus (GBS) status. No pregnancy complications. She has had prenatal care throughout her pregnancy. Denies headache, vision change, upper abdominal pain.

- Past medical history: none
- Past surgical history: none
- Medications: prenatal vitamins
- Allergies: none
- Family history: noncontributory.
- Vital signs:
    - Heart rate (HR) – 110
    - Respiratory rate (RR) – 20
    - Temperature (T) – 98F
    - Blood pressure (BP) – 100/60
    - Pulse oximetry (O_2sat)– 98% on RA
- Weight: 100 kg

Assessment: Lying supine, experiencing contractions every three minutes.

How the scenario unfolds: 32-year-old G4P3 female who is 36 weeks pregnant presents by private vehicle saying "The baby is coming!" Baby will be delivered and will require to be warmed, dried, and stimulated. Mom will deliver placenta without complication. Mom and baby will then be transferred to a hospital with obstetric capabilities.

- If baby is not warmed/dried/stimulated, Apgar score remains unchanged at 6 until actions are performed (then increases to 10).

Critical Actions:

1. IV access
2. Assess mom's vitals for abnormalities
3. Delivery of baby
4. Delivery of placenta
5. Assess neonate and perform warming/drying/stimulating maneuvers
6. Apgar scores at 1 and 5 minutes
7. Assess mom for postpartum hemorrhage after placenta delivery
8. Reassessment of mom and baby's clinical status and vital signs
9. Transfer to hospital with OB services

INSTRUCTOR MATERIALS

Case title: Precipitous Delivery Case Scenario

Chief Complaint: 32-year-old G4P3 female who is 36 weeks pregnant presents by private vehicle saying "The baby is coming!"

Vitals: *HR* 110 *BP* 100/60 *RR* 20 *Temp* 98.0 O_2*Sat* 98% on room air (RA)

General Appearance: lying supine, contracting every 3 minutes

Primary Survey:

- **Airway:** Intact
- **Breathing:** clear to auscultation bilaterally
- **Circulation:** mild tachycardia, 2+ symmetric pulses

History:

- **History of present illness:** 32-year-old G4P3 female who is 36 weeks pregnant presents by private vehicle saying "The baby is coming!" Her water broke on the way to the hospital. She reports that she has had contractions for the past twelve hours, but thought they were Braxton-Hicks. She is unsure of her GBS status. No pregnancy complications. She has had prenatal care throughout her pregnancy.
- **Past Medical history:** none
- **Past Surgical history:** none
- **Patients Medications:** prenatal vitamins
- **Allergies:** no known drug allergies
- **Social history:** denies alcohol, smoking, drugs
- **Family history:** non-contributory

Secondary Survey/Physical Examination:

- **General Appearance:** lying supine, contracting every 3 minutes
- **Head, ears, eyes, nose and throat (HEENT):**
    - **Head:** within normal limits
    - **Eyes:** within normal limits
    - **Ears:** within normal limits
    - **Nose:** within normal limits
    - **Throat:** within normal limits
- **Neck:** within normal limits

INSTRUCTOR MATERIALS

- **Heart:** tachycardic, regular rhythm, no murmurs
- **Lungs:** clear to auscultation
- **Abdominal/Gastrointestinal:** gravid, contractions every 3 minutes
- **Genitourinary:** fetal head obscures the cervix
- **Rectal:** within normal limits
- **Extremities:** within normal limits
- **Back:** within normal limits
- **Neuro:** within normal limits
- **Skin:** +diaphoretic
- **Lymph:** within normal limits
- **Psych:** within normal limits

OPERATOR MATERIALS

SIMULATION EVENTS TABLE:

