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Maternal Safety Bundle for Obstetric Hemorrhage

Updated January 2020

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Maternal Mortality

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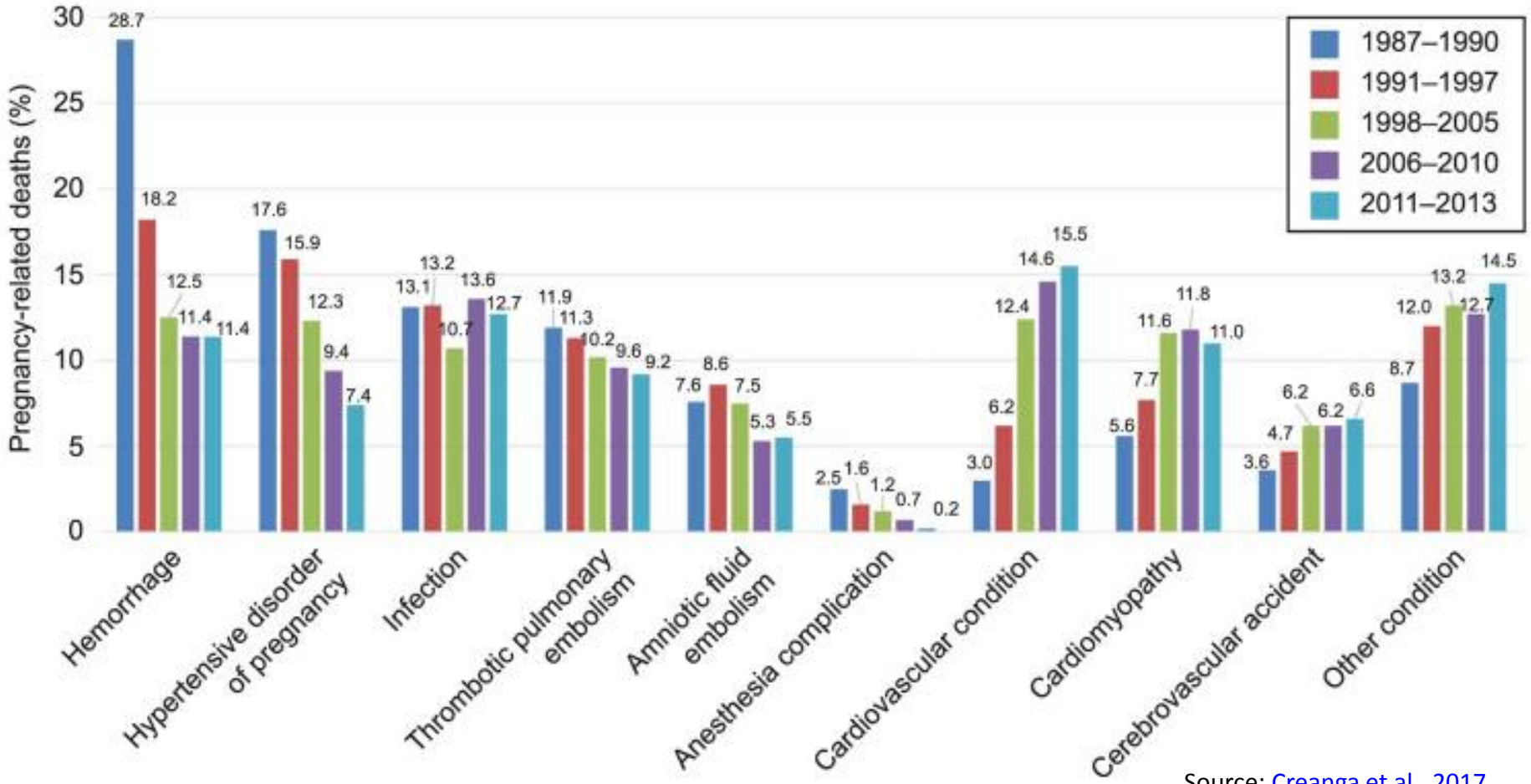
PREGNANCY-RELATED MORTALITY IN THE U.S.

