

Educational Modules and Cognitive Aids for Providers Caring for Parturients Suffering from Obstetric Hemorrhage

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**NO CONFLICTS OF INTEREST TO
DECLARE**

Objectives

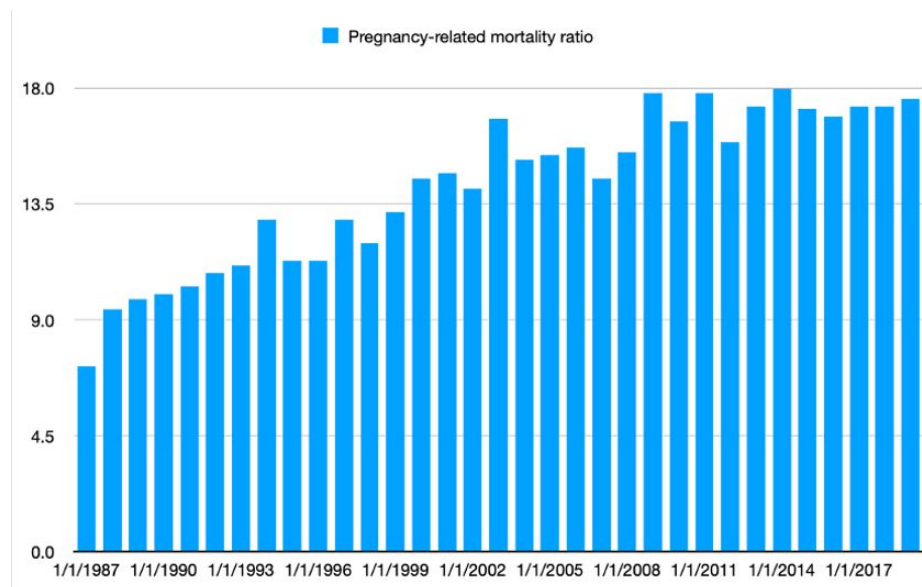
Describe the significance of obstetric hemorrhage in the US and the various factors leading to morbidity and mortality

Review quantitative data related to provider confidence and knowledge in obstetric hemorrhage management

Discuss the impact of evidence-based cognitive aids and online educational modules for obstetric care

