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Simulation Patient Design (March, 2021)
Case of Drug Administration Error in Labor and Delivery

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Introduction:
According to the National Coordinating Council for Medication Error Reporting and Prevention, a drug error is defined as, 'any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the healthcare professional, patient, or consumer'.[1] A drug error could result in an adverse drug event, which is defined as an injury resulting from medical intervention related to a drug. Drug errors can occur at any stage from prescribing the drug, during pharmacy's dispensing process, during administration by the nursing or anesthesiology team, or during the patient's consumption. Drug errors in adult anesthesiology are estimated to occur in 1:133 anesthetics, and approximately 1% of these errors cause direct patient harm.[2]

The majority of drug errors are preventable, and errors occur more commonly during high stress emergency situations. There are certain drugs that carry an increased risk of patient harm when administered incorrectly or in error, such as epidural or intrathecal drugs, epinephrine, magnesium, oxytocin, tranexamic acid and insulin.[2,3] Caution needs to be given to drug vials that look similar (e.g. metoclopramide/ondansetron/oxytocin, epinephrine/glycopyrrolate, fentanyl/protamine, ondansetron/vasopressin) which is why it is imperative that every drug vial is thoroughly checked for the drug/concentration/route/date prior to administration.[4]

Various factors that might lead to a drug error include[5]:

a) Health care professional related: Lack of training, inadequate drug knowledge, inadequate knowledge about the patient, overworked and fatigued healthcare professionals, poor communication and misunderstanding
b) Patient related: Complex medical history, polypharmacy resulting in adverse drug interactions, lack of literacy, age, language barriers
c) Work environment related: Increased workload, time constraints, distractions and interruptions, lack of standardized protocols, poor environmental conditions (rarely)
d) Drug related: Inappropriate labelling, packaging
e) Drug delivery related: Issues with ordering in the electronic medical record (EMR), issues with dispensing the drug, lack of a process to confirm prior to administration

Educational Rationale: To teach team skills in preventing drug errors from occurring, identify drug administration errors, manage the consequences of drug errors and create a culture of reporting events to promote patient safety without fear of repercussions.

Target Audiences: Nursing, OB, Anesthesiology, 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:

- *Medical knowledge*: Understand the different mechanisms in the workflow that might lead to drug errors and the potential harm that might ensue https://www.nccmerp.org/sites/default/files/indexBW2001-06-12.pdf

- *Patient care*: To quickly identify the drug error and take active steps to reverse or treat the effects https://www.nccmerp.org/sites/default/files/algorBW2001-06-12.pdf
- *Practice-based learning and improvement*: Know the incident reporting system in the EMR that should be used after a drug error for root cause analysis and disseminate the knowledge to help prevent it happening again
- *Interpersonal and communication skills*: Improve communication using closed-loop communication among the care teams to reduce misunderstanding and misinterpretation
- *Professionalism*: Report drug errors without fear and establish an 'open and just culture', and educate the importance of reporting an adverse drug event
- *Systems-based practice*: Develop a system where drug reviews and reconciliation are standard practice

Questions to ask after the scenario:
1. What system issues can you identify in your current Labor and delivery (L&D) unit/work environment that could potentially lead to a drug error?
2. How can you mitigate these issues in your workplace/system?
3. Can you identify any particular drugs in your unit that are at a higher risk that other drugs to be involved in an error?
4. Did you find any aspects of the scenario that were unexpected?

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

Equipment Needed and Set-up:
In-situ set-up
Mannequin or a standardized patient (actor) in a labor room
Continuous fetal monitoring
18 G IV access
EKG, BP, pulse oximetry

Simulation Scenario Set-up:
The case
Ms. Tori John is a 26 year-old patient (G4P3) who was admitted to L&D in spontaneous labor and has had several fetal heart rate deceleration episodes, the last of which was prolonged so she has been taken to the OR for an emergency CD. The OB resident has asked the (orientee) nurse to administer terbutaline as the other nurse is retrieving antibiotics from the electronic dispensing machine. The patient's labor epidural has successfully been converted to surgical anesthesia with 2% lidocaine/epinephrine and the CD is just getting started.

Simulation Pre-brief
- Read the scenario and instruct team members on their role during the simulation
- The learners take their place in the Labor room
- Roles: L&D nurse and orientee nurse, anesthesiology resident and attending, OB resident and attending