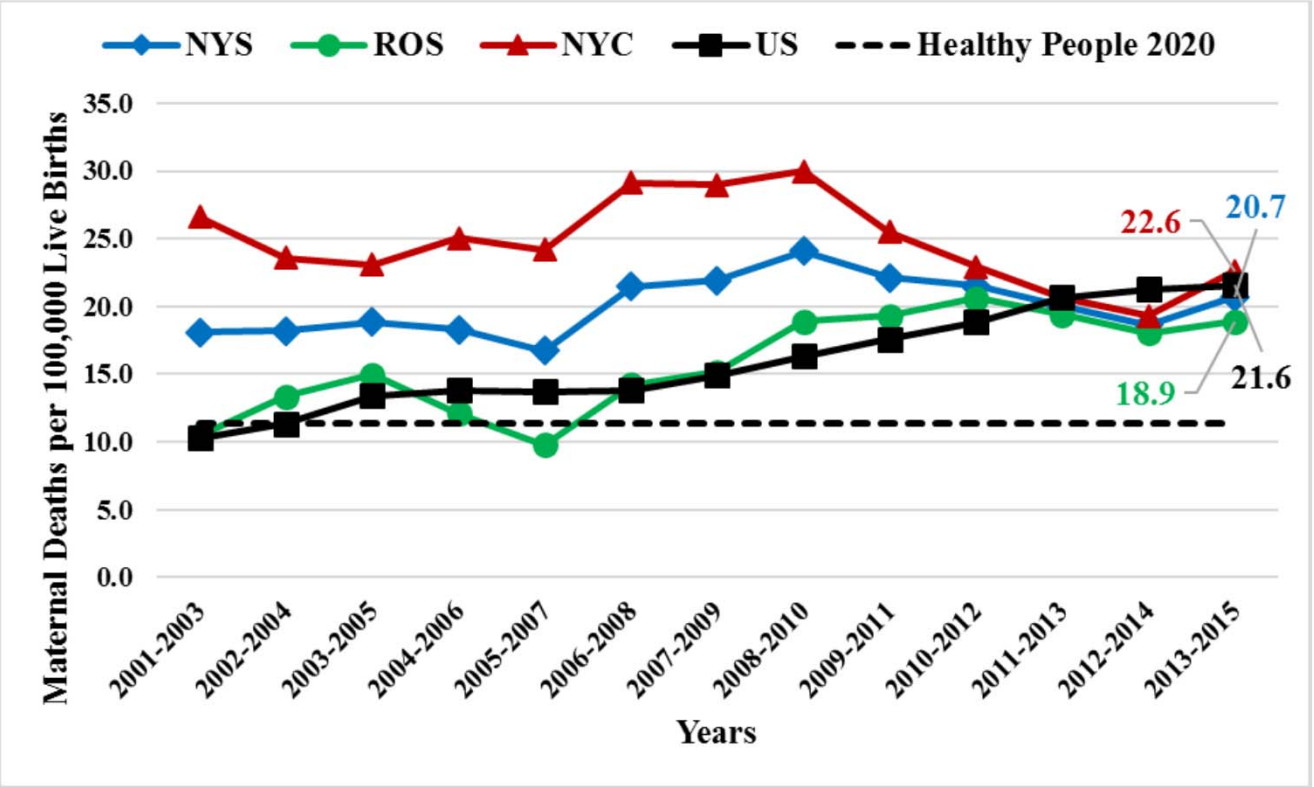
(1987 – 2013)



Source: Creanga et al., 2017

Maternal Mortality

NYS Three-Year Rolling Average Maternal Mortality Rate



*Causes of death from death records A34, O00-O95,O98-O99.
2000-2014 data from NY Vital Records. 2015 NY and national data from CDC Wonder database.