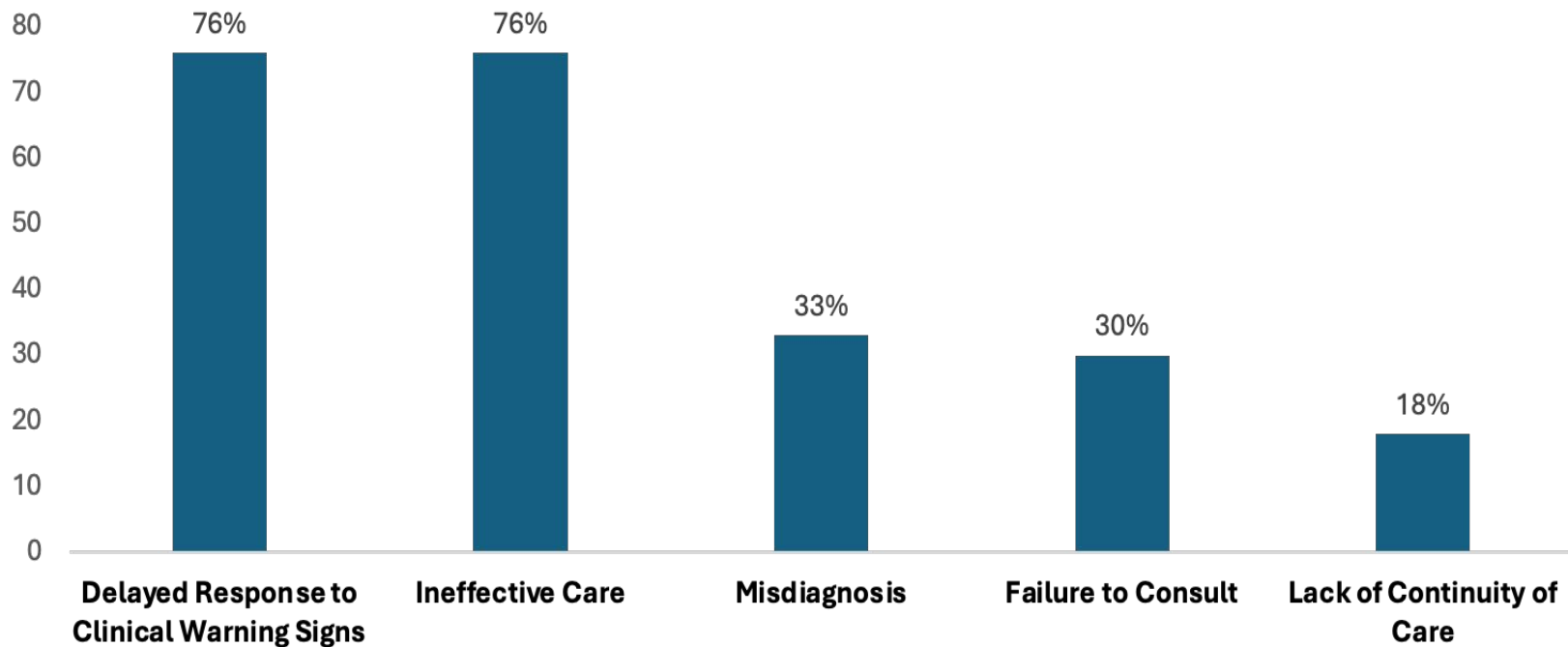
Background

- OBH has accounted for approximately **12% of pregnancy- related deaths each year** (Centers for Disease Control and Prevention [CDC], 2023)
- Over \$250 million per year** is spent on additional maternal costs associated with severe maternal morbidity (Phibbs et al., 2022).
- In Illinois, there are approximately 140,000 births annually, with **one out of every 150 women succumbing to severe maternal morbidity**, including OBH (Illinois Department of Public Health, 2021)
- Approximately **54-93% of maternal deaths due to OBH may be preventable**, suggesting provider identification and treatments were inappropriately delayed



<https://www.cdc.gov/reproductivehealth/maternal-mortality/pregnancy-mortality-surveillance-system.htm>

Provider Influences on Obstetric Hemorrhage Outcomes



The California Pregnancy-Associated Mortality Review. Report from 2002-2007 Maternal Death Reviews. Sacramento: California Department of Public Health, Maternal, Child and Adolescent Health Division. 2017

Cognitive Aids and Educational Modules In Healthcare

MALIGNANT HYPERTHERMIA

By Stanford Anesthesia Cognitive Aid Group and Henry Rosenberg, MD

SIGNS

EARLY:

1. Increased ETCO₂
2. Tachycardia
3. Tachypnea
4. Mixed Acidosis (ABG)
5. Masseter spasm/ trismus
6. Sudden cardiac arrest in young person due to hyperkalemia

May be LATER:

1. Hyperthermia
2. Muscle rigidity
3. Myoglobinuria
4. Cardiac Arrest

CALL FOR HELP CALL FOR MH CART

INFORM TEAM

START PREPARING DANTROLENE!

DDX

- Light anesthesia
- Hypoventilation
- Over-heating (external)
- Thyroid storm
- Pheochromocytoma
- Hypoxemia
- Insufflation of CO₂

TREATMENT

1. **Discontinue** anesthetic triggers (volatiles and succinylcholine) and **increase** fresh gas flow to 10 L/min. Do **NOT** change machine or circuit
2. **Halt procedure.** If emergent, continue with non-triggering anesthetic
3. **Hyperventilate**, FiO₂ 100%, high flow O₂
4. **Assign several people to prepare 2.5 mg/kg IV Dantrolene bolus.** Dilute each 20 mg Dantrolene vial in 60 mL preservative-free **sterile water** (for 70kg person give 175 mg so prepare **9 vials** of 20 mg Dantrolene each as above)
5. **Rapidly administer dantrolene.** Continue giving until patient stable (may give up to 10 mg/kg)
6. **Administer** sodium bicarbonate 1-2 mEq/kg for metabolic acidosis/hyperkalemia