Drug Error Scenario

Trigger	Patient Condition	Action	Done	Time	Comments
Patient in OR Monitors on	Patient is awake and responsive, having tremors, diaphoretic and extremely anxious HR 176 bpm BP 80/50 mm Hg SpO_2 97% (air) Resp 23/min Temp 36.5°C FHR 145 bpm	1) L&D nurse, OB team and anesthesiology team in the OR ☐ Anesthesiology team confirms 'block ready' and verbalizes concern of abnormal maternal vital signs ☐ OB Attending verbalizes 'Stat', not urgent CD as concern for concealed hemorrhage ☐ 2nd IV placed (18G) + send stat labs (include CBC, TEG/ROTEM/ABG) ☐ Fluid resuscitate ☐ Activate MTP ☐ Call NICU team			
Concern for placental abruption due to unstable maternal vital signs and history of non-reassuring fetal trace	Splash with betadine	1) Fetus is delivered ☐ OB verbalizes poor uterine tone ☐ Oxytocin bolus and infusion are administered			
Poor uterine tone continues	Patient remains diaphoretic but shivering is subsiding and she is less anxious HR 156 bpm BP 82/53 mm Hg SpO_2 97% (air) Resp 22/min Temp 36.9°C	☐ Administer methylergonovine 0.2 mg IM ☐ Continue crystalloid bolus ☐ Activate forced-air warming			
Uterine tone has improved and the OB reports minimal bleeding	Patient is feeling better HR 118 bpm BP 105/65 mm Hg SpO_2 98% (air)	1. Discuss differential diagnosis ☐ Hemorrhage excluded ☐ Other major etiologies excluded 2. Drug doses/routes examined ☐ Anesthesiology team do			

Nurse says, 'the patient was OK before the OR apart from the FHR'	Resp 18/min Temp 37.2^{o}C	not report any drug errors - Nursing team report that they only administered terbutaline - Orientee nurse questioned about the terbutaline dose/route, who explains she administered 1 mg IV 3. Surgery completed			
Debrief postop		1. Identify error (terbutaline 1 mg IV instead of 0.25 mg SC) 2. Educate nurse regarding unfamiliar tasks, and tasks outside her scope of practice, for example 3. Emphasize closed-loop communication with whole team 4. Report the error following hospital protocol 5. Full disclosure to the patient			

Appendix 1

Learner Knowledge Assessment
Labor and Delivery Multidisciplinary Team Simulation

Name of simulation: _____ Date: _____

OB Nursing Anes

Each item has two components. The "Before the simulation" column (left side) examines your perspective at the beginning of the simulation. The "End of Simulation" column (right side) is to evaluate your perspective at the completion of the simulation.

1. How would you rate your knowledge of causes of drug errors?

BEFORE THE SIMULATION	END OF SIMULATION
1 2 3 4 5 6 7 Little/none Knowledgeable	1 2 3 4 5 6 7 Little/none Knowledgeable

2. How would you rate your knowledge of the correct process at your institution to report drug errors?

BEFORE THE SIMULATION	END OF SIMULATION
1 2 3 4 5 6 7 Little/none Knowledgeable	1 2 3 4 5 6 7 Little/none Knowledgeable

3. How would you rate your knowledge of methods to prevent drug errors occurring?

BEFORE THE SIMULATION	END OF SIMULATION
1 2 3 4 5 6 7 Little/none Knowledgeable	1 2 3 4 5 6 7 Little/none Knowledgeable

4. How would you rate your knowledge of drugs that are high-risk for potential errors?

BEFORE THE SIMULATION	END OF SIMULATION
1 2 3 4 5 6 7 Little/none Knowledgeable	1 2 3 4 5 6 7 Little/none Knowledgeable

5. How would you rate your overall confidence in your ability to explain a drug error to a patient?

BEFORE THE SIMULATION	END OF SIMULATION
1 2 3 4 5 6 7 Little/none Knowledgeable	1 2 3 4 5 6 7 Little/none Knowledgeable

Appendix 2

Simulation Activity Evaluation

DATE OF SIMULATION: _____

OCCUPATION: Consultant PG Y 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

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
PHYSICAL SPACE						
Realism of the simulator space	1	2	3	4	5	N/A
EQUIPMENT						
Satisfaction with the mannequin	1	2	3	4	5	N/A
SCENARIOS						
Realism of the scenarios	1	2	3	4	5	N/A
Ability of the scenarios to test technical skills	1	2	3	4	5	N/A
Ability of the scenarios to test behavioral skills	1	2	3	4	5	N/A
Overall quality of the debriefings	1	2	3	4	5	N/A
DID YOU FIND THIS USEFUL?						
To improve your clinical practice?	1	2	3	4	5	N/A
To improve your teamwork skills?	1	2	3	4	5	N/A
To improve your VERBAL communication?	1	2	3	4	5	N/A
To improve your 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) Food and Drug Administration. Working to Reduce Medication Errors https://www.fda.gov/drugs/information-consumers-and-patients-drugs/working-reduce-medication-errors (accessed 2/27/21)
2) Martin D. Medication Errors Persist. APSF Newsletter. 2008;23(3):37, 39
3) Kacmar RM, Mhyre, JM. Obstetric Anesthesia Patient Safety: Practices to Ensure Adequate Venous Access and Safe Drug Administration During Transfer to the Operating Room for Emergency Cesarean Delivery. APSF Newsletter. 2015:30(2):23-25 https://www.apsf.org/article/obstetric-anesthesia-patient-safety-practices-to-ensure-adequate-venous-access-and-safe-drug-administration-during-transfer-to-the-operating-room-for-emergency-cesarean-delivery/
4) SOAP Patient Safety Alert – Look-alike Medications. https://soap.memberclicks.net/patient-safety-alert-look-alike-medications (accessed 2/27/21)
5) Medication Errors: Technical Series on Safer Primary Care. World Health Organization, 2016. https://www.who.int/patientsafety/topics/primary-care/technical_series/en/ (accessed 2/27/21)