Maternal 911 in Action: Postpartum Hemorrhage

Traditional patient safety approaches, known as Safety-I, are reactive and focus on identifying and mitigating contributing factors after adverse events have occurred. This approach views safety as the condition whereas few things go wrong as possible, using tools like root cause analysis and risk assessments to prevent future incidents. While Safety-I is effective in evaluating failures and minimizing adverse events, it fails to consider the many factors that contribute to everyday successes in healthcare, which are often just as critical to ensuring patient safety in dynamic and complex environments. [1,2]
In contrast, the Safety-II framework takes a proactive, system-wide approach to patient safety by focusing on understanding and learning from everyday successes rather than just failures. Safety-II emphasizes the importance of adaptability and resilience, recognizing that safety is not only the absence of adverse events but also the presence of actions that go right. By studying what works well and how healthcare professionals effectively adapt to varying conditions, Safety-II aims to replicate and strengthen these successful processes to ensure optimal outcomes, even in unpredictable circumstances. [1,2]

1. Venkatesan C, Helak K, Sousane Z, et al. Application of Safety-II Principles. PSNet [internet]. Rockville (MD): Agency for Healthcare Research and Quality, US Department of Health and Human Services. 2024.
2. Safety-I and Safety-II: The Past and Future of Safety Management. Hollnagel E. Aldershot, Hampshire, England: Ashgate; 2014. ISBN: 9781472423085.

Is Something About to Happen?

The objective of Maternal 911 in Action is to put real-life events in to practice with the management of each step prior to an actual event. This is not a test of individuals. This is an opportunity to strengthen the process, to identify and fix gaps within the unit and to improve teamwork, communication and overall reliability.

Every healthcare scenario aims to be as realistic as possible ideally involving the members of the team that would be present during an actual event. Even consider involving another colleague to simulate a family member.

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A 911 in Action drill should be practiced in a room consistent with where an actual event would occur. This will make the drill efficient in helping participants familiarize themselves with the room set-up, equipment location, and medication available helping participants to identify improvements in their location for faster retrieval in a real event.

911 in Action is to be as hands-on as possible.

Following the practice event, the team should discuss what went well, what could be improved, what needs to be changed regarding equipment, supply location, and questions answered so each member has a clear understanding of the event and management.

Maternal 911 in Action Steps to Preparedness

1. Please have conversations with your risk team to have non-discoverable status; this may ensure that protected documents and items cannot be used in a court of law during a malpractice suit.
   - This process is best determined by the hospital attorney or the Risk Management Department and needs to be in place before simulation occurs**.**
   - Simulations and findings may also be considered a quality improvement project and be protected in the same manner other such projects are.
   - Once a process is determined, simulation instructors need to be familiar with how to protect simulations and findings along with consequences of not following the process.
   - Instructors are responsible for explaining what non-discoverable status is to trainees, ensure all in simulation follow the process and understand the consequences violating the process.
2. Simulations are a safe place to learn; therefore, confidentiality is a key part of training.
   - Everyone attending the simulation training must sign a confidentiality form stating they will not discuss the events of the scenario and debriefing (obtain from legal/risk).
   - Whether mistakes are made, or performance is excellent, each trainee needs to understand that anyone at the session from instructors to other trainees to observers will not discuss their performance outside of the training session.
   - Issues that are uncovered for quality improvement will be described, but not attributed or linked with any specific individual.
3. The drill should be as realistic as possible:
   - Mannequins or individuals may be used.
   - Equipment and supplies should be available.
   - Even consider having a colleague simulate a family member.
4. Drills should meet department or unit needs and practices using current evidence-based practice.
5. Those who attend should be the team members who would provide care during an actual event.
6. Explanation of the process should be understood prior to initiation of the action:
   - Provide a case scenario.
   - Participants understand their role is to respond as would be done during an actual event.
   - Individuals should know that the patient's outcome will be based upon their actions.
7. The trainer will provide scenario outcomes in events as participants work through the drill and redirect as appropriate.
8. All procedure performances will be demonstrated through discussion, so the team will be aware of the time and supplies needed for successful completion.
9. Following the event, the team will discuss the process:
   - Debriefing provides a powerful and essential structure for maintaining learning capacity.
   - The team can evaluate what worked well and identify needed improvements.
   - This may include adding or removing equipment, supplies, and medication, etc.
10. Repeating the drill may be necessary until all members are functioning proficiently within their scope of practice.
11. The trainer will have the participant(s) go through the drill until they are competent in the topic and health care delivery.