MALIGNANT HYPERTHERMIA

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TREATMENT

7. Actively **cool patient** with ice packs, lavage if open abdomen. Stop cooling at 38°C
8. Arrhythmias are usually secondary to Hyperkalemia. **Go to ACLS algorithms as needed.**
9. **Treat hyperkalemia with:**
Calcium Chloride 1 g IV
D50 1 Amp IV (25 g Dextrose) + **Regular Insulin** 10 units IV (monitor glucose)
Sodium Bicarbonate 1 Ampule.
Avoid calcium channel blockers
10. Send **labs** for ABG, CPK, myoglobin, PT/PTT, and lactic acid
11. Place **foley** catheter. Monitor urine output. Goal 2 cc/kg per hour urine output. Can give IV fluid and diuretics
12. Arrange **ICU** bed. Mechanical ventilation usually required.
13. **Continue dantrolene** 1mg/kg every 4-6 hours for 24-36 hours, observe closely 24 hours. Call MH hotline with questions.

Contact the Malignant Hyperthermia Association of the United States (MHAUS hotline) at any time for consultation if MH is suspected:
1-800-MH-HYPER (1-800-644-9737)
or online at <http://www.mhaus.org/>

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15 MALIGNANT HYPERTHERMIA

15 MALIGNANT HYPERTHERMIA

EMERGENCY MANUAL MARCH 2013

EMERGENCY MANUAL MARCH 2013

For healthcare providers caring for obstetric patients, does implementing **context-specific cognitive aids** and an **evidence-based online educational module** for identification and management of obstetric hemorrhage affect **provider knowledge and confidence levels?**



Aims of The Project



Increase staff knowledge and confidence in OBH management

Create cognitive aid and educational module based on best available practice guidelines

Evaluate the impact of context-specific implementation of CA and educational module

Observe secondary outcomes such as decreased maternal morbidity and mortality and decreased hospital costs

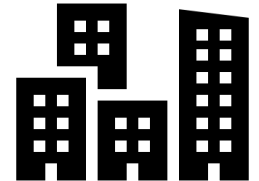


Organizational Need:

