Rural Institute
UNIVERSITY OF MONTANA

Emergency Obstetric Services (EOS) Survey Report

Medical Products, Equipment, and Technology Sub-Report

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Background

The EOS Survey gathered information about the availability of medical products, equipment, and technology in the event of an obstetric emergency. Hospitals reported on the availability of blood products based on what they had on hand that day. This report summarizes results from the medical products, equipment, and technology section of the EOS Survey.

Emergency Obstetric Services Study Abstract

Objective: To gather information on the local capacity and preparedness to support emergency obstetric services (EOS) in Montana communities.

Study Design: The University of Montana Rural Institute for Inclusive Communities (UM) research team adapted a survey developed by Kozhimannil et al. 2021 on emergency obstetric services in rural hospitals without obstetric units in the United States [1]. The survey comprises components of the World Health Organization's (WHO) Emergency Obstetric Care (EmOC) indicators and other measures of emergency obstetric capacity [2].

Results: Of the 34 hospitals without an obstetric unit, 32 (94.0%) participated in the survey. More than half (51.6%) of the hospitals had experienced an emergency room birth within the last two years, and 34.4% had experienced a close call or other unanticipated adverse birth outcome. When hospitals needed to transfer a patient, 37.0% of respondents had experienced challenges arranging transport for a pregnant patient. Only one surveyed hospital met all the assessed criteria of the WHO's guidelines for Basic Emergency Obstetric Care (BEmOC).

Conclusion: The EOS survey provides valuable information on the perinatal care system in Montana by highlighting the role of rural hospitals without obstetric units in providing obstetric care. The survey results can inform activities to strengthen perinatal care networks, ultimately leading to improved maternal and infant health outcomes in Montana.

MOMS Montana Obstetrics & Maternal Support
HRSA Health Resources & Services Administration
MONTANA DPHHS

Results

Blood Products

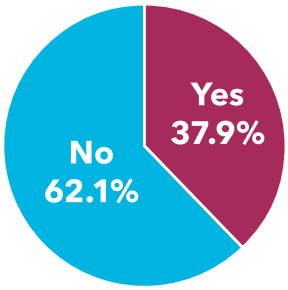
The WHO includes the capacity to perform a blood transfusion as one of the required indicators of a Comprehensive EmOC facility; patients experiencing antepartum and/or postpartum hemorrhage often require blood transfusion [1]. The American College of Obstetrics and Gynecology (ACOG) strongly recommends a minimum of four units of O-negative packed red blood cells (PRBCs), with the ability to obtain six units of PRBCs and four units of fresh frozen plasma (FFP)in case of obstetric hemorrhage, see Appendix for ACOG hemorrhage recommendations [2].

Nearly all (80.0%) responding hospitals had some quantity of PRBCs available, but quantities varied. Of those hospitals that had PRBCs available, most hospitals (30.0%) reported having between one to two units, and some (20.0%) reported having more than seven units.

Other types of blood products were less common, with only 34.3% of hospitals reporting that they had FFP, 3.1% reporting that they had platelets, and 3.1% saying that they had cryoprecipitate (used if clinical coagulopathy is present – when the blood's ability to clot is impaired) [3]. In emergencies requiring blood transfusion, approximately 38.0% of respondents had a massive transfusion policy, as illustrated in Figure 1.

Figure 1. Montana Hospitals without an Obstetric Unit that Reported Having a **Massive Transfusion Policy (N=29)**

Emergency Obstetrics Survey conducted October 18, 2021, to December 10, 2021



Hospitals utilized various methods to access more blood products to maintain supply. Several (78.5%) mentioned getting access through organizations, blood banks, or other hospitals, with one respondent saying, ***"We call Vitalant letting them know we placed an order, then we send one of our maintenance folks to pick up the package. Two hour turn around to get more blood in our facility."*** Most facilities (85.7%) coordinate with transport teams to get access to more blood products in emergencies. Four facilities commented that they did not have the capacity to provide blood transfusions in the event of an emergency.

It was also important to understand the challenges non-birthing hospitals experienced in accessing or maintaining blood supply. Several hospitals expressed their concerns about not having a blood bank at all. Other challenges included infrequent use, shelf life, lack of supply, and national availability, with one hospital reporting ***"Lack of blood supply from American Red Cross. Other emergencies that use our supply that is not OB related. (Traumas, GI bleeds)"*** and another stating ***"we are very rural we scab together what we can in an emergency."***

Equipment

Hospitals also provided information about the inventory of equipment to handle obstetric emergencies, specifically equipment used to manage post-partum hemorrhage. Only one hospital (3.3%) had a Non-Pneumatic Anti-Shock Garment (NASG), and three hospitals (10.0%) had a balloon tamponade device (e.g., Bakri Balloon or Jada system).

Non-Pneumatic Anti-Shock Garment (NASG) – a first aid device that applies external pressure to the lower body to decrease blood loss until treatment can be administered.