Source: NYS MMR Report, 2017

Maternal Mortality

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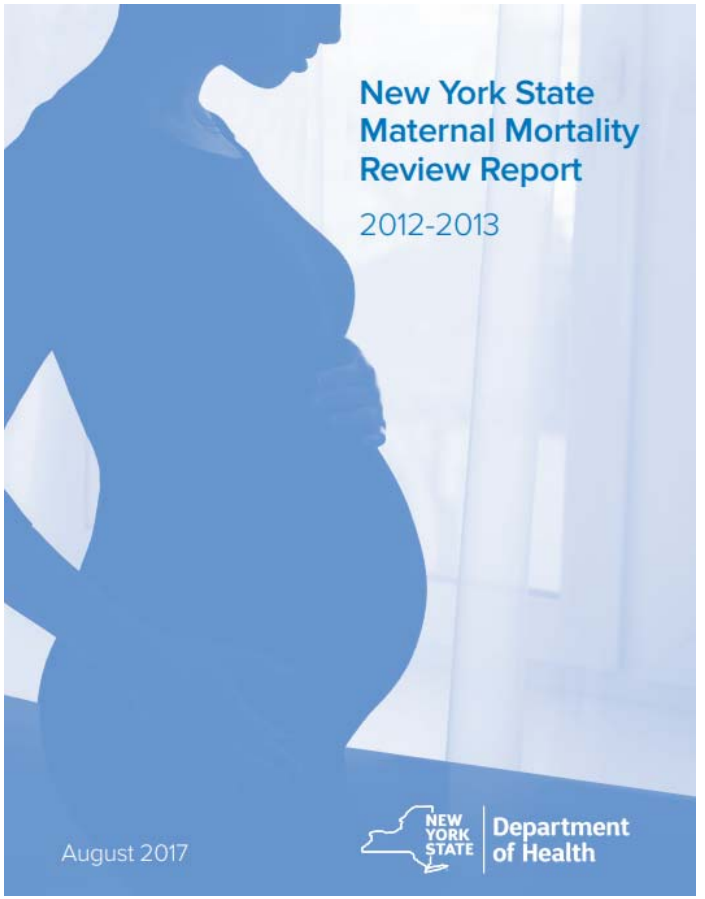
What's causing these deaths?

- NYS maternal mortality review (MMR) identified 62 pregnancy-related & 104 pregnancy-associated, not related deaths, from 2012-13.
- Leading causes of pregnancy-related deaths:
  - Embolism (29%)
  - Hemorrhage (17.7%)
  - Infection (14.5%)
  - Cardiomyopathy (11.3%)
- Leading causes of pregnancy-associated deaths:
  - Injury (51.9%)
  - Cancer (8.7%)
  - Generalized septicemia (5.8%)
  - Cardiac arrhythmia (4.8%)



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Source: NYS MMR Report, 2017

Maternal Mortality

Pregnancy-Related Mortality in New York State

(2012 – 2013)

Cause	Number	Percentage
Embolism	18	29.0
Hemorrhage	11	17.7
Infection	9	14.5
Cardiomyopathy	7	11.3
Hypertensive Disorder	6	9.7
Cardiovascular Problems	4	6.5
Cardiac Arrest/Failure (NOS)	2	3.2
Hematopoietic (sickle cell, thalassemia, idiopathic thrombocytopenic purpura (ITP)	2	3.2
Intracerebral hemorrhage (not associated with pregnancy-induced hypertension (PIH)	2	3.2
Pulmonary	1	2.0
TOTAL	62	100

Source: NYS MMR Report, 2017

Safe Motherhood Initiative: History

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- Began in 2001 as a voluntary review program to examine reported cases of hospital-based maternal deaths
- Collaborative effort between ACOG & NYSDOH
- Assisted hospitals in making protocol changes to improve patient safety and raise awareness of risk factors that can contribute to serious morbidity
- Timely recognition and intervention could have prevented many of the deaths reviewed
- De-funded in Executive Budget proposal in 2010