Northwestern Medicine Huntley Hospital



20-bed Family
Birth Center



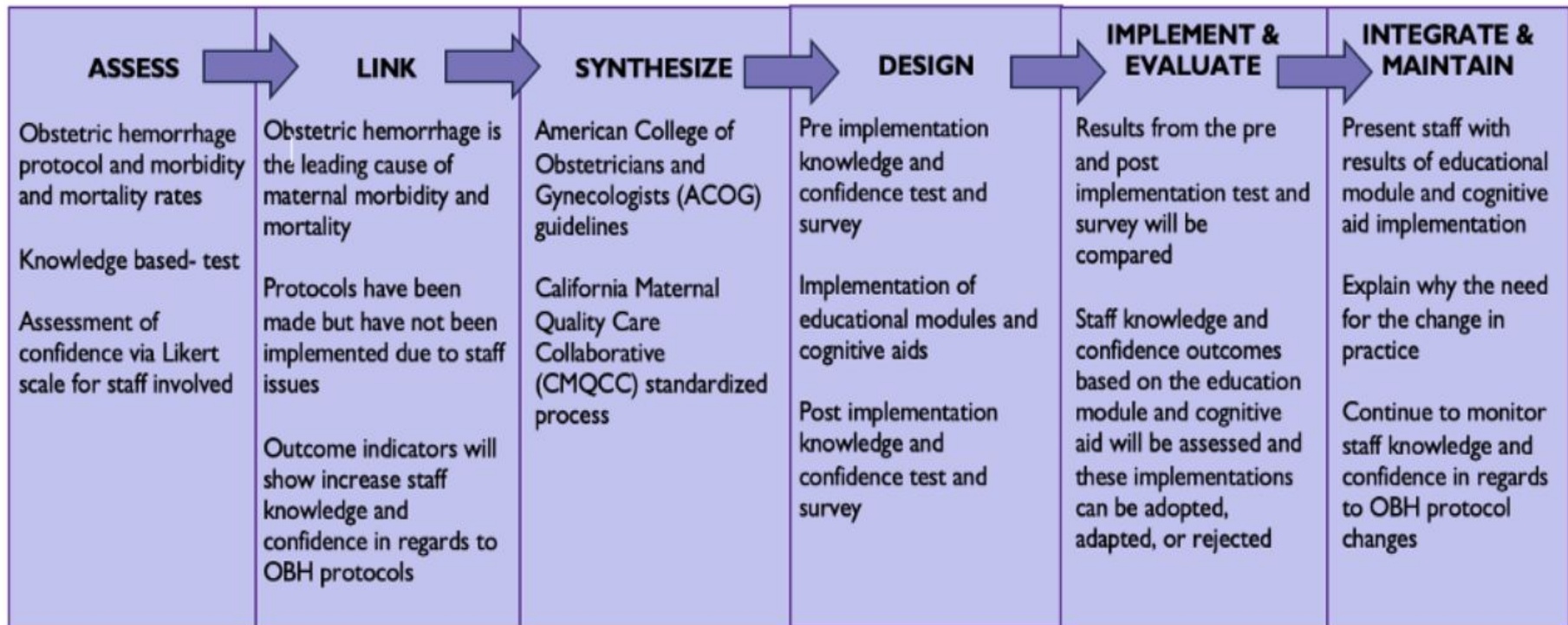
McHenry County
Population:
311,747



Approximately
300-500 births
annually



Theoretical Model for Change: Rosswurm & Larrabee



Methods

❖ **Project design:**

- Prospective, single-group pretest-posttest, quasi-experimental with survey data collection

❖ **Intervention:**

- Online educational module made with SkillsOnPoint through Teachable
 - Emailed to 43 staff members
- Cognitive aid with best practice guidelines
 - OB hemorrhage cart, ORs, nursing unit, anesthesia office

❖ **Evaluation**

- Anonymous pre- and post-implementation surveys via Qualtrics
 - Confidence survey + knowledge exam

Online Module



- ❖ 21 slides on Microsoft PowerPoint with script, recorded on iMovie
- ❖ Sections included:
 - Introduction and Objectives (0:56)
 - Background and Education (4:42)
 - Management and Treatment (6:44)
 - Cognitive Aid (3:10)
 - Conclusion (0:24)
- ❖ Total estimated time to complete: 25 mins
- ❖ Surveys implemented before and after completion of the module

Educational Modules and Cognitive Aids for Obstetric Hemorrhage Care

Scan the QR code below for module access.



Your participation is vital for improving obstetric care! THANK YOU for your time and for all you do to care for our parturients and their families.

If you have any questions or concerns regarding this education module please reach out to Joan Stout or Rachel Varghese.

POSTPARTUM HEMORRHAGE CHECKLIST & MANAGEMENT

WHAT IS IT?

Postpartum hemorrhage is defined as a blood loss of **>1,000mL** or blood loss accompanied by signs or symptoms of hypovolemia within 24 hours. However, blood loss **>500mL in a vaginal delivery** or a blood loss **>1500mL in a repeat c-section** is abnormal & should be investigated & managed

ASSESSING RISK FACTORS

- LOW RISK**
 - No previous uterine incision
 - Singleton pregnancy
 - <4 vaginal births
 - No bleeding disorder
- MEDIUM RISK**
 - Prior c-section
 - Multiple gestation, >4 vaginal births
 - Chorioamnionitis, polyhydramnios
 - History of PPH or uterine fibroids
 - PLT count <100k, HCT < 30%
 - Preeclampsia or prolonged labor
- HIGH RISK**
 - Placenta previa or accreta
 - Abruptio or active bleeding
 - Known coagulopathy
 - HELLP syndrome
 - PLT count <50k or HCT <24%
 - Fetal demise

IMPORTANT PHONE NUMBERS

- RAPID RESPONSE** 5-5555
- BLOOD BANK** 654-0807
- ANESTHESIA** VOCERA
- OB HOSPITALIST/ATTENDING** VOCERA
- NURSING SUPERVISOR** VOCERA

SIGNS & SYMPTOMS

CONFUSION
HR >110
BP < 85/45
O2 SAT < 95%
SHOCK INDEX 0.9
CONFUSION
DIAPHORESIS

RECOGNITION

Active bleeding: soaking a perineal pad (holds up to 80mL) in 1 hour or passing a clot > 5cm