Bakri Balloon - an internal device that provides pressure against the uterus which can reduce bleeding.

Jada System – a vacuum-induced uterine tamponade that works by stimulating uterine contraction to stop bleeding.

In addition to the need for these devices, respondents provided information about what other equipment or technologies would improve obstetric services at their facilities. Several facilities (31.8%) reported needing an ultrasound or improved ultrasound capabilities. Others (31.8%) mentioned fetal monitoring equipment, infant warmers, and other supplies for adequately caring for an infant. One hospital emphasized that the priority was to do what they could with what they had by stating ***"We really just have a CAH (Critical Access Hospital) emergency kit in one cupboard to hopefully get us by until we can get mother and baby transported."***

Technology

In critical situations without time to transport a patient, telemedicine can provide immediate access to specialists or guidance through high-risk consultations [4], and yet, only 15.6% of respondents reported having telemedicine support for births.

Recommendations

The survey demonstrated that many non-birthing facilities do not have the necessary supplies and equipment to address obstetric complications and emergencies.

To alleviate these deficits, the Montana Obstetric and Maternal Support (MOMS) program can seek grant opportunities and support investment in essential medical equipment and supplies for obstetric emergencies. For those situations when extra support is needed, telemedicine's integration into hospital procedures will assist staff during challenging events when a patient transfer is too risky.

The development of regional perinatal networks helps address the unique challenges of distance to care and limited resources by building relationships, facilitating consultation and transport, and ultimately, allowing patients to receive care at a facility prepared to meet their needs.

We recommend that the MOMS program facilitate discussions with birthing facilities and non-birthing facilities across the state to guide the development of strategies to support regionalized perinatal care.

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Conclusion

Although the EOS Survey revealed insufficient supplies and medical equipment to perform emergency obstetric services in many of Montana's non-birthing facilities, improving access to resources with the support of the MOMS program and coordination with hospitals that provide obstetric services could address these needs.

Investment in resources by the MOMS program, integrating telemedicine into current protocols, and implementing a regionalized system of care should decrease preventable severe maternal morbidity and mortality [5]. The WHO emergency obstetric care indicators can contribute to a statewide measurement strategy to monitor the impact of risk-appropriate care activities on maternal and neonatal health in Montana.

References:

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Appendix: Obstetric Hemorrhage CHECKLIST

Complete all steps in prior stages plus current stage regardless of stage in which the patient presents.

Postpartum hemorrhage is defined as cumulative blood loss of greater than or equal to 1,000mL or blood loss accompanied by signs or symptoms of hypovolemia within 24 hours. However, blood loss >500mL in a vaginal delivery is abnormal, and should be investigated and managed as outlined in Stage 1.

Recognition: Call for assistance (Obstetric Hemorrhage Team)

DESIGNATE: ☐ Team leader _____ ☐ Checklist reader/recorder ☐ Primary RN

ANNOUNCE: ☐ Cumulative blood loss ☐ Vital signs _____ ☐ Determine stage

Stage 1: Blood loss >1000mL after delivery with normal vital signs and lab values. Vaginal delivery 500-999mL should be treated as in Stage 1.

Initial Steps:
- ☐ Ensure 16G or 18G IV Access
- ☐ Increase IV fluid (crystalloid without oxytocin)
- ☐ Insert indwelling urinary catheter
- ☐ Fundal massage

Medications:
- ☐ Ensure appropriate medications given patient history
- ☐ Increase oxytocin, additional uterotonics

Blood Bank:
- ☐ Confirm active type and screen and consider crossmatch of 2 units PRBCs

Action:
- ☐ Determine etiology and treat
- ☐ Prepare OR, if clinically indicated (optimize visualization/examination)

Oxytocin (Pitocin):
10-40 units per 500-1000mL solution

Methylergonovine (Methergine):
0.2 milligrams IM (may repeat); **Avoid with hypertension**

15-methyl PGF2α (Hemabate, Carboprost): 250 micrograms IM (may repeat in q15 minutes, maximum 8 doses);
Avoid with asthma; use with caution with hypertension

Misoprostol (Cytotec):
800-1000 micrograms PR
600 micrograms PO or 800 micrograms SL

- **Tone** (i.e., atony)
- **Trauma** (i.e., laceration)
- **Tissue** (i.e., retained products)
- **Thrombin** (i.e., coagulation dysfunction)

Stage 2: Continued Bleeding (EBL up to 1500mL OR > 2 uterotonics) with normal vital signs and lab values
(*two or more uterotonics in addition to routine oxytocin administration; or > 2 administrations of the same uterotonic).

