Postpartum Hemorrhage: Practice Updates

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YKHC
7/2/19
Disclosures

• Nothing to disclose

• I would like to thank the Yupik and other Tribes of the Delta for allowing us to live on their land, work with their community, and deliver their babies
Objectives

• Understand global and national trends in PPH
• Identify risk factors
• Explore the data behind various practices for prevention and management
• Case based approach, emphasizing implementation of best practices
An Ignored Truth:

Maternal Mortality in American Indigenous and Alaska Native Communities

• No large national studies
• Excluded from comparative studies
• Most data derived from state studies
  • WI: Increased OR of PPH (2.07), GDM (2.27), Preeclampsia
  • Washington:
    • Pregnancy Associate Mortality Rate: 196.2 per 100,000 births
    • Pregnancy Related Mortality Ratio: 84.4-46.5 in Non-Hispanic native women
PPH: Implications

- One of the leading cause of maternal mortality worldwide
- 3\textsuperscript{rd} leading cause of maternal death in the US
- Rates have been increasing since 1994
PPH: Implications

- 70% of deaths related to postpartum hemorrhage were preventable
- Rates of atony are increasing
- We need protocols to address it
PPH: Definitions

• Cumulative Blood loss of 1,000 ml accompanied by signs and symptoms of hypovolemia in 24 hours after birth process

• Post-delivery HCT drop > 10%

• Tachycardia, Hypotension concerning for blood loss >25% total blood volume, 1500 cc

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<thead>
<tr>
<th>Trauma Assessment of Blood Loss</th>
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<td>Class</td>
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The Case:

• 30 G6P3023 at 38.1
  • gHTN, GDMA1, HSV on ppx, anemia (Iron infusions x3)
  • OB History
    • PPH x2, 1 transfusion (2014, last delivery)

• HPI: Presented from clinic with gHTN, no PEC
  • Admitted for induction
  • Hx PPH on problem list of admission H&P
    • 2 IVs, active management at 3rd stage
    • Written Pitocin 40 u and miso at delivery
    • Started on miso for IOL
PPH: Risk Stratification

• Risk Assessment tools: Identify 60-86% of patients who experience PPH

• Validation study of 10,000 women
  • Sensitivity of 80%, Specificity of 60%
  • 1% in low risk group had severe postpartum hemorrhage

Table 2. Example of Risk Assessment Tool

<table>
<thead>
<tr>
<th>Low Risk</th>
<th>Medium Risk</th>
<th>High Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singleton pregnancy</td>
<td>Prior cesarean or uterine surgery</td>
<td>Previa, accreta, increta, percreta</td>
</tr>
<tr>
<td>Less than four previous deliveries</td>
<td>More than four previous deliveries</td>
<td>HCT &lt;30</td>
</tr>
<tr>
<td>Unscarred uterus</td>
<td>Multiple gestation</td>
<td>Bleeding at admission</td>
</tr>
<tr>
<td>Absence of postpartum hemorrhage history</td>
<td>Large uterine fibroids</td>
<td>Known coagulation defect</td>
</tr>
<tr>
<td></td>
<td>Chorioamnionitis</td>
<td>History of postpartum hemorrhage</td>
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<tr>
<td></td>
<td>Magnesium sulfate use</td>
<td>Abnormal vital signs (tachycardia and hypotension)</td>
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<td></td>
<td>Prolonged use of oxytocin</td>
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Abbreviation: HCT, hematocrit.

YKHC Risk Calculator

• Risk Assessments:
  • h/o PPH, bleeding disorder
  • Multiparity, IUFD

• Calculates Risk
  • 0: Low risk
  • 1-2: Moderate Risk
  • >2: High risk
PPH: Risk Stratification

- Population based Cohort study in France (N=4,550)
- Severe PPH: 20.9%
- Risk factors:
  - Delay in starting oxytocin after pph diagnosed
    - >10 minutes: 38%
    - >20 minutes: 86%
    - Manual examination of the uterine cavity more than 20 minutes: OR 1.83
  - Call for assistance >10 minutes: OR 1.61
## PPH: Additional Risk Factors