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Data from completing the modules may be used in research and publications with privacy maintained

Maternal 911 in Action
Case Scenario to Post/Distribute Postpartum Hemorrhage (PPH)

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Anna's spouse telephones for emergency assistance in route to the emergency department stating her wife had a vaginal delivery 20 hours ago and is home now with their other children. She started bleeding heavier over the past two hours and nothing they have done has helped and she is now feeling weak. She has no known allergies. She has no significant medical history. She is not asthmatic and does not have any hypertension issues. She arrives.

Trainer's Form
Maternal 911 in Action Case Scenario
Postpartum Hemorrhage (PPH)

Supplies

- Two printed cases (with answers) for the trainer, one for yourself and one for the role of the family member
- Pelvic model with cord, uterus and blood-looking fluid (red gelatin).
- Medications (available where they would normally be stored).
- Consent for all participants to sign regarding confidentiality (from legal/risk).

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Anna's spouse telephones for emergency assistance while in route to the hospital stating her wife had a vaginal delivery 20 hours ago. She started bleeding heavier over the past two hours and nothing they have done has helped and she is now feeling weak. They arrive several minutes later. She has no known allergies. She has no significant medical history. She is not asthmatic and does not have any hypertension issues. She arrives.

Role playing family member asks: "Why is she bleeding so much. I never bled like this after giving birth and I've had five children, what is wrong?"

Discuss initial management:

911 in Action	Discussion
1. Massage the uterine fundus.	To evaluate for tone.
2. Assess the bladder.	A full bladder will not allow the uterus to contract, which controls bleeding.
3. Ask if she has been urinating.	Oliguria is a sign of hypovolemia.
4. Obtain vitals	Signs of hypovolemia; hypotension, tachycardia, oxygen saturation < 95%.
5. Assess blood loss	Is she currently bleeding? If so, assess the volume. Ask her how often she is changing a peri pad. This will help estimate her bleeding volume.
6. Gain IV access	What gauge? Is there another person to help?
7. Consider TXA	Beyond 3 hours from delivery TXA is known not to be as efficacious
8. Notify delivering provider	Utilize the PPH protocol if available. If there is not one, consider creating a protocol for PPH.

Eight minutes later the fundus remains boggy. Blood continues to trickle from her vagina. Anna's perineal pad is soaked within five minutes. Vitals are stable.

Role playing family members: "What are you doing to get her to stop bleeding?"

911 in Action	Discussion
9. Continue assessing circulation, airway and breathing (CAB's), and speak to the patient to assess consciousness.	
10. Prepare to transfer her by ambulance to the accepting facility.	Be conscious of the time.
11. Continue fundal massage	This will assist in maintaining uterine tone.
12. Administer ordered medications.	Discus route of administration; drug, dose, [see numbers 22-25].
13. Rapid IV infusion of fluids.	How much?
14. Consider bladder catheterization.	Straight catheter or Foley catheter.
15. Inform the patient and her family	What would you say?

The hemorrhage continues. Anna now becomes tachycardic (HR 122) and her BP is 89/52mmHg.

911 in Action	Discussion
16. Bimanual compression with massage	Trainees should demonstrate this skill.
17. If appropriate, increase IV infusion rate	
18. Consider other medications	Discus route of administration; drug, dose, [see numbers 22-25].
19. Inspect the genital tract for lacerations	If a laceration is noted, pressure will need to be applied to decrease and control blood loss.
20. Evacuate clots from the uterus by continuing uterine massage	If a clot is noted at the vaginal introitus (opening) do not disturb it. This clot may be slowing the bleeding at this point.
21. Continue assess and manage CAB's	

Bleeding continues. Anna's uterus remains boggy with bleeding.