PERCENTAGE OF SPONGE SATURATION



OTHER CONSIDERATIONS & INTERVENTIONS

- Intrauterine JADA system placement
- Uterine artery ligation
- Hysterectomy

INITIAL STEPS

1. Call for **additional help** & activate hemorrhage protocol
2. Bring cart & medications to the room
3. **Assess airway, breathing, circulation** & vital signs Q5 min
 1. Provide **supplemental O2** >5L/min via mask
 2. Ensure adequate, **large bore IV** access (at least 18 gauge)
 3. Increase **fluids** & increase **oxytocin** rate
 4. Provide **fundal massage**
 5. Record **quantitative blood loss** Q5-15 min
 6. Insert **straight cath** or **urinary catheter**
 7. Potential to activate **Massive Transfusion Protocol (MTP)**

BLOOD PRODUCTS

- PACKED RED BLOOD CELLS (PRBCS)**
First line product for blood loss; 35-40 min for a crossmatch; in an emergency O negative blood is used
1 unit = 200mL volume
- FRESH FROZEN PLASMA (FFP)**
Highly desired if >2 units PRBCs given or for prolonged PT, PTT
1 unit = 180mL volume
- PLATELETS (PLTs)**
Priority for women with platelets < 50k
1 unit = 40-50k increase in platelets
- CRYOPRECIPITATE (CRYO)**
Priority for fibrinogen levels < 80