### Table 1. Antenatal and Intrapartum Risk Factors for Postpartum Hemorrhage

<table>
<thead>
<tr>
<th>Etiology</th>
<th>Primary Problem</th>
<th>Risk Factors, Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abnormalities of uterine contraction—</td>
<td>Atonic uterus</td>
<td>Prolonged use of oxytocin</td>
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<tr>
<td></td>
<td></td>
<td>High parity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chorioamnionitis</td>
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<tr>
<td></td>
<td></td>
<td>General anesthesia</td>
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<tr>
<td></td>
<td>Over-distended uterus</td>
<td>Twins or multiple gestation</td>
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<td></td>
<td>Fibroid uterus</td>
<td>Polyhydramnios</td>
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<td></td>
<td>Uterine inversion</td>
<td>Macrosomia</td>
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<tr>
<td></td>
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<td>Multiple uterine fibroids</td>
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<tr>
<td></td>
<td></td>
<td>Excessive umbilical cord traction</td>
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<tr>
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<td></td>
<td>Short umbilical cord</td>
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<tr>
<td></td>
<td></td>
<td>Fundal implantation of the placenta</td>
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<tr>
<td>Genital tract trauma</td>
<td>Episiotomy</td>
<td>Operative vaginal delivery</td>
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<tr>
<td></td>
<td>Cervical, vaginal, and</td>
<td>Precipitous delivery</td>
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<tr>
<td></td>
<td>perineal lacerations</td>
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<tr>
<td></td>
<td>Uterine rupture</td>
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<tr>
<td>Retained placental tissue</td>
<td>Retained placenta</td>
<td>Succenturate placenta</td>
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<tr>
<td></td>
<td>Placenta accreta</td>
<td>Previous uterine placenta</td>
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<td></td>
<td></td>
<td>Incomplete placenta at delivery</td>
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<tr>
<td>Abnormalities of coagulation</td>
<td>Preeclampsia</td>
<td>Abnormal bruising</td>
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<tr>
<td></td>
<td>Inherited clotting factor deficiency (von Willebrand, hemophilia)</td>
<td>Petechia</td>
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<tr>
<td></td>
<td>Severe infection</td>
<td>Fetal death</td>
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<tr>
<td></td>
<td>Amniotic fluid embolism</td>
<td>Placental abruption</td>
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<td></td>
<td>Excessive crystalloid replacement</td>
<td>Fever, sepsis</td>
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<tr>
<td></td>
<td>Therapeutic anticoagulation</td>
<td>Hemorrhage</td>
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<tr>
<td></td>
<td></td>
<td>Current thromboembolism treatment</td>
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</tbody>
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Identifying PPH: How much is too much?

• Shock Index:
  • HR/SBP
  • Ex: HR: 120
  • BP: 100/80
  • What is the shock index?

  • Shock Index of 0.9-1.0 is normal
  • >1.1: strong predictive value surgical intervention
  • 1.5: 87% specific for transfusion
  • 1.7: 97% specific for ICU admit

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Natham 2014
Le Bas 2014
Case

• HD #1:
  • Limited response to Misoprostol x2, declined Foley
  • Started Pitocin at 0500
  • 24 hours into induction
    • SVE: 3/60/-2

• HD #2:
  • Limited response: Pitocin d/c’ed for Foley 2200
  • Foley out, SVE: 4/100/-2, restarted Pitocin 0630

• HD #3:
  • AROM 0550, IUPC placed
  • SVD at 0656
  • 40 u oxytocin, 800 mcg rectal miso given
  • Cord clamped at 1 min due to risk of maternal hemorrhage
  • QBL: <500 cc
Active Management of 3rd Stage: Role of Cord Traction

• 5 center study
• Cord traction did not decrease risk of PPH
• Benefits:
  • Reduced need for manual placenta removal (4.2% vs 6.1%, RR: 0.69%)
  • Shortened 3rd stage duration >15 minutes (4.5% vs 14.3%, RR 0.31%)
  • Women reported significantly less discomfort
  • No increased risk of uterine inversion

Deneux-Tharaux 2013
PPH: Timing of Oxytocin

- RCT
- N= 1,486 patients of similar EGA, fetal weight, labor duration, parity, age, parity, ethnicity (BIAS ALERT!)
- 20 u in 500 cc bolus at delivery of anterior shoulder or placenta
- No difference of incidence of PPH (5.4% vs 5.8%)
- No difference of incidence of retained placenta (2.4% vs 1.6% CI 0.72-3.08)
Oxytocin: High vs Low Dose

Cesarean Deliveries
• 10 u or 80 u in 500 ml
• Trial of 321 women undergoing CS
  • 39% of women on low dose oxytocin required 2nd uterotonic agent