Minute (state)	Participant action/ trigger	Patient status (simulator response) & operator prompts	Monitor display (vital signs)
0:00 (Baseline)	Patient just placed into bed in ED.	Patient alert responding to questions, in moderate distress due to abdominal pain	Mom: T 98F HR 110 BP 100/60 RR 20 O_2sat 98% RA
3:00	IV placed, patient put on oxygen. Participant should perform a pelvic exam and note that the patient is fully dilated and there is a fetal head being delivered.	Patient continues to scream that the baby is coming, asking if everything is ok.	Mom: T 98F HR 110 BP 100/60 RR 20 O_2sat 98% RA
5:00	Regardless of participants performing physical exam, the baby is delivered without complications and either falls into the nurse's hands, physician's hands or on to the bed.	Patient asking if everything is ok with the baby, why can't she hear the baby cry, asking if she is ok. Participants should reassure mom, clamp and cut cord, and then tell her that they are going to assess the neonate.	Mom: T 98F HR 110 BP 100/60 RR 20 O_2sat 98% RA
7:00	Mom post-delivery, participants should perform uterine massage; placenta will be delivered without difficulty, and mother's bleeding will slow. Assess	Mom will reports feeling well. If Apgar scores are not discussed, mom will ask what her baby's "score is," prompting participants to give an Apgar score.	Mom: T 98F HR 80 BP 100/60 RR 12 O_2sat 98% RA

OPERATOR MATERIALS

Minute (state)	Participant action/ trigger	Patient status (simulator response) & operator prompts	Monitor display (vital signs)
	mom for vaginal lacerations, retained products of conception, etc.		
7:00 Baby	Baby should be warmed, dried and stimulated. First baby vitals are obtained. Apgar scores are obtained.	Stay here until the baby is warmed, dried, stimulated, then go to 9:00 baby (baby's pulse ox will continue to increase to 90% at 10 minutes postpartum if appropriately warmed and stimulated. Apgar score is 6 at 1 minute (1 point for weak cry, 1 for muscle tone with only some flexion, 1 for grimacing for reflex irritability, 1 for blue extremities).	Baby: HR 110 RR 26 O_2sat 75% RA
9:00 Baby	Baby is warmed, dried, stimulated. Baby can be taken to mom to hold.	Apgar score 10. Discuss with mom that your hospital doesn't have obstetrics or pediatric services, and that the patients will need to be transferred to outside hospital for further management. Initiate transfer process.	Baby: HR 126 RR 26 O_2sat 92% RA

Diagnosis: Precipitous Delivery

Disposition:
Transfer to outside hospital

DEBRIEFING AND EVALUATION PEARLS

Precipitous Delivery

Precipitous birth requires managing two patients simultaneously, often with limited staff and equipment resources. Preplanning for such low-frequency, high-acuity events with a precipitous birthing cart helps mitigate stress and keep things organized.

If possible, split staff ahead of time into mom and neonatal teams and assign roles.

If shoulder dystocia occurs, start with McRobert's maneuver and suprapubic pressure to deliver the baby's anterior shoulder.

For neonatal care, start with warming, drying, and stimulating an infant. Neonates do not require routine suctioning. If this does not work, proceed down the neonatal resuscitation pathway, which focuses on respiratory causes of clinical deterioration.

Evaluate mom for postpartum hemorrhage (PPH). Uterine atony is the most common cause of PPH, but one should also evaluate for retained products, vaginal lacerations, and bleeding diathesis. Know your hospital's massive transfusion protocol if bleeding continues, and have oxytocin on hand.

Other debriefing points:
Closed-loop communication amongst team: Was it used? Why or why not? Were there any implications of this during case execution?

DEBRIEFING AND EVALUATION PEARLS

Precipitous Birth Management Handout

Disposition

- Does your hospital have obstetric services?
- Is fetal head visible? Is cervix fully effaced and dilated?
    - If yes, prepare for delivery in the emergency department
- Evaluate for umbilical cord prolapse
    - If present, elevate the presenting fetal part to avoid cord compression, and continue elevation until surgery. Do not reduce a prolapsed umbilical cord (Frasure, 2016)
- Evaluate for breech deliveries
    - Immediate obstetrics consult. Do not apply traction to baby.