Initial Steps:
- ☐ Mobilize additional help
- ☐ Place 2nd IV (16-18G)
- ☐ Draw STAT labs (CBC, Coags, Fibrinogen)
- ☐ Prepare OR

Action:
- ☐ For uterine atony -> consider uterine balloon or packing, possible surgical interventions
- ☐ Consider moving patient to OR
- ☐ Escalate therapy with goal of hemostasis

Medications:
- ☐ Continue Stage 1 medications; consider TXA

Blood Bank:
- ☐ Obtain 2 units PRBCs (DO NOT wait for labs. Transfuse per clinical signs/symptoms)
- ☐ Thaw 2 units FFP

Tranexamic Acid (TXA)
1 gram IV over 10 min (add 1 gram vial to 100mL NS & give over 10 min; may be repeated once after 30 min)

Possible interventions:
- Bakri balloon
- Compression suture/ B-Lynch suture
- Uterine artery ligation
- Hysterectomy

Huddle and move to Stage 3 if continued blood loss and/or abnormal VS

Stage 3: Continued Bleeding (EBL > 1500mL OR > 2 RBCs given OR at risk for occult bleeding/ coagulopathy OR any patient with abnormal vital signs/labs/oliguria)

Initial Steps:
- ☐ Mobilize additional help
- ☐ Move to OR
- ☐ Announce clinical status (vital signs, cumulative blood loss, etiology)
- ☐ Outline and communicate plan

Medications:
- ☐ Continue Stage 1 medications; consider TXA

Blood Bank:
- ☐ Initiate Massive Transfusion Protocol (If clinical coagulopathy: add cryoprecipitate, consult for additional agents)

Action:
- ☐ Achieve hemostasis, intervention based on etiology
- ☐ Escalate interventions

Oxytocin (Pitocin):
10-40 units per 500-1000mL solution

Methylergonovine (Methergine):
0.2 milligrams IM (may repeat);
Avoid with hypertension

15-methyl PGF2α (Hemabate, Carboprost):
250 micrograms IM
(may repeat in q15 minutes, maximum 8 doses)
Avoid with asthma;
use with caution with hypertension

Misoprostol (Cytotec):
800-1000 micrograms PR
600 micrograms PO or 800 micrograms SL

Tranexamic Acid (TXA):
1 gram IV over 10 min (add 1 gram vial to 100mL NS & give over 10 min; may be repeated once after 30 min)

Possible interventions:
- Bakri balloon
- Compression suture/B-Lynch suture
- Uterine artery ligation
- Hysterectomy

Stage 4: Cardiovascular Collapse (massive hemorrhage, profound hypovolemic shock, or amniotic fluid embolism)

Initial Steps:
- ☐ Mobilize additional resources

Medications:
- ☐ ACLS

Blood Bank:
- ☐ Simultaneous aggressive massive transfusion

Action:
- ☐ Immediate surgical intervention to ensure hemostasis (hysterectomy)

Post-Hemorrhage Management
- Determine disposition of patient
- Debrief with the whole obstetric care team
- Debrief with patient and family
- Document

Safe Motherhood Initiative

ACOG
The American College of Obstetricians and Gynecologists
District II

Appendix:
BLOOD BANK:
Massive Transfusion Protocol (MTP)

In order to provide safe obstetric care, institutions MUST:

- Have a minimum of 4 units of O-negative PRBCs
- Have the ability to obtain 6 units PRBCs & 4 units FFP (compatible or type specific) for a bleeding patient
- Have a mechanism in place to obtain platelets & additional products in a timely fashion

Blood transfusion or crossmatching should not be used as a negative quality marker and is warranted for certain obstetric events.

1 Patient currently bleeding & at risk for uncontrollable bleeding

A. Activate MTP – call (**ADD NUMBER**) & say "activate massive transfusion protocol"

B. Nursing/anesthesia draw stat labs
- type & crossmatch
- hemoglobin & platelet count, PT (INR)/PTT, fibrinogen, & ABG (as needed)

2 Immediate need for transfusion *(type & crossmatch not yet available)*

A. Give 2-4 units O-negative PRBCs

B. **"OB Emergency Release"**

3 Anticipate ongoing massive blood needs

A. Obtain massive transfusion pack
- Consider using coolers

B. Administer as needed in a 6:4:1 ratio
- 6 units PRBCs
- 4 units FFP
- 1 apheresis pack of platelets

4 Initial lab results

A. Normal > anticipate ongoing bleeding > repeat massive transfusion pack > bleeding controlled > deactivate MTP

B. Abnormal > repeat massive transfusion pack > repeat labs > consider cryoprecipitate and consultation for alternative coagulation agents (Prothrombin Complex Concentrate [PCC], recombinant Factor VIIa, tranexamic acid)

Important Protocol Items to Be Determined at Each Institution:

How to activate MTP: _____

Blood bank # & location; notify ASAP: _____

I will call: _____

Emergency release protocol that both blood bank staff & ordering parties (MD/RN/CNM) understand:

_____

How will blood be brought to L&D?

_____

How will additional blood products/platelets be obtained?

_____

Mechanism for obtaining serial labs, such as with each transfusion pack, to ensure transfusion targets achieved:

_____