Safe Motherhood Initiative: History

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- V2.0 kicked off in May 2013
- Develop standard approaches for managing obstetric emergencies associated with maternal mortality and morbidity
- Focuses on the leading causes of maternal death – obstetric hemorrhage (severe bleeding), venous thromboembolism (blood clots), severe hypertension in pregnancy (high blood pressure), maternal sepsis
- 117 obstetric hospitals engaged
- On-site implementation visits to assist with QI efforts

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Safe Motherhood Initiative: Bundles

Obstetric Bundle Development:

Founded in evidence-based, best practices

- Delineation of standard of care
- Minimization of variability
- Decreased reliance on memory
- Emphasized patient safety
- Reduction in redundant efforts

Safe Motherhood Initiative: Bundles

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Obstetric Bundle Composition:

Tangible tools hospitals can use to implement directives

- PowerPoint slide decks
- Visual aids posters
- Checklists
- Algorithms
- Risk assessment tables
- Medication dosing tables
- Debriefing forms

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KEY ELEMENTS: OBSTETRIC HEMORRHAGE BUNDLE

- RECOGNITION & PREVENTION (every patient)
  - Risk assessment
  - Universal active management of 3rd stage of labor
- READINESS (every unit)
  - Blood bank (massive transfusion protocol)
  - Cart & medication kit
  - Hemorrhage team with education & drills for all stakeholders
- RESPONSE (every hemorrhage)
  - Checklist
  - Support for patients/families/staff for all significant hemorrhages
- REPORTING / SYSTEMS LEARNING (every unit)
  - Culture of huddles & debrief
  - Multidisciplinary review of serious hemorrhages
  - Monitor outcomes & processes metrics

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EXAMPLE

Risk Assessment: Prenatal

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PRENATAL	
RISK FACTORS	☐ Suspected previa/accreta/increta/percreta
	☐ Pre-pregnancy BMI › 50
	☐ Clinically significant bleeding disorder
	☐ Other significant medical/surgical risk *(consider patients who decline transfusion)*[1]
INTERVENTION	☐ Transfer to appropriate level of care for delivery[2]

[1] See supplemental guidance document on patients who decline blood products

[2] Review availability of medical/surgical, blood bank, ICU, and interventional radiology support

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Risk Assessment: Antepartum

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ANTEPARTUM		
		TIMING OF DELIVERY (WEEKS)
RISK FACTORS	☐ Placenta accreta	34 0/7 – 35 6/7
	☐ Placenta previa	36 0/7 – 37 6/7
	☐ Prior classical cesarean	36 0/7 – 37 6/7
	☐ Prior myomectomy	37 0/7 – 38 6/7
	☐ Prior myomectomy, if extensive	36-37
PLACENTA ACCRETA MANAGEMENT[3]	For 1 or more prior cesareans, placental location should be documented prior to delivery. Patients at **high risk** for placenta accreta, should: ☐ Obtain proper imaging to evaluate risk prior to delivery ☐ Be transferred to appropriate level of care for delivery if accreta is suspected	

[3] *See supplemental guidance document on morbidly adherent placenta*

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EXAMPLE

Risk Assessment: Labor & Delivery Admission

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Labor & Delivery Admission

	Medium Risk	High Risk
RISK FACTORS	☐ Prior cesarean, uterine surgery, or multiple laparotomies	☐ Placenta previa/low lying
	☐ Multiple gestation	☐ Suspected accreta/percreta
	☐ › 4 prior births	☐ Platelet count ‹ 70,000
	☐ Prior PPH	☐ Active bleeding
	☐ Large myomas	☐ Known coagulopathy
	☐ EFW › 4000 g	☐ 2 or more medium risk factors
	☐ Obesity (BMI › 40)	/
	☐ Hematocrit ‹ 30% & other risk	/
INTERVENTION	☐ **Type & SCREEN, review protocol**	☐ **Type & CROSS, review protocol**

