Obstetric Hemorrhage 2019

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OUTLINE

Obstetric Hemorrhage

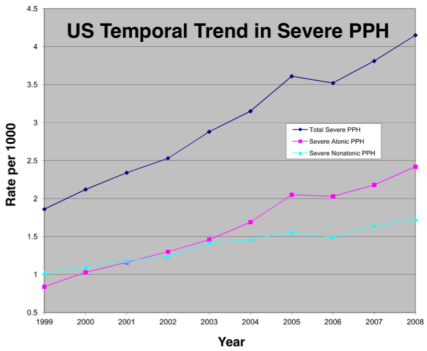
- Recognition
- Current treatment protocols
- Communication – keys to success
- Bonus section

OB Hemorrhage Morbidity

Incidence
- 3% all deliveries
- 1-2% life threatening
- Antepartum Hemorrhage stable

- Morbidity Increased 75% P<.05
  - 129/10,000 deliveries = 52,000/year USA
- Blood transfusion nearly tripled to 96/10,000 P<.05
- Hysterectomy increased 24% to 9.1/10,000, P<.05
- Morbidity increased 114% post-partum re-admit
  - 29/10,000 deliveries

-Callaghan Obstet Gynecol 2012:120:1029-36, CMQCC 2015



Kramer MS. AJOG 2013

Maternal Mortality Hemorrhage

- #1 cause worldwide
- 15% maternal deaths USA
  - 1.8/100k (down from 2.6/100k)
- 70% deaths due to hemorrhage deemed potentially PREVENTABLE

-Berg Obstet Gynecol 2010:117:1302-9
-CMQCC.org

Causes Major OB Hemorrhage

Cause	2012	
	Number	Percentage
Uterine atony	194	57.2
Retained placenta/membranes	81	23.9
Vaginal laceration/haematoma	53	15.6
Bleeding from uterine incision	62	18.3
Abruption	27	8.0
Placenta praevia	24	7.1
Cervical laceration	10	2.9
Morbidity adherent placenta	16	4.7
Broad ligament haematoma	8	2.4

-Scottish Confidential Audit Severe Maternal Morbidity July 2014

Post Partum Hemorrhage Etiology

- Uterine atony
- Laceration genital tract
- Retained placental tissue

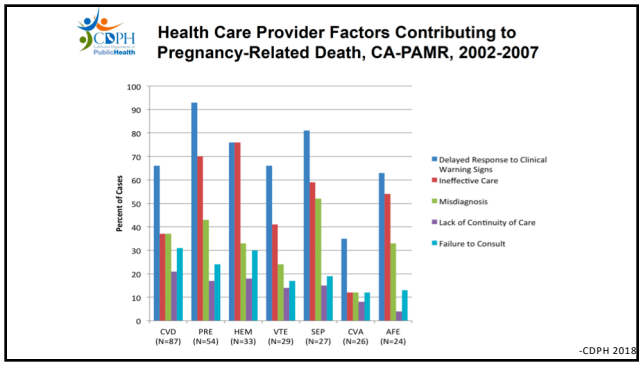
Less common

- Abruption
- Coagulopathy
- Accreta
- Uterine inversion
- Amniotic Fluid Embolism

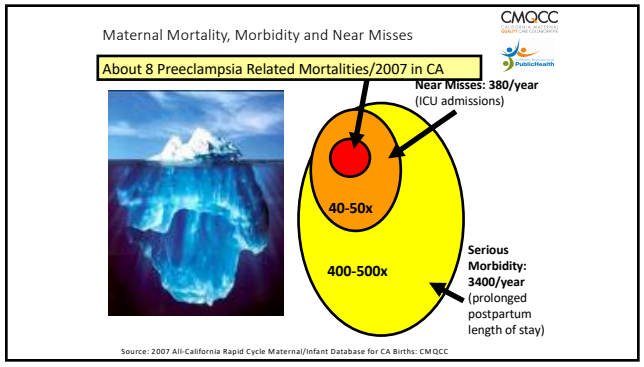
-ACOG PB183 Post Partum Hemorrhage 2017

Uterine Atony Risk Factors

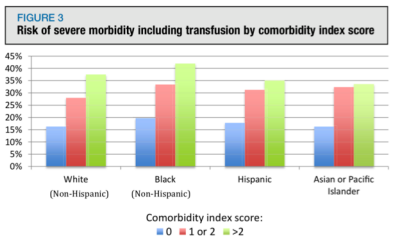
- Prolonged oxytocin >24 h
  - Endogenous or exogenous
- Infection (Chorioamnionitis)
- Uterine abnormality
  - Fibroids
- Over distention
  - Twins, polyhydramnios, macrosomia
- Medications
  - Magnesium, Ca++ channel blocker, potent inhaled anesthetics
- Multiparity
- Prolonged 2nd stage



