Maternal Mortality
- SMI Protocols -

ACOG-District II
Maternal Mortality

- SMI Protocols -

1. Obstetrical Hemorrhage
2. Venous Thromboembolism
3. Hypertensive Disorders
Peripartum Hemorrhage
Antepartum Risk assessment

Risk Factors

That require antepartum interventions,
- timing of delivery
- specific delivery plans
- additional resources
- optimizing maternal status
- consults, etc.
Peripartum Hemorrhage
- Antepartum Risk Assessment -

Interventions

- Timing of Delivery*
- Special Delivery plans
  (Pl accreta protocol)

Placenta accreta
- 34-36 weeks

Placenta Previa
Prev classical C/S
- 36-37 weeks
Hx of myomectomy

- Timing of Delivery*

* - Pl accreta 34-36 weeks
   - Pl previa 36-37 weeks
   - Prior classical C/S 36-37 weeks
   - Hx myomectomy 37-38 weeks
   - If extensive 36-37 wks
Peripartum Hemorrhage
Antepartum Risk assessment

Interventions

- Maximize pre-delivery Hb/Hct
- Review Bl products options acceptable*
- Consult MFM/Hem
- Outline potential surgical interventions (including need for hysterectomy in case of PPH)
- Adjust coagulation therapy

* If not done (earlier) obtain on admission to L&
<table>
<thead>
<tr>
<th>Category I</th>
<th>Will Accept Patient Please Initial</th>
<th>Will Not Accept Patient Please Initial</th>
<th>May Accept Under Certain Circumstances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Blood Cells</td>
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<tr>
<td>Fresh Frozen Plasma</td>
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<tr>
<td>Platelets</td>
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<tr>
<td>Autologous Banked Blood</td>
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<tr>
<td><strong>Category II – minor blood fractions</strong></td>
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<tr>
<td>Albumin</td>
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<tr>
<td>Factor VII</td>
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<tr>
<td>Fibrin Glue</td>
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<tr>
<td>Erythropoietin</td>
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<tr>
<td>RhoGAM</td>
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<tr>
<td>Plasma Protein Fractions/Plasmanate</td>
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<tr>
<td>Human Immunoglobulin</td>
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<tr>
<td>Cryoprecipitate</td>
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<tr>
<td>Humate-P</td>
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<tr>
<td>Prothrombin Complex Concentrate</td>
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<tr>
<td><strong>Category III – no blood component</strong></td>
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<tr>
<td>Tranexamic Acid</td>
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<td>Amicar</td>
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<tr>
<td>Hetastarch</td>
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<tr>
<td><strong>Category IV</strong></td>
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<tr>
<td>Isovolemic Hemodilution</td>
<td></td>
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<tr>
<td>Cell Saver</td>
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<tr>
<td>Plasmapharesis</td>
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</tbody>
</table>
Obstetrical Hemorrhage

- EBL -

RN - Initiates the process
- LDR → Primary RN
- OR → Circulator

Evaluates objective data
- No of laps/pads
- Suction
- Drapes, Floor

Surgeon
Anesthesia
- Duration of surgery
- Clinical changes

Establish a consensus → Realistic EBL

*Avoid having different EBL’s i.e. Anesthesia, RN, Surgeon
One Full and dripping lap/soaked

12 fully soaked laps

~ 100ml

~ 1200ml
Full lap (not soaked or dripping)

~ 75ml

Half a lap

~ 40ml
Fully soaked through Peripad

Partially soaked peripad

~ 70ml

~ 50ml
1 small lap (NSVD) full

~ 45ml

1) 12 ounce can

~ 355ml
Fist/ baseball or apple sized clot

~ 60ml
Peripartum Hemorrhage

- EBL -

4x4 guaze pad = 5ml
Full & dripping chux = 800 ml
Fully soaked peripad = 70ml
Partially soaked peripad=50 ml
Full & dripping lap pad = 100 ml
Full lap pad (not dripping) =75 ml
Half a lap pad = 40 ml
12 ounce soda can = 355ml
Fist or baseball size clot = 60 ml
Peripartum Hemorrhage
- Escalation -

Operating Room

Delivery Room

EBL > 1500cc

10 RN / Circulator

- Alert Surgeon
- Alert 2nd Attending (Svc Att/MFM)

Inquires if additional help is necessary
Hand-off communication

(OR→PACU and PACU→Floor)

Procedure:
- NSVD
- Instrumental delivery
- C/S - Duration ______

EBL: Total
- For the delivery
- In the PACU

Interventions:
- Uterotonics
- Blood transfusion

Vital Signs:
- On admission to the hospital
- Last 30 minutes in OR
- Last 30 minutes in PACU

Urinary Output:
- Total output in OR
- Total output in PACU

Medical/Obstetrical co-morbidities:
- Cr HTN
- Etc.
Site: OR/LDR

Patient: EBL>1,500cc and Hemostasis not yet achieved

**Communications/Logistics**
- RN → alerts Surgeon re... EBL
- RN alerts 2nd Surgeon (svc Att)
- 2nd Att → Inquires if additional Resources are necessary
- Initiate use of Flow sheet
- Call for 2nd Anesthesiologist

**Hemostasis**
- Atony:
  - Admin uterotonics
  - If uterotonics already used, without success
    - Vag → Bakri balloon
    - C/S → Compression sutures (B-Lynch)