** Establish a culture of huddles for high-risk patients & post-event debriefing **

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EXAMPLE

Risk Assessment: Intrapartum

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INTRAPARTUM		
	MEDIUM RISK	HIGH RISK
RISK FACTORS	☐ Chorioamnionitis	☐ New active bleeding
	☐ Prolonged oxytocin › 24 hours	☐ 2 or more medium (admission and/or intrapartum) risk factors
	☐ Prolonged 2nd stage	/
	☐ Magnesium sulfate	/
INTERVENTION	☐ Type & SCREEN, review protocol	☐ Type & CROSS, review protocol

** Establish a culture of huddles for high-risk patients & post-event debriefing **

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Risk Assessment: Placenta Accreta Management

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- For one or more prior cesareans, placental location should be documented prior to scheduled delivery
- Patients at high risk for placenta accreta should:
  - Obtain proper imaging to evaluate risk prior to delivery, and
  - Be transferred to appropriate level of care for delivery if accreta is suspected

EXAMPLE

Universal Active Management of 3rd Stage of Labor

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- Increase IV Oxytocin rate, 500mL/hour of 10-40 units/500-1000mL solution
- Titrate infusion rate to uterine tone, up to 500mL as needed

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Blood Bank: Massive Transfusion Protocol

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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 & is warranted for certain obstetric events.

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Statement on the Use of Blood Products

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Blood transfusion or crossmatching should not be used as a negative quality marker and is warranted for certain obstetric events. In cases of severe obstetric hemorrhage, ≥4 units of blood products may be necessary to save the life of a maternity patient.

Hospitals are encouraged to coordinate efforts with their laboratories, blood banks, and quality improvement departments to determine the appropriateness of transfusion and quantity of blood products necessary for these patients.

EXAMPLE

Blood Bank: Massive Transfusion Protocol

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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:

  _____

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EXAMPLE

Blood Bank: Massive Transfusion Protocol

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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)

EXAMPLE

Recommended Instruments: Hemorrhage Cart Checklist

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Hemorrhage Cart	
VAGINAL	☐ Vaginal retractors; long weighted speculum
	☐ Long instruments (needle holder, scissors, Kelly clamps, sponge forceps)
	☐ Intrauterine balloon
	☐ Banjo curette
	☐ Bright task light
	☐ Procedural instructions (balloon)
CESAREAN/LAPAROTOMY	☐ Hysterectomy tray
	☐ #1 chromic or plain catgut suture & reloadable straight needle for B-Lynch sutures
	☐ Intrauterine balloon
	☐ Procedural instructions (balloon, B-Lynch, arterial ligations)

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Recommended Instruments: Medication Kit Checklist

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Medication Kit (for rapid access to medications)

Medication ensure appropriate medications given patient history	Amount
☐ Oxytocin (Pitocin) 10-40 units per 500-1000mL solution	2 pre-mixed bags
☐ Oxytocin (Pitocin) 10 units	2 vials
☐ 15-methyl $PGF_2\alpha$ (Hemabate, Carboprost) 250 micrograms per mL **Avoid with asthma; use with caution with hypertension**	1 ampule *
☐ Misoprostol (Cytotec) 200 microgram tablets	5 tabs
☐ Methylergonovine (Methergine) 0.2 milligrams per mL **Avoid with hypertension**	1 ampule *

* Needs refrigeration

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Tranexamic Acid (TXA)

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- Anti-fibrinolytic drug for treatment of PPH
- Treatment of PPH
  - 1 gram IV as soon as possible, can repeat in 30 minutes
  - Maximum dose 2 grams in 24 hours
- Prevention of PPH
  - Not well studied used in women with hemophilia and VWD
  - 1 gram after cord clamping
- Can breastfeed

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Source: SMFM Guidance Document, Pacheco et al., 2017.