-CDPH 2018



Risk Factors: Comorbidity and Race



P<.01
Comorbidity Black>White

-Gyamfi-Bannerman C. Am J Obstet Gynecol 2018;219:185.e1-10

Opportunities for Quality Improvement

HEMORRHAGE

Improvement in care opportunities included

- Facility and clinician readiness through practice standardization, better organization of equipment to treat hemorrhage, and planning for care of high risk patients.
- Hemorrhage recognition through better appreciation of blood loss, risk factors, and early clinical signs of deterioration.
- Reducing delays in giving blood, seeking consultations, transferring patients to a higher level of care, and moving on to other treatments if the patient was not responding to current treatment.

-CDPH 2018

OUTLINE

- Obstetric Hemorrhage
- **Recognition**
- Current treatment protocols
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Post Partum Hemorrhage Risk Assessment

Low Risk	Medium Risk	High Risk
Singleton pregnancy	Prior cesarean or uterine surgery	Previa, accreta, increta, percreta
Less than four previous deliveries	More than four previous deliveries	HCT <30
Unscarred uterus	Multiple gestation	Bleeding at admission
Absence of postpartum hemorrhage history	Large uterine fibroids	Known coagulation defect
	Chorioamnionitis	History of postpartum hemorrhage
	Magnesium sulfate use	Abnormal vital signs (tachycardia and hypotension)
	Prolonged use of oxytocin	

-ACOG PB183 Post Partum Hemorrhage 2017

OB Hemorrhage: Definition

Staged Blood Loss

- Stage 1
  - Blood loss >500 mL vaginal delivery
  - Blood loss >1000 mL cesarean
- Stage 2
  - Blood loss <1500 mL
- Stage 3
  - Blood loss > 1500 mL

ACOG Post Partum

- >1000 mL/24 h

-CMQCC Hemorrhage Toolkit V2-2015

-ACOG PB 183 2017

OB Hemorrhage Blood Loss

- Estimated Blood Loss (EBL) inaccurate
- Quantitated Blood Loss is in!

Rx:

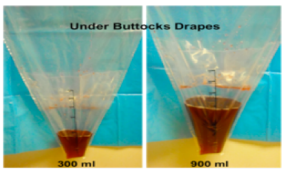
- Graduated markings under buttock drapes
- Weigh sponges/laps
- Training for visual estimation
  - Large blood losses underestimated up to 50%
  - Small blood losses overestimated
- Technology

-Didly Obstet Gynecol 2004:104:601-6
-Toledo Anesth Analg 2007:105:1736-40
-Scavone Anesthesiology 2014:121:439-41

Methods to Estimate Blood Loss

Quantifying blood loss by measuring

- Use graduated collection containers (C/S and vaginal deliveries)
- Account for other fluids (amniotic fluid, urine, irrigation)



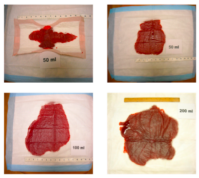
With kind permission of Bev VanderWal, CNS

Methods to Estimate Blood Loss

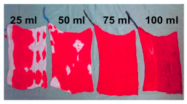
Develop Training Tools: Visual aids displayed in Labor & Delivery and/or Postpartum areas are guides for more accurate visual estimation (visual aids can be displayed discreetly for clinicians)