Vaginal Deliveries
• Double blind, RCT 3,000 women with 10 u vs 80 u in 500 cc
• Increased oxytocin did not lower rate of PPH (6% vs 7%)

UpToDate, ACOG Recommend max dose of 40 u if dx with PPH
Case

0900:
- MD called to bedside for ongoing bleed
- Additional 40 units Pitocin in 500 cc given
- Hemabate at bedside
- HROB contacted
- HR: 100-110
- BP: 136/83
- QBL: 1,000 cc
Stage 1: QBL of 500 cc, ongoing bleeding

- Increase Oxytocin to 40 units
- Insert 2nd IV
- Vigorous Massage
- Empty Bladder
- Oxygen supplementation
- Warm blankets
- Administer 2\textsuperscript{nd} line uterotonic supplementary measures:

```
Stage 1
500 mL loss after vaginal delivery or 1000 mL after cesarean OR increased bleeding during recovery
- Notify charge nurse
- Notify attending physician or on call physician
- Insert IV if not previously done
- Increase oxytocin
- Vigorous fundal massage
- Methergine 0.2 mg IM if not hypertensive
- Misoprostol 400 mcg SL or Hemabate 250 mcg IM are alternatives
- Apply pulse oximeter
- Vital signs and O2 sat every 15 minutes
- Empty bladder
- T&C 2 units if not already done
- Oxygen to keep O2 sat >95%
- Warm blankets or Bair Hugger
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2nd Line Uterotonics

- Hemabate, Miso, Methergine
- ACOG
  - Injectables more effective than misoprostol
  - Rapid time of onset:
    - Methergine: 2-5 min (IM), immediate if IV
    - Hemabate: 2-3 minutes (IM), q 15-90 min, $$$$  
    - Misoprostol: 15 minutes (sublingual)

What does the data say?
Misoprostol- Evolving Attitudes

Cochrane Reviews 2012
- “Compared to injectable uterotonics, oral miso associated with higher risk of severe PPH RR: 1.33
- Neither IM oxytocin nor misoprostol are preferable to injectable

Cochrane Review 2013
- Misoprostol does not appear to increase or reduce severe morbidity or mortality

Cochrane 2014
- Among women who received oxytocin for treatment of primary PPH, adjunctive use of misoprostol confers no added benefit
# Medication Recommendations 2.0

<table>
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<th>Prevention</th>
<th>Treatment</th>
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<tr>
<td>Oxytocin or 10-40 international units/500-1000 mL IV infusion titrated to uterine tone</td>
<td>Rapid infusion of IV oxytocin 10-40 IU/500-1000 mL at ≥ 500 mL/hour, titrated to response</td>
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<tr>
<td>Oxytocin 10 units IM when no IV access</td>
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Choose a standard second line agent
- Methergine 0.2 mg IM
- Misoprostol 600 mcg orally or 800 mcg sublingually
- Hemabate 250 mcg IM or intramyometrially
Misoprostol in Practice

- Preferred Route:
  - Sublingual: 400-800 mcg
  - Oral 400-600 mcg
Case: Part III

- 0910:
  - HROB arrives at the bedside
  - HR: 100-140
  - BP: 158/100
  - PE: no lacerations, hematomas. No signs of DIC.
  - Blood bank alerted
  - Manual sweep performed.
  - TXA given: 1 g IV
  - Nursing continued measuring QBL, >1500 cc
  - Bakri balloon placed
  - Bleeding resolved
  - QBL: 1977 cc
Stage 2: Bleeding 1,000-1,500 cc, unstable VS

- HROB at the bedside
- Vital signs every 5-10 minutes
- Give 3rd uterotonic:
  - such as Misoprostol 800 mcg SL or Hemabate 250 mcg IM
- TXA if <3 hours since delivery
- Bimanual massage
- Consider Bakri
- 2u pRBC at bedside, 2u FFP thawed
- Foley with urimeter
Tranxemic Acid

- WOMAN Trial
  - International, Multicenter RCT
  - Reduced risk of death by 31%
- Reduced risk of death from atony: 26%
- No difference in medication adverse events
- Early studies show benefit in prophylaxis and treatment
  - **TXA should not be regarded as alternative therapy and is given concomitantly with other drugs and procedures**

Roberts 2017
Novikova 2015
Shakur 2018
Tranxemic Acid

• Mechanism:
  • Anti-fibrinolytic agent: inhibits protolytic activity of plasmin and decreases fibrinolysis
  • IV more bioavailable (oral: 45%)
  • Time to peak: 2.5 hours (range: 1-5 hours)