1 unit = 80-100 mg/dL increase in fibrinogen
Best for DIC with low fibrinogen where volume replacement is not needed

INFUSIONS & LABS

- LACTATED RINGERS** --- replaces blood loss 3:1
- DRAW STAT BLOOD WORK** --- CBC and type & cross if not already completed
- WARM BLOOD PRODUCTS** --- prevent lethal triad of hypothermia, coagulopathy, & acidosis

MEDICATIONS

- OXYTOCIN (PITOCIN)**
30units/500mL solution IV
- METHYLERGONOVINE (METHERGINE)**
0.2mg IM (may repeat)
Avoid with hypertension
- HEMABATE, CARBOPROST**
250mcg IM (may repeat Q20 up to 3x)
Avoid with asthma, caution with hypertension
- MISOPROSTOL (CYTOTEC)**
800-1000mcg PR
600mcg PO or 800mcg SL
- TRANEXAMIC ACID (TXA)**
1 gram over 10 minutes (add 1 gram vial to 100mL NS bag); may repeat once after 30 min

Results

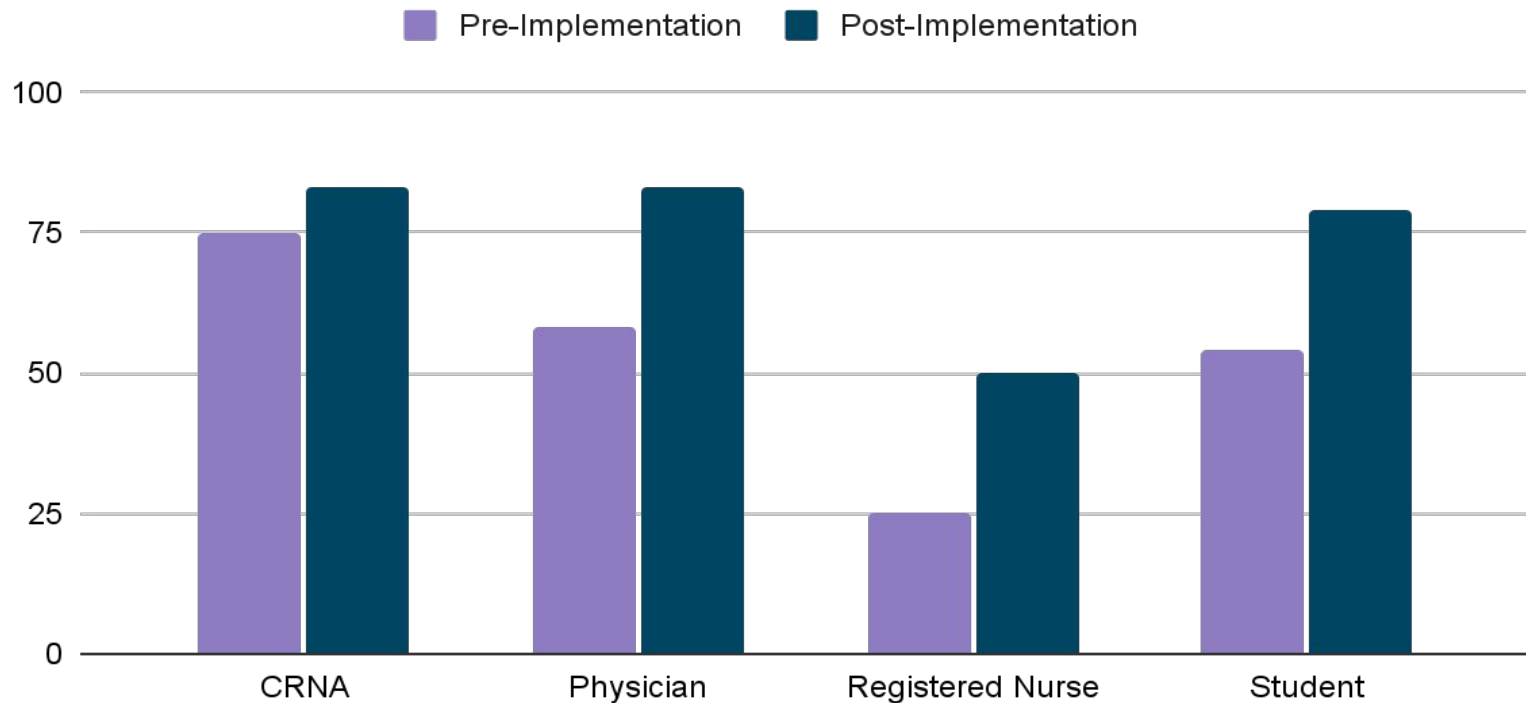
- ❖ 43 staff members received email invitation to participate in the study
 - 30 obstetric staff members
 - 13 anesthesia staff members
 - Additional 3 OBGYN physicians and 3 SRNAs recruited
- ❖ 16 participants signed up for the module → 6 completed the pre- and post-implementation surveys and exams and are included in the study