Training Tools

Posters



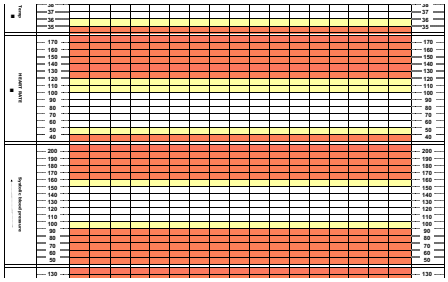
18 X 18 inch Dry Lap Sponges



- 25 ml saturates about 50% area
- 50 ml saturates about 75% area
- 75 ml saturates entire surface
- 100 ml will saturate and drip

With kind permission of Bev VanderWal, CNS

MOEW-Mat. OB Early Warning



-NHS UK

MOEW

	1 point	2 points
Pulse	>100 or <50	>120 or <40
SBP	>150 or <100	>160 or <85
SpO2	<94%	<90%
Respiration	>20	>30 or <10
Mental status	Arousable	Unresponsive

2 or more points => call MD to come assess

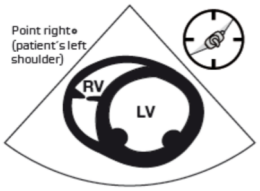
Vitals – Reliability

Blunt Trauma Need to operate/intervene

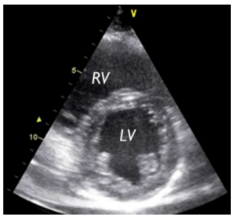
	HR 100-120	HR >120
Sensitivity	37%	13%
Specificity	79%	95%
Intervene	OR 1.8	OR 2.2
Transfuse PRBC	OR 2.2	OR 4.8

-Brasel J Trauma 2007:62:812-7

FATE PSAV



Pos 3: Parasternal LV short axis



-Sloth E., USABCD.org

OUTLINE

- Obstetric Hemorrhage
- Recognition
- **Current treatment protocols 2019**
- Communication – keys to success
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CMQCC V2

Update changes

- Active management 3rd stage labor
  - Oxytocin – no need to wait for cord clamping
- After 2 RBC – 1:1 FFP:RBC
- Optimize –
  - Calcium, acidosis, hypothermia
  - Factor VII has little support
- Support family needs

-CMQCC.org

Active Management 3rd stage Labor

- Oxytocin after delivery infant –OLD
  - NEW- after delivery shoulder!
- Vigorous fundal massage
  - Continued (NEW)
- Decreased Post Partum Hemorrhage (PPH) - 60%
- Okay to use with Delayed Cord Clamping

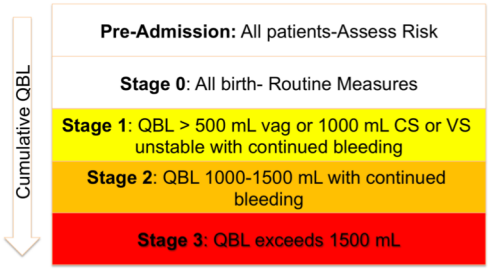
-Prendiville Cochrane Database Syst Rev 2000:3:CD000007
-Hoffman AJOG 2006
-CMQCC Hemorrhage Toolkit V2- 2015

Non-Blood Component

- Liberal Crystalloid/colloid, minimize blood – OLD
- Massive hemorrhage – transfuse blood early - NEW
- Minimize Cystalloid/colloid – NEW
- Cystalloid limit 3.5 L, 2L if blood available right away
- Crystalloid limit 2L,Colloid 1.5 L prior to blood

-Abdul-Kadir Transfusion 2014:54:1756-68
-Scottish Confidential Audit Severe Maternal Morbidity July 201

Hemorrhage Guidelines: Staged Responses



-CMQCC 2015

Stage 1: Actions

- Call for help –
  - OB, Anesthesiologist, Charge RN
- Activate OB Hemorrhage Protocol
- 2nd IV, fluids, Cross match, Uterotonics
- DDx – consider all options

IV Gauge and Rapid Transfuser

Gauge IV	Flow (gravity) mL/min	Flow (rapid transfuser) mL/min
20	65	
18	140	250
16	190	350
14	300	500
18 +PRBC	15 min	6 min standard rapid transfuser
14 Central line		500-1000 mL/min (Belmont)

Stage 2: Actions

- Additional uterotonics
- Labs, transfuse PRBC on clinical signs
  - Do NOT wait for labs
- FFP if >2 PRBC
- Rapid transfusion equipment helpful
- DDx
- If Vitals worse then expected - laparotomy