EXAMPLE

OB Hemorrhage Checklist: Stage 1

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Obstetric Hemorrhage Checklist

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

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 › 500 mL vaginal OR blood loss › 1000 mL cesarean with normal vital signs and lab values

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:

☐ Type and Crossmatch 2 units RBCs

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 $PGF_2\alpha$ (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)

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EXAMPLE

OB Hemorrhage Checklist: Stage 2

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STAGE 2: Continued Bleeding (EBL up to 1500mL OR > 2 uterotonics) with normal vital signs and lab values

INITIAL STEPS:

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

MEDICATIONS:

- ☐ Continue Stage 1 medications; consider TXA

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)

BLOOD BANK:

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

ACTION:

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

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

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Intrauterine Balloon Technique

- Insert under ultrasound guidance
- Inflate to 500 cc with sterile water or NaCl
- Use vaginal packing (iodoform or antibiotic soaked gauze) to maintain correct placement and maximize tamponade
- Gentle traction — secure to patient's leg or attach weight <than 500 g

Intrauterine Balloon Technique

- Transabdominal placement (via incision) — late after incision is closed
- Connect to fluid collection bag to monitor hemostasis
- Continuous monitoring of vital signs and signs of increased bleeding
- May need to flush clots with sterile isotonic saline
- Maximum time balloon can remain in place is 24 hours
- To deflate:
  - Remove tension from shaft
  - Remove packing
  - Aspirate fluid
  - Remove catheters gently

EXAMPLE

Surgical Management

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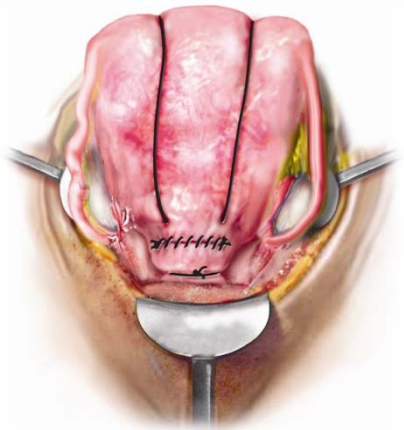
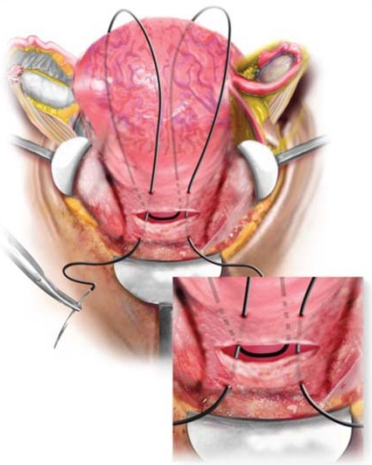
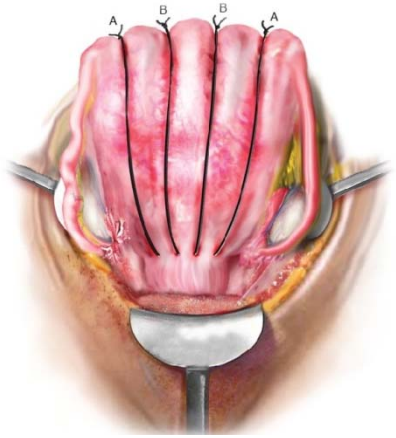
- Uterine curettage
- Placental bed suture
- Uterine artery ligation
- Uteroovarian ligation
- Repair uterine rupture
- B-Lynch suture, multiple square sutures
- Hysterectomy