Role playing family member: "Do we need to be worried?"

911 in Action	Discussion
22. Medications Hemabate® 250mcg IM	Demonstrate retrieving, drawing up and administration of mock vials. Discuss contraindications to use: asthma, pelvic inflammatory disease, active cardiac, pulmonary, renal, or hepatic disease.
23. Misoprostol [Cytotec®] 800mcg oral, 400-800mcg sublingual, 800-1000mcg rectally	Discuss contraindication to use: hypersensitivity or to other prostaglandins.
24. Methylergonovine [Methergine®] has two dosing methods: 0.2mg-0.25mg IM or IV (slow); may repeat once at 15min followed by further doses IV or IM q4hr Alternatively: 0.2-0.25mg IM or slow IV once. Then q2-4hr IM or slow IV	Discuss the implications of pre-eclampsia with the use of ergonovine, even with current normal BP.
25. Tranexamic acid [TXA] 1g in 10mL (100mg/mL) IV at 1mL per minute administered over 10 minutes with a second dose of 1g IV if bleeding continues after 30 minutes of if bleeding restarts within 24 hours of completing the first dose.	TXA should be given over 10 minutes, when given faster the risk of transient low blood pressure may occur. FYI: TXA should not be mixed with blood for transfusion, solutions containing penicillin or mannitol. TXA should not be used in women with contraindications to antifibrinolytic therapy.

-TXA can be used during PPH regardless of whether the bleeding is due to genital tract trauma or other causes. -Use TXA within three hours and as early as possible after onset of PPH. Do not initiate TXA more than 3hrs after birth, unless using for bleeding restarting within 24 hours of completing the first dose	(Known thromboembolic event during pregnancy, history of coagulopathy, active intravascular clotting, or known hypersensitivity to TXA). The antifibrinolytic effect lasts up to 7 to 8 hours in serum. The concentration in breast milk is approximately one hundredth of the serum peak concentration, so it is unlikely to have antifibrinolytic effects in the infant. The World Maternal Antifibrinolytic Trial (WOMAN) found that tranexamic acid reduced death due to bleeding in women with PPH by 20 to 30%, and was not associated with an increase in adverse effects [1].

Anna's bleeding continues but has become much less and more stable vital signs.

Role playing family member: "Are you just going to let her die? She needs you to do something! She still wants to have more children. You have to help her!!!"

911 in Action	Discussion
26. She is prepared for transport to the accepting facility.	What are some of the issues that can occur during transport?

Anna remained stable in the transport and received surgery at the accepting facility.

Reference

1. WOMAN Trial Collaborators. Effect of early tranexamic acid administration on mortality, hysterectomy, and other morbidities in women with post-partum hemorrhage (WOMAN): an international, randomized, double-blind, placebo-controlled trial. Lancet. 2017

Discussion for all participants:

1. What is the appropriate management?
   - Continue IV oxytocin infusion
   - Observe vital signs
   - Monitor further bleeding
   - Documentation
   - Explain to the patient and her family
   - Assess renal function (urinary output)

2. Do you have a postpartum hemorrhage (PPH) kit? What should be included in it?
   a. Consider Bakri balloon
   b. Consider Jada suction device

3. Where is your rapid infuser? How does one set it up?

4. Who else is available to help?
   a. Massive Transfusion Team
   b. Radiology
   c. Others

5. Review the table below
   - Consider printing and adding to the imminent birth kit or cart
   - Consider printing and placing with the postpartum hemorrhage kit or cart

After the Maternal 911 in Action drill:

1. What will occur next?
2. Discuss the importance of documenting.
3. Discussion with the patient and/or her family.
4. Documentation of the event.

After the Maternal 911 in Action drill, trainer leads team through the debriefing process:

1. What went well for the team?
2. What did we learn through this drill?
3. What would we do differently in a real-life situation?
4. Did we have any issues; equipment, processes, communication, understanding?
5. Who is going to follow-up to resolved problems and notify the team?
6. What time frame will be allowed for completion of this project?
7. How will changes be communicated to the team?