Stage 3: Actions

- Move to OR if not already there
- Surgical consult
- Massive transfusion protocol
- Additional lines
- Surgical treatment – hysterectomy should be considered

OB Hemorrhage 2019

- Repeat labs q30 min
- Monitor ionized Calcium
- Normothermia
  - 1°C –> 10% drop clotting factor activity
- Fibrinogen 100-125 mg/dL
  - Cryo 6-10 Unit needed if <100
- FFP:RBC 1:1 after 2nd RBC
- Platelets for stage 3 hemorrhage

CMQCC Hemorrhage Toolkit v2-2015

Post Partum Hemorrhage

- 1% low risk women have severe PPH
- BP, P unreliable until late 25% blood volume loss
- > 1000 mL/24 h
- Active Management 3rd stage labor:
  - Oxytocin 10 U
  - Uterine massage
  - Umbilical cord traction
  - 3-25% need 2nd uterotonic in PPH

-ACOG PB183 Post Partum Hemorrhage 2017

Post Partum Hemorrhage Uterotonics

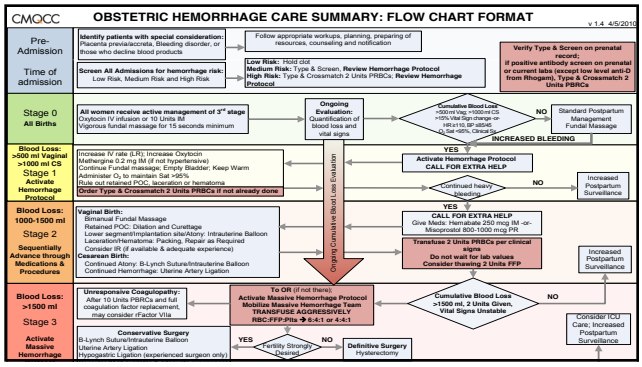
Drug*	Dose and Route	Frequency	Contraindications	Adverse Effects
Oxytocin	IV: 10–40 units per 500–1,000 mL as continuous infusion or IM: 10 units	Continuous	Rare, hypersensitivity to medication	Usually none. Nausea, vomiting, hyponatremia with prolonged dosing. Hypotension can result from IV push, which is not recommended.
Methylergonovine	IM: 0.2 mg	Every 2–4 h	Hypertension, preeclampsia, cardiovascular disease, hypersensitivity to drug	Nausea, vomiting, severe hypertension particularly when given IV, which is not recommended
15-methyl $PGF_{2\alpha}$	IM: 0.25 mg Intramyometrial: 0.25 mg	Every 15–90 min, eight doses maximum	Asthma. Relative contraindication for hypertension, active hepatic, pulmonary, or cardiac disease	Nausea, vomiting, diarrhea, fever (transient), headache, chills, shivering hypertension, bronchospasm
Misoprostol	600–1,000 micrograms oral, sublingual, or rectal	One time	Rare, hypersensitivity to medication or to prostaglandins	Nausea, vomiting, diarrhea shivering, fever (transient), headache

-ACOG PB183 Post Partum Hemorrhage 2017

Post Partum Hemorrhage: Mechanical

- Intrauterine balloon
- Extrauterine compression suture
  - B-Lynch 60-75% success
- Decrease blood flow to uterus
  - Uterine artery ligation
  - Hypogastric/Internal iliac ligation
  - Interventional radiology – identify source, embolize
- Removal uterus - hysterectomy

-ACOG PB183 Post Partum Hemorrhage 2017



PPH Blood Transfusion

- Start early, don't need labs
- TXA
  - 1 gram IV, early to benefit
- Whole blood equivalent
  - After 2 PRBC, 1:1 PRBC: FFP
- Fibrinogen decreases early

PPH Fibrinogen

Dx: Pregnancy elevated 3.7-6.2 g/L
- 1 gL/L decrease = 2.6x severe PPH
- >4g/L 79% negative predictive value
- <2g/L 100% positive predictive value

Rx
- FFP limited fibrinogen (2U FFP -> +0.4 g/L)
- Cryoprecipitate pooled, 200-250 fibrinogen
- Fibrinogen Concentrate, 60mg/kg -> +100 mg/dL