  • Antifibrinolytic effect lasts up 7-8 hours in serum

• Administration
  • 1 g IV over 10-20 minutes
  • Repeat dose at 30 minutes
  • Rapid infusion (>1 ml/minute can cause hypotension)
Interventional Management

• Bakri Balloon vs Foley vs Compression and Packing
  • 86% of women who had balloon tamponade did not require further procedures or surgeries
  • Volume: around 350 cc
  • Kept in place from 12 hrs - 24 hours
    • For removal: remove tamponade 50 cc at a time over 30 minute observation
    • If bleeding resumes, can refill prior to OR but should be removed

• Compression Gauze:
  • Impregnated with Thrombin Activator
  • Not as effective but can be used in low resource settings
  • Antibiotics required
Case: Part IV

- 1430: Bakri balloon expelled
- No further bleeding
- Hgb at 24 hours: 7.9
- Asymptomatic
- Offered IV iron, patient declined
- Discharged to follow up in 1-2 days
Timing of Transfusion

- For women with ongoing bleeding >1500 cc or more
- Unstable VS
- High for DIC
  - depletion of coagulation factors- common to develop consumptive coagulopathy
  - PEC known risk factor for coagulopathy

- Per our guideline:
  - 2 u pRBC with 2 u FFP thawed
  - Ratio pRBC: FFP is 1:1
  - Ratio of pRBC: FFP: platelet: 4:4:1
Sequelae of Transfusion in PPH

• Risk of Massive Transfusion
  • Hyperkalemia, Hypocalcemia
  • Hypothermia

• Crystalloid Resuscitation
  • Dilutional coagulopathy
  • Pulmonary Edema

• Other reactions
  • Febrile nonhemolytic: 8 per 10,000
  • Hemolytic transfusion rxn: 1.9/10,000
  • TRALI: 1 per 10,000 (ARDS analogue)
  • Transfusion associated reactions: HIV, West Nile, Chagas, Malaria 1 per 100,000- to 1 million

Lethal Coagulopathy Triad
  Dilution
  Hypothermia
  Acidosis
PPH as Independent Risk factor for VTE

• Swedish birth/discharge registries: 82,378 deliveries
• Increased risk of VTE in women with preeclampsia and placenta abruption

• However......
  • WOMAN trial:
    • 0.3% of women with PPH had thromboembolic event within 42 days
    • Patients receiving blood transfusions should receive thromboprophylaxis and continue until discharge
Secondary Postpartum Hemorrhage

• PPH between 24 hours and 12 weeks postpartum
• Incidence:
  • 0.2-2%
• Peak incidence is 1-2 weeks postpartum
• Risk Factors: Previous PPH
• Most common causes:
  • Retained POCs
  • Infection
  • Subinvolution of placental bed
Vascularized retained products of conception with secondary postpartum hemorrhage

Blood clot in postpartum uterus
Interventions to address PPH

• California: Coordinated Quality Improvement
  • California Maternal Quality Care Collaborative
  • Mentor Model among 113 Hospitals
  • Implementation of Hemorrhage Bundle

• Outcomes:
  • Women in Collaborative Hospitals: 20.8% reduction in morbidity from PPH
  • Comparison Hospitals: 1.2% reduction
  • Maternal Morbidity reduction of 11.7%
Addressing the Problem: Protocols

Obstetric Hemorrhage Safety Bundle

**Readiness: (every unit)**
- Hemorrhage Cart / with Procedural Instructions (balloons, compression stiches)
- Rapid access to hemorrhage medications (kit or equivalent)
- Establish a response team: multiple partnerships // unit education, drills, debriefs
- Establish MTP and 0-neg/unmatched transfusion protocols

**Recognition: (every patient)**
- Assessment of hemorrhage risk (prernaial, on admission, ongoing in labor & PP)
- Measurement of CUMMULATIVE blood loss
- Active Management of 3rd Stage (oxytocin after birth)

**Response: (every hemorrhage)**
- Unit-standard, stage-based OB Hemorrhage Emergency Management Plan w/checklist
- Support program for patients, families and staff

**Reporting / Systems Learning: (every unit)**
- Establish a culture of Huddles for high-risk patients and post-event debriefings
- Review all stage 3 hemorrhages for systems issues
- Monitor outcome and process metrics in perinatal QI committee

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**Stage 0**

- Assess every woman in laboring birth
- **Admission Management**
  - Infection
  - Hypertension