Staff Knowledge of OBH

Obstetric Hemorrhage Knowledge Exam

Mean Scores (%)



Note. Only completion of the entire module and pre- and post-tests were included in analyses. One question answered correctly accounts for one point, out of a total of 12 possible points. PPH = postpartum hemorrhage. (-) = No data points available. Data points were scored as a percentage of correct answers and averaged among the total number of participants.

Staff Self Confidence with OBH Management

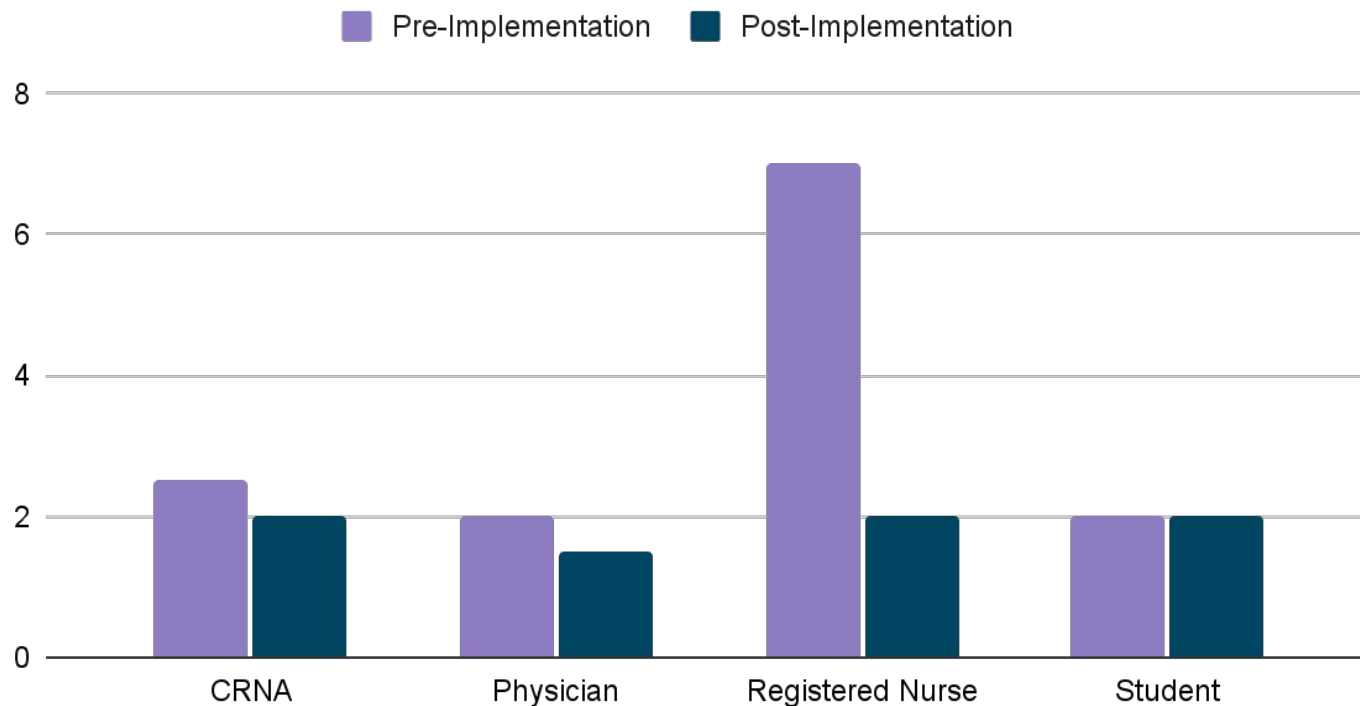
| Statement | Baseline score (median) | Post-implementation score (median) |
|---|-------------------------|------------------------------------|
| I am able to stay calm in emergency situations | 2 | 1.5 |
| PPH will make me paralyzed/unable to act | 2.5 | 2 |
| I can handle PPH whenever it happens | 3 | 2.5 |
| I remain calm when handling PPH | 2.5 | 2 |
| I have experienced that I am able to act in situations with PPH | 3.5 | 3.5 |
| I am able to identify PPH in an early stage | 2.5 | 2 |
| I am confident in how to treat PPH | 3 | 1.5 |
| I can carry out the necessary actions to handle PPH | 2 | 1 |

Note. OBH = obstetric hemorrhage. Scored on a scale ranging from 1 = always to 8 = never.

Staff Self Confidence with OBH Management, by Role

Confidence in Obstetric Hemorrhage Care Survey

Median Score on Likert Scale 1-8



Note. OBH = Obstetric hemorrhage. Scored on a scale ranging from 1 = always to 8 = never. Question number 2 scored in reverse for analysis. (-) = No data points available.

Discussion



Strengths

Ease of distribution and accessibility

- Online module and surveys; QR codes for access anywhere, anytime

Close working relationship with RFU and NMHH

- Clinical site rotation

Few prior studies done successfully for guidance on implementation

Small sample size

- No statistical analyses
- Selection, response, and nonresponse biases present

Technical difficulties



Limitations

Translation to Practice

❖ California Maternal Quality Care Collaborative (CMQCC) and American College of Obstetricians and Gynecologists (ACOG) best practice guidelines:

- Early and ongoing risk identification strategies
- Establishing a chain of command for escalating care
- Quantitative and cumulative blood loss measurements
- Activating an OBH specific MTP
- Emergency hemorrhage cart
- Cognitive aids