-Abbassi-Ghanavati M Obstet Gynecol 2009:114:1326, Charbit B. J Thromb Haemostasis 2007:5:266, DeLloyd L Int J Obstet Anesthesia 2011:20:135, Seto S. IJOA 2017:32:11, Snegovskikh D. JCA 2018:44:50

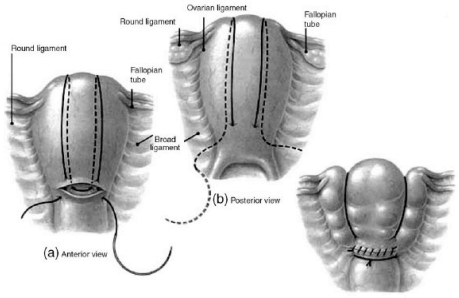
Surgical Strategies

Method	No. Cases	Success Rates (%)	95% CI (%)
B-Lynch/compression sutures	108	91.7	84.9–95.5
Arterial embolization	193	90.7	85.7–94.0
Arterial ligation/pelvic devascularization	501	84.6	81.2–87.5
Uterine balloon tamponade	162	84.0	77.5–88.8

There was no statistically significant difference between the 4 groups ($P = 0.06$).

Doumouchtsis S, et al. Obstetr Gynecol Surv 2007; 62: 540-7.

B-Lynch compression suture



Tranexamic Acid (TXA)

- Anti-fibrinolytic
- 1 gram IV, then 1gm/8 hr OR redose Q4-8 hr
- Improved survival trauma hemorrhage
- WHO recommended list
- Trauma – improved survival, reduced adverse events

-Shakur Lancet 2010:376:23-32
-WHO recommendation prevention PPH 2007
-BMJ 2012:345:e5839, Health Tech Asses 2013:17:10

TXA WOMAN Trial: applicability?

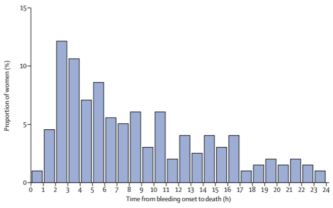
WOMAN cohort
- 346 PPH deaths/6 yr
- 20,060 deliveries
- NNT=250 women
- Many countries, different systems, disease burden

- Australian Cohort
- 11 PPH deaths/5 yr
- 1.5 million deliveries
- NNT=35,587 women

"…TXA should not be used routinely for obstetric hemorrhage in women from high income countries"
– Dennis AT and Griffiths JD, Lancet 2017:390:1582

TXA Delay

Meta-analysis
- TXA improved survival
  - OR1.2, P=0.001
- TXA delay reduces benefit
  - P=0.0001
- Immediate Rx survival
  - OR 1.7, p=0.0001
- 15 min delay = ↓10% survival benefit until 3hr
- >3h – no benefit



-Gayet-Ageron A. Lancet 2018:391:125-32.

Viscoelastrography PPH

- Fibtem A5 low predicted >2500 mL loss

Pregnancy baseline
- Lower: INTEM CT, INTEM CFT, EXTEM CFT
- Higher: INTEM 11%, EXTEM 11%, FIBTEM 47%

-Seto S. IJOA 2017:32:11, Snegovskikh D JCA 2018:44:50, Mallaiah S. Anaesthesia 2015:7:166

Viscoelastography OB Hemorrhage

- Impact study, 2yr
- PPH >1500 mL
- Point of care ROTEM
- Better outcomes
- Less blood
- Less cost

	PCVT	Non-PCVT	P
Hct POD1	24.7	27.8	0.004
Hys	25%	53%	0.013
EBL ml	2000	3000	0.001
RBC >1u	36%	90%	0.001
FFP	11%	72%	0.001
Cryo	21%	19%	NS
Plt	0%	45%	0.001
ICU	3.6%	43%	0.001
LOS days	4	5	0.001
Cost	$11,800	$20,400	0.001

-Snegovskikh D., Norwitz ER. J Clinical Anesthesia 2018:44:50-6

OUTLINE

- Obstetric Hemorrhage
- Recognition
- Current treatment protocols 2014-15
- **Communication – keys to success**
- Bonus section

Preventability Maternal Morbidity: Communication

Closed Claims: **60% communication lapses**

-Dutton Anesthesiology 2014:121:450-8
-Scavone Anesthesiology 2014:121:439-41

Severe Maternal Morbidity

	Preventable	Improved care needed	Total
Diagnosis/Recognition Risk	31%	21%	52%
Treatment	37%	35%	71%
Communication	26%	17%	43%
Policies/Procedures	28%	16%	44%

-Lawton AJOG 2014:210:557.e1-6.