  - Elective Preterm Delivery
  - Fetal
  - Adrenaline

**Stage 1**

- Assess every woman in laboring birth
- **Admission Management**
  - Infection
  - Hypertension
  - Elective Preterm Delivery
  - Fetal
  - Adrenaline

**Stage 2**

- Continue bleeding with total blood loss under 1500mL
- **Prevention**
  - Infection
  - Hypertension
  - Elective Preterm Delivery
  - Fetal
  - Adrenaline

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**Stage 3**

- Total blood loss over 1500mL or 2 units PRBCs given
- **Prevention**
  - Infection
  - Hypertension
  - Elective Preterm Delivery
  - Fetal
  - Adrenaline
Coming soon to a YK near you!

ED Deliveries: Code Stork

Prevention of Bleeding:
- Active Management of the Third Stage of Labor
- No need to suction after delivery of the placenta: shoulder (preferred), delivery of the baby (preferred) if delivery is planned
- Consider placement of misoprostol 400 mcg as antepartum delivery for any patient with history of PPH, grand multiparity, metopic stenosis, or suspected chorioamnionitis

Measurement of Blood Loss:
- Quantification of blood loss (cL) will be performed at 60 minutes
- This will be done by weighing the linens: 1 L = 200 cL
- This must be done ongoing if hemorrhage bleeding is noted

Stage 1
- NICU beds after vaginal delivery or 1000 mL after cesarean Q8 increase bleeding during recovery
- Notify charge nurse
- Notify attending physician or on call physician
- Insert IV if not previously done
- Increase oxytocin
- Vaginal fundal massage
- Uterine ergonovine 0.5 mg IM (First hypertensive)
- Mepiperazin 400 mg IV or methotrexate 50 mg IV are alternatives
- Apply postpartum
- IV fluids and 30 set every 15 minutes
- Anterior Saddle:
  - Tac 2 until fluid is allowed
  - Oxygen to keep O2 sat = 90%
  - Warm blankets or Baby Hugger

Stage 2
- Continuous bleeding or unstable vital signs: loss between 2000-3000 mL
- NICU bed in place
- Activate Rapid Response Team
- Consider whether to call in OR team
- Vital signs every 10 minutes, announce to room
- O2 level every 15-20 minutes, announce to room
- Give another ergonovine 400 mg IV or methotrexate 250 mg IV
- Tamoxifen 10 mg IV may be considered if > 3 hours since delivery
- Vigorous abdomen uterine massage
- Intravenous bolus of terbutaline should consider
- 2 units of FFP: CD to bedded with 2 units of FFP getting shoved, transfuse first unit DO NOT wait for lab results
- Apply Birthing
- Insert Foley with unilateral

Stage 3
- CDL > 3000 mL
- Ensure Rapid Response Team is at bedside
- Activate Rapid Response Protocol
- Tamoxifen should be given ± 2-3 hours since delivery
- All medical and surgical actions should be considered in consultation with OB/GYN if needed
- Provide PEPAC and IPP is ± 4.5 min aggressively using rapid infusion
- Continue the ongoing Q8 assessment, announce to room
- Continue vital signs every 15 minutes, announce to room
- Notify level II SICU on call at every 30 minutes, announce to team
- Notify level II SICU on call immediately
- CBC, BMP, PTT, INR, Thrombin, platelet count, ABG if < 60 Sat < 95%
- Notify OB/GYN (high risk, complications, decision)
- Notify staff to family support
In Conclusion

• PPH is on the rise, but there are multiple modalities to address this issue
• Quick identification is crucial
• Active management of 3rd stage is important:
  • Cord traction
  • Oxytocin whenever you want it
  • Low threshold to utilize 2nd, 3rd Uterotonic if bleeding >1L
• TXA is an important adjunct that can save lives (QBL>1L)
• Ask for help and transfuse when VS unstable (QBL>1.5L)
• Coordinated care and teamwork are essential to reducing morbidity and disparities
Fin!
Gratitude to Dr. Ellen Hodges, for input and insight

Gratitude to all OB nursing staff, whose knowledge and compassion make us better doctors

Gratitude to fellow OB providers, for sharing their practices and cases

Grateful to patients, who trust us with their lives.

Questions?

• Contact: elizabeth_bates@ykhc.org


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