Option	Discussion
Oxytocin (40units in 1L NS, wide open initially, then 100-150mL/hour	250-500mL IV fluids would be reasonable. Oxytocin is not typically given as a bolus due to concern for resultant hypotension.
Hemabate 250micrograms IM	Contraindications to use: pelvic inflammatory disease, active cardiac, pulmonary, renal, or hepatic disease and asthma
Misoprostol [Cytotec] 800micrograms oral, 400-800 micrograms sublingual, 800-1000 micrograms rectally	Contraindication to medications: hypersensitivity or other prostaglandins Sublingual administration works the fastest
Methylergonovine [methergine] has two dosing methods ▪ 0.2mg-0.25mg IM or IV (slow); may repeat once at 15min followed by further doses IV or IM q4hrs ▪ Alternatively: 0.2-0.25mg IM or IV (slow) once. Then q2-4hr IM or IV (slow)	Note the implications of pre-eclampsia with the use of ergonovine, even with current normal BP
Tranexamic acid [TXA] 1g in 10mL (100mg/mL) IV at 1mL per minute administered over 10minutes with a second dose of 1g IV if bleeding continues after 30 minutes of if bleeding restarts within 24hours of completing the first dose. • TXA can be used during PPH regardless of whether the bleeding is due to genital tract trauma or other causes. • Use TXA <u>within three hours</u> and as early as possible after onset of PPH. Do not initiate TXA more than 3hrs after birth, unless using for bleeding restarting within 24hours of completing the first dose TXA can be used in addition to any of the other medications to treat postpartum hemorrhage.	TXA should be given over 10 minutes, when given faster the risk of transient low blood pressure may occur. TXA should not be mixed with blood for transfusion, solutions containing penicillin or mannitol. TXA should not be used in women with contraindications to antifibrinolytic therapy. (known thromboembolic event during pregnancy, history of coagulopathy, active intravascular clotting, or known hypersensitivity to TXA). The antifibrinolytic effect lasts up to 7 to 8 hours in serum. The concentration in breast milk is approximately one hundredth of the serum peak concentration, so it is unlikely to have antifibrinolytic effects in the infant. The World Maternal Antifibrinolytic Trial (WOMAN) found that tranexamic acid reduced death due to bleeding in women with PPH by 20 to 30 percent, and was not associated with an increase in adverse effects [1] TXA should NEVER be given intrathecal.

	See the WHO warning box below to avoid intrathecal placement of TXA.
Devices	Bakri Balloon Jada Suction System Foley catheter
Transfusion	In an active hemorrhage with vital sign abnormalities, it is reasonable to transfuse 2 units of PRBC. If the fibrinogen is <200, recommend transfusing 1 unit of cryoprecipitate. Transfusion of platelets and FFP can be considered in any patient with postpartum hemorrhage if platelet abnormalities or ongoing bleeding is noted
IV access versus Intraosseous access	Consider intraosseous access when IV access is not available

MATERNAL911

SIMULATION-BASED TRAINING ANALYSIS TEMPLATE

Topic of SBT:

Date(s) of training:

Number of trainees: *This section can be broken down by discipline or job title if this is relevant to the findings*

1. METRICS

METRIC	FINDING	COMMENTS
(Example) Time Anesthesiologist called to time in room	(Example) 6 minutes	(Example) Anesthesiologist needs pager that works in the OR to decrease response time to OB

2. SYSTEMS ISSUES AND PROCESSES UNCOVERED

ISSUE OR PROCESS	REPORTED TO	SUGGESTION FOR IMPROVEMENT
(Example) Instrument labeled incorrectly	(Example) Unit manager and sterile supply dept	(Example) Inform OB surgical staff of incorrect label, have 2 sets in case one is incorrect

To help the Maternal 911 team improve simulations please have your team scan the QR code to complete a post simulation survey.