Communication

- Predelivery huddle – identify at risk patients
- QBL – measure/weigh
- Call for help, activate Hemorrhage Protocol
  - Equipment
  - Blood products
- Recognize Denial
- Recognize Delays

Communication Strategies

- "Open-air" commands - common error
  - Always direct to someone
- Close the loop – acknowledge
- Multidisciplinary Team Drills
- Leadership
  - Have clear leader of team

-Lipman SOAP Consensus Anesth Analg 2014:118:1003-16

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Comprehensive Maternal Hemorrhage Protocols Reduce the Use of Blood Products

	BEFORE Intro. (2 mos)	5 mos AFTER Intro. (2 mos)	10 mos AFTER Intro. (2 mos)	Difference (BEFORE vs. 10mos AFTER)
Total Deliveries	10,433	10,457	11,169	+7%
Stage II Hemorrhage (per 1,000 births)	7.0	9.5	9.6	+37%
Stage III Hemorrhage (per 1,000 births)	2.7	3.1	4.8	+77%
PRBC (N)	232	189	197	-15% (p=0.02)
Total Blood Prod (includes coags) (N)	375	354	297	-25% (p<0.01)
TBP per 1,000 births	35.9	33.9	26.6	-27% (p<0.01)

Slide by CMQCC

Shields et al AJOG 2014 (29 hospitals)

Placenta Accreta

- Advanced center
- Delivery at 34-35 weeks
- Ultrasound 80-90% sensitivity, 95% specificity
- MRI 88% Sensitivity, 100% Specificity

Invasive Placenta Guideline IS-AIP 2019

- Incidence worldwide increasing
  - 0.8-3.1/1000 birth prior cesarean
- Optimize Hb 28 weeks
- Delivery 36 weeks if stable/elective
- Arterial balloon prophylactic
  - No benefit, some complications
- Expectant management 60-93% successful
  - 6% severe maternal morbidity
  - No scheduled interventional radiology

-Collins SL. Guideline Int Society abnormally-invasive placenta AJOG 2019: in press

4 Domains of Patient Safety Bundles

- **Readiness**
- **Recognition and Prevention**
- **Response**
- **Reporting/Systems Learning**

COUNCIL ON PATIENT SAFETY IN WOMEN'S HEALTH CARE

Slide 29

Partnership for Maternal Safety

Readiness every unit
- Hemorrhage cart, supplies, checklist
- Uterotonics on unit
- Response team
- Blood bank support massive transfusion protocols
- Drills/simulations

-www.safehealthcareforeverywoman.org, Main EK Anest Analg 2015

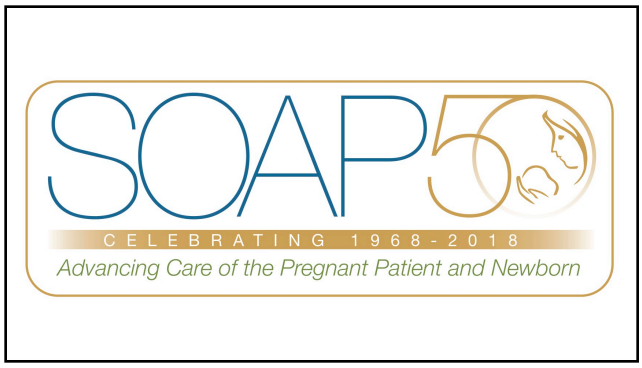
Partnership for Maternal Safety

Recognition
- Risk assessment
- Measure blood loss (Quantitated)
- Active management 3rd stage

Response
- Team based

Reporting and systems
- Multidisciplinary review
- Debriefs/huddles

-www.safehealthcareforeverywoman.org, Main EK Anest Analg 2015


SOAP 50
CELEBRATING 1968-2018
Advancing Care of the Pregnant Patient and Newborn