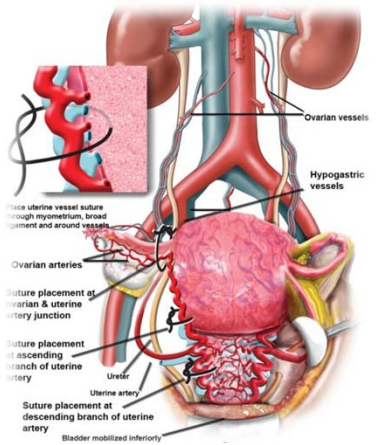
B-Lynch suture



B-Lynch suture



Hayman uterine compression suture



Surgical ligation locations of uterine blood supply

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FEMALE PELVIC SURGERY VIDEO ATLAS SERIES
Mickey Karam, Series Editor

Management of Acute Obstetric Emergencies
Baha Sibai, MD
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EXAMPLE

OB Hemorrhage Checklist: Stage 3

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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 $PGF_2\alpha$ (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

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OB Hemorrhage Checklist: Stage 4

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

INITIAL STEP:

- ☐ 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

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Reporting/Systems Learning

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(every unit)

- Establish a culture of huddles for high-risk patients and post-event debriefs
- Conduct a multidisciplinary review of serious hemorrhages for systems issues
- Monitor outcomes and processes metrics

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EXAMPLE

Supplemental Guidance

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Guidance Document

Morbidly Adherent Placenta

Patient Identification

1) Targeted placental imaging in the early 3rd trimester (no later than 28-32 weeks) for MAP:

Historical Risk Factors

- Prior cesarean delivery
- Placenta previa or low lying placenta
- History of endometrial ablation
- Prior uterine surgery, including multiple dilation & curettage
- Multiple episodes of vaginal bleeding

Sonographic Risk Factors

- Abnormal placental appearance, uterine shape, and/or vascularity of the myometrial wall
- Current/previous cesarean scar

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Supplemental Guidance

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GUIDANCE DOCUMENT

Patients Who Decline Blood Products

NOTE:

The progression of care from observation/fluid replacement to mechanical hemostasis (e.g., intrauterine compression balloon) to hysterectomy must occur faster in patients who decline blood products than in those who can be transfused.

Since blood replacement is not possible, achieving hemostasis in the most efficient and rapid manner is absolutely critical.

- In cases of significant ongoing bleeding, consider involving a 2nd MD.
- In cases of suspected intra-abdominal bleeding, include imaging studies as part of the initial (immediate) evaluation. Return the patient to the OR without delay if these studies suggest intra-abdominal bleeding.
- Do not delay definitive surgical intervention pending correction of coagulopathy or hemodynamic parameters (e.g., BP, pulse, urine output)

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Conclusion

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- Early opportunities exist to assess risk, anticipate, and plan in advance of an obstetric hemorrhage.
- Multidisciplinary coordination and preparation, particularly with the blood bank, is critical in order to provide safe obstetrical care.
- A standardized approach to obstetric hemorrhage includes a clearly defined, staged checklist of appropriate actions to be taken in an emergency situation and can help to improve patient outcomes.