History

- Birth history – previous children, miscarriages, abortions
- How many weeks gestation, how many fetuses, if there was any prenatal care
- Any complications with current pregnancy
    - Eg) Gestational hypertension, pre-eclampsia, eclampsia, gestational diabetes
- Medications during current pregnancy
- Onset and frequency of contractions
- Mom's past medical history
- Mom's allergies
- GBS and ABO Rh status

Preparation – Equipment

- Neonatal warmer
- Warm blankets
- Broselow tape
- Infant-sized intubation equipment
- Bulb suction
- Umbilical catheter kit
- Neonatal positive pressure ventilation equipment
- Clamps for the umbilical cord
- Sterile scalpel
- Pitocin
- Gowns, gloves, and mask for providers

DEBRIEFING AND EVALUATION PEARLS

Preparation – Mom

- IV placement
- Start IV fluids
- Monitor

After delivery – Baby

- Clamp the cord in two places and use a sterile scalpel or scissors to cut between the clamps 1-3 minutes after delivery
    - This delayed clamping increases neonatal iron stores (Frasure, 2016)
- Check baby's tone and if they are breathing
    - If not → warm, dry, stimulate
        - If despite this, baby is still apneic, gasping, or has a heart rate less than 100, start positive pressure ventilation via neonatal resuscitation pathway
    - If tone is good and baby is spontaneously breathing adequately/crying, calculate Apgar scores at one and five minutes after birth
        - Based on infant's color, tone, heart rate, respiratory effort, and reflexes
- If delivery was uncomplicated and baby responded to initial stimulation and has good respirations, may wrap in blanket and give to mom OR place under neonatal warmer

After delivery – Mom

- Gentle continuous traction with suprapubic massage to deliver the placenta
- Massage the abdomen at the level of the fundus to promote uterine contraction (Frasure, 2016)
- Examine the placenta for missing cotyledons, then place in a red biohazard bag
- Evaluate for continued bleeding after placental delivery
    1. Uterine atony, retained placental tissue, GU laceration, bleeding diathesis, disseminated intravascular coagulation
    - If there is uterine atony → fundal massage
    - Treat with Pitocin, 10 units IM or 10-40 units in 1L normal saline at 250 cc/hr (Frasure, 2016)

References/Further Reading:

1. Frasure S. Emergency delivery. In: Tintinalli JE, Stapczynski J, Ma O, Yealy DM, Meckler GD, Cline DM, eds. *Tintinalli's Emergency Medicine: A Comprehensive Study Guide.* 8th ed. New York, NY: McGraw-Hill; 2016:652-661.

DEBRIEFING AND EVALUATION PEARLS

2. Desai S, Henderson SO. Labor and delivery and their complications. In: Marx JA, Walls RS, Hockberger RM, et al. eds. *Rosen's Emergency Medicine: Concepts and Clinical Practice.* 8th ed. Philadelphia, PA: Elsevier; 2013:2331-2351.
3. Silver DW, Sabatino F. Precipitous and difficult deliveries. *Emerg Med Clin North Am.* 2012;30(4):961-975. doi: 10.1016/j.emc.2012.08.004

SIMULATION ASSESSMENT

Precipitous Delivery Case Scenario

Learner: _____

Assessment Timeline

This timeline is to help observers assess their learners. It allows observer to make notes on when learners performed various tasks, which can help guide debriefing discussion.

Critical Actions	0:00
1. IV access 2. Assess mom's vitals for abnormalities 3. Delivery of baby 4. Delivery of placenta 5. Assess neonate and perform warming/drying/stimulation maneuvers 6. Apgar scores at 1 and 5 minutes 7. Assess mom for postpartum hemorrhage after placenta delivery 8. Reassessment of mom and baby's clinical status and vital signs 9. Transfer to hospital with OB services	

SIMULATION ASSESSMENT

Precipitous Delivery Case Scenario

Learner: _____

Critical Actions:

- ☐ IV access
- ☐ Assess mom's vitals for abnormalities
- ☐ Delivery of baby
- ☐ Delivery of placenta
- ☐ Assess neonate and perform warming/drying/stimulating maneuvers
- ☐ Apgar scores at 1 and 5 minutes
- ☐ Assess mom for postpartum hemorrhage after placenta delivery
- ☐ Reassessment of mom and baby's clinical status and vital signs
- ☐ Transfer to hospital with OB services