POSTPARTUM HEMORRHAGE CHECKLIST & MANAGEMENT

| | | | | | | | | | | | | | | | | | | | | | | |
|--|---|---|-----|------|------|----------|--|--|--|--|----------|--|--|--|--|----------|--|--|--|--|--|--|
| WHAT IS IT? Postpartum hemorrhage is defined as a blood loss of >1,000mL or blood loss accompanied by signs or symptoms of hypovolemia within 24 hours. However, blood loss >500mL in a vaginal delivery or a blood loss >1500mL in a repeat c-section is abnormal & should be investigated & managed | ASSESSING RISK FACTORS <div> LOW RISK No previous uterine incision Singleton pregnancy <4 vaginal births No bleeding disorder </div> <div> MEDIUM RISK Prior c-section Multiple gestation, >4 vaginal births Chorioamnionitis, polyhydramnios History of PPH or uterine fibroids PLT count <100k, HCT < 30% Preeclampsia or prolonged labor </div> <div> HIGH RISK Placenta previa or accreta Abruptio or active bleeding Known coagulopathy HELLP syndrome PLT count <50k or HCT <24% Fetal demise </div> | IMPORTANT PHONE NUMBERS RAPID RESPONSE 5-5555 BLOOD BANK 654-0807 ANESTHESIA VOCERA OB HOSPITALIST/ATTENDING VOCERA NURSING SUPERVISOR VOCERA | | | | | | | | | | | | | | | | | | | | |
| SIGNS & SYMPTOMS CONFUSION HR >110 BP < 85/45 O2 SAT < 95% SHOCK INDEX 0.9 CONFUSION DIAPHORESIS | INITIAL STEPS 1. Call for additional help & activate hemorrhage protocol 2. Bring cart & medications to the room 3. Assess airway, breathing, circulation & vital signs Q5 min 1. Provide supplemental O2 >5L/min via mask 2. Ensure adequate, large bore IV access (at least 18 gauge) 3. Increase fluids & increase oxytocin rate 4. Provide fundal massage 5. Record quantitative blood loss Q5-15 min 6. Insert straight cath or urinary catheter 7. Potential to activate Massive Transfusion Protocol (MTP) | INFUSIONS & LABS LACTATED RINGERS --- replaces blood loss 3:1 DRAW STAT BLOOD WORK --- CBC and type & cross if not already completed WARM BLOOD PRODUCTS --- prevent lethal triad of hypothermia, coagulopathy, & acidosis | | | | | | | | | | | | | | | | | | | | |
| RECOGNITION Active bleeding: soaking a perineal pad (holds up to 80mL) in 1 hour or passing a clot > 5cm PERCENTAGE OF SPONGE SATURATION <table border="1"> <tr> <td></td> <td>25%</td> <td>50%</td> <td>75%</td> <td>100%</td> </tr> <tr> <td>10x10 cm</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>30x30 cm</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>45x45 cm</td> <td></td> <td></td> <td></td> <td></td> </tr> </table> <div> LACERATION ABRASION RETAINED PRODUCTS COAGULATION DYSFUNCTION </div> | | 25% | 50% | 75% | 100% | 10x10 cm | | | | | 30x30 cm | | | | | 45x45 cm | | | | | BLOOD PRODUCTS PACKED RED BLOOD CELLS (PRBCS) First line product for blood loss; 35-40 min for a crossmatch; in an emergency O negative blood is used 1 unit = 200mL volume FRESH FROZEN PLASMA (FFP) Highly desired if >2 units PRBCs given or for prolonged PT, PTT 1 unit = 180mL volume PLATELETS (PLTs) Priority for women with platelets < 50k 1 unit = 40-50k increase in platelets CRYOPRECIPITATE (CRYO) Priority for fibrinogen levels < 80 1 unit = 80-100 mg/dL increase in fibrinogen Best for DIC with low fibrinogen where volume replacement is not needed | MEDICATIONS OXYTOCIN (PITOCIN) 30units/500mL solution IV METHYLERGONOVINE (METHERGINE) 0.2mg IM (may repeat) Avoid with hypertension HEMABATE, CARBOPROST 250mcg IM (may repeat Q20 up to 3x) Avoid with asthma, caution with hypertension MISOPROSTOL (CYTOTEC) 800-1000mcg PR 600mcg PO or 800mcg SL TRANEXAMIC ACID (TXA) 1 gram over 10 minutes (add 1 gram vial to 100mL NS bag); may repeat once after 30 min |
| | 25% | 50% | 75% | 100% | | | | | | | | | | | | | | | | | | |
| 10x10 cm | | | | | | | | | | | | | | | | | | | | | | |
| 30x30 cm | | | | | | | | | | | | | | | | | | | | | | |
| 45x45 cm | | | | | | | | | | | | | | | | | | | | | | |
| OTHER CONSIDERATIONS & INTERVENTIONS Intrauterine JADA system placement Uterine artery ligation Hysterectomy | | | | | | | | | | | | | | | | | | | | | | |

Implementation Challenges



- ❖ Importance of EBP not valued by all
 - Average of 17 year lag-time
- ❖ Buy-in from leadership vital for student-led projects
- ❖ Clinician turnover, stress, and frequent schedule changes
 - Frequent meetings with leadership and staff

Dissemination



Conclusion



References



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