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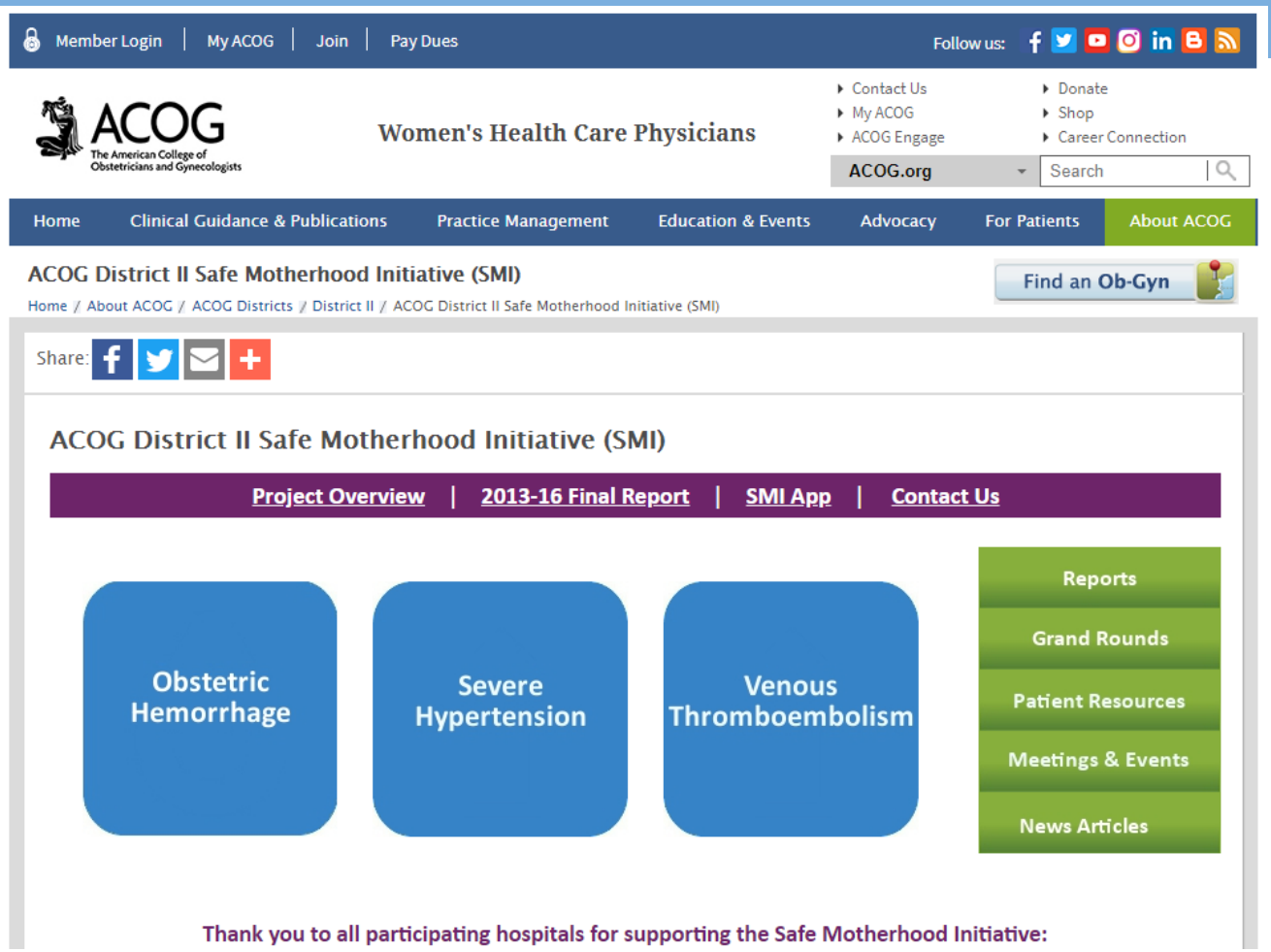

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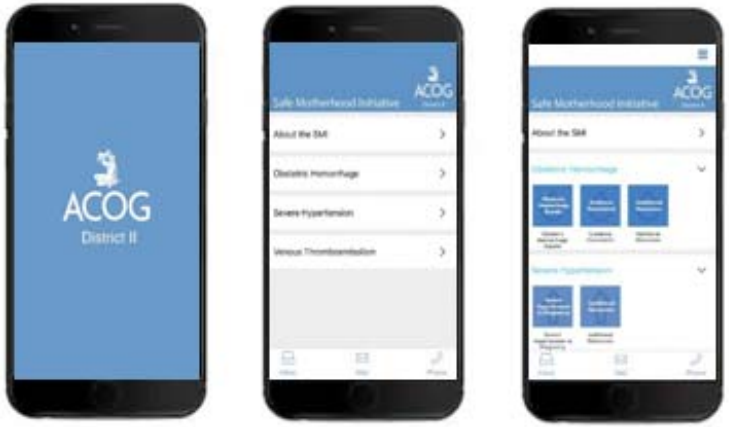

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