Summative and formative comments:

Milestones assessment:

	Milestone	Did not achieve level 1	Level 1	Level 2	Level 3
1	**Emergency Stabilization (PC1)**	☐ Did not achieve Level 1	☐ Recognizes abnormal vital signs	☐ Recognizes an unstable patient, requiring intervention Performs primary assessment Discerns data to formulate a diagnostic impression/plan	☐ Manages and prioritizes critical actions in a critically ill patient Reassesses after implementing a stabilizing intervention

SIMULATION ASSESSMENT

Precipitous Delivery Case Scenario

Learner: _____

	Milestone	Did not achieve level 1	Level 1	Level 2	Level 3
2	**Performance of focused history and physical (PC2)**	☐ Did not achieve Level 1	☐ Performs a reliable, comprehensive history and physical exam	☐ Performs and communicates a focused history and physical exam based on chief complaint and urgent issues	☐ Prioritizes essential components of history and physical exam given dynamic circumstances
4	**Diagnosis (PC4)**	☐ Did not achieve Level 1	☐ Considers a list of potential diagnoses	☐ Considers an appropriate list of potential diagnosis May or may not make correct diagnosis	☐ Makes the appropriate diagnosis Considers other potential diagnoses, avoiding premature closure
6	**Observation and reassessment (PC6)**	☐ Did not achieve Level 1	☐ Reevaluates patient at least one time during case	☐ Reevaluates patient after most therapeutic interventions	☐ Consistently evaluates the effectiveness of therapies at appropriate intervals
7	**Disposition (PC7)**	☐ Did not achieve Level 1	☐ Appropriately selects whether to admit or discharge the patient	☐ Appropriately selects whether to admit or discharge Involves the expertise of some of the appropriate specialists	☐ Educates the patient appropriately about their disposition Assigns patient to an appropriate level of care (ICU/Tele/Floor) Involves expertise of all appropriate specialists
9	**General Approach to Procedures (PC9)**	☐ Did not achieve Level 1	☐ Identifies pertinent anatomy and physiology for a procedure Uses appropriate Universal Precautions	☐ Obtains informed consent Knows indications, contraindications, anatomic landmarks, equipment, anesthetic and procedural technique, and potential complications for common ED procedures	☐ Determines a back-up strategy if initial attempts are unsuccessful Correctly interprets results of diagnostic procedure

Standardized assessment form for simulation cases. JETem © Developed by: Megan Osborn, MD, MHPE; Shannon Toohey, MD; Alisa Wray, MD
King A, et al. Precipitous Birth Case Scenario. JETem 2017. 2(4):S1-18. https://doi.org/10.21980/J8192R

SIMULATION ASSESSMENT

Precipitous Delivery Case Scenario

Learner: _____

	Milestone	Did not achieve level 1	Level 1	Level 2	Level 3
20	**Professional Values (PROF1)**	☐ Did not achieve Level 1	☐ Demonstrates caring, honest behavior	☐ Exhibits compassion, respect, sensitivity and responsiveness	☐ Develops alternative care plans when patients' personal beliefs and decisions preclude standard care
22	**Patient centered communication (ICS1)**	☐ Did not achieve level 1	☐ Establishes rapport and demonstrates empathy to patient (and family) Listens effectively	☐ Elicits patient's reason for seeking health care	☐ Manages patient expectations in a manner that minimizes potential for stress, conflict, and misunderstanding. Effectively communicates with vulnerable populations, (at risk patients and families)
23	**Team management (ICS2)**	☐ Did not achieve level 1	☐ Recognizes other members of the patient care team during case (nurse, techs)	☐ Communicates pertinent information to other healthcare colleagues	☐ Communicates a clear, succinct, and appropriate handoff with specialists and other colleagues Communicates effectively with ancillary staff