- Others:
  - Adress the source of bleeding

**Replacement**
- ↑ IV Fluids
- Tranexamic acid 1g IV/10min*
- Get Blood to the floor
- Start transfusion (RBC/FFP) if:
  - Abn V.S. U/O, Labs
  - In the judgment of Surgeon hemostasis is not imminent

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**Observe for 20-30 min → Bleeding continues**

- If not in the OR move patient to OR now
- Contact Hemorrhage Team
- Call Code Fusion

- For pat with abn VS, Labs, significant bleeding proceed to:
  - Stepwise devascularization
  - Uterine artery ligation
  - Hysterectomy

- For pat hemodinamically stable moderate bleeding and IR immediately available → embolization may be an alternative

- If not already done start transfusion now
- For severe loss (EBL>2-2,500 low BP, acidosis etc) initiate MTP at this time
  - RBC:FFP:Plts → 4:4:1
- If coagulopathic despite MTP consider PCC (Kcentra, Bebulin)
**Site:** PACU or Post Partum floor

**Patient:** Suspected bleeding (intra-abdominal)
- Abn V.S. U/O
- Abn Labs
- Abn clinical exam

### Communications/Logistics
Bedside evaluation*
- < 15min
- Sr resident
- Notify Att MD
  (Pvt and Svc Att’s)
Include Abd/Pelvic Sono (CT if necessary)

- If + for free fluid
- Or large collection
- Move patient to L&D
- Att MD at bedside
- Perinatal Huddle
- Contact Hemorrhage Team

### Hemostasis
- Conservative management
  - Hemodynamically stable

  **Return to OR**
  - Hemodynamically unstable

### Replacement
- IV fluids
- Tranexamic acid 1g IV/10min
- Transfusion as necessary

Evaluate < 60min
- Condition deteriorates
- Lack of improvement

**Laparotomy**

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*Follow the MEOWS algorithm*
Site: PACU or Post Partum floor

Patient: Abn vag bleeding

Communications/Logistics
- Bedside evaluation*
  - < 15min
  - Sr resident
  - Notify Att MD (Pvt and Svc Att’s)

Hemostasis
- Atony:
  - Empty bladder
  - Bimanual uterine massage
  - Uterotonic agents
- Others:
  - Address source of bleeding

Replacement
- IV Fluids
- Tranexamic ac 1g IV/10min

Observe 15-20min → Bleeding continues
- Move patient to L&D area
- Att MD at bedside

Observe 15-20min → Bleeding continues
- Continue uterotonic
- Bakri balloon

Get Blood to the floor
- Start Transfusion if:
  - Abn VS, U/O, Labs
  - EBL > 1,500cc
  - Brisk bleeding

- Perinatal Huddle
- Contact Hemorrhage Team
- Open OR
- Call Code Fusion

- If bleeding moderate, hemodynamically stable and IR immediately available, embolization may be an option
- If bleeding heavy, Abn V.S. Labs, proceed to laparotomy
  - Compression sutures (B-Lynch)
  - Uterine artery ligation
  - Stepwise devascularization
  - Hysterectomy

Start transfusion
- Abn VS, U/O, Labs
- EBL > 1,500cc
- Brisk bleeding
- In the opinion of Surgeon extensive surgery required

For massive Blood loss
- Start MTP RBC:FFP:Plts 4:4:1
If coagulopathic despite MTP consider PCC (Kcentra, Bebulin)
<table>
<thead>
<tr>
<th>Code OB: immediate evaluation by the OB team</th>
<th>Physician Escalation: bedside evaluation within 15 minutes</th>
<th>Perinatal Huddle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breech/Head Entrapment</td>
<td>2 consecutive SBP ↑ 160mmHg or DBP ↑ 100 mmHg 3-5 minutes apart</td>
<td>Does not require immediate medical evaluation</td>
</tr>
<tr>
<td>Brisk vaginal bleeding (&gt;500cc over 10 min)</td>
<td></td>
<td>Conditions requiring a multidisciplinary approach where consults</td>
</tr>
<tr>
<td>Category 3 fetal heart rate tracings</td>
<td>Vaginal bleeding</td>
<td>from additional services are warranted</td>
</tr>
<tr>
<td>ESI levels 1 and 2 (as reported by the ED)</td>
<td>Acute Abdomen</td>
<td>ESI level 3 (as reported by the ED)</td>
</tr>
<tr>
<td>Maternal Seizure</td>
<td>Altered mental status</td>
<td></td>
</tr>
<tr>
<td>*Maternal Unresponsiveness</td>
<td>Blood sugar ↑ 250 mg/dl</td>
<td></td>
</tr>
<tr>
<td>Prolapsed Cord</td>
<td>Blood sugar ↓ 50 mg/dl</td>
<td></td>
</tr>
<tr>
<td>*Significant Respiratory distress</td>
<td>Critical Lab Values- HCT ↓ 20, PLT ↓ 75, lactate ↑ 3, abnormal Coags, fibrinogen ↓ 200</td>
<td>Fetal issues: All confirmed structural abnormalities</td>
</tr>
<tr>
<td>and/or SPO2 less than 90% with oxygen</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shoulder Dystocia</td>
<td>Maternal HR ↓ 40 BPM and ↑ 120 BPM</td>
<td>Significant maternal medical comorbidities</td>
</tr>
<tr>
<td>Uterine Inversion</td>
<td>Oxygen saturation ↓ 90% on room air</td>
<td>Logistical/Staffing issues</td>
</tr>
<tr>
<td>RR ↓ 12 or ↑ 30</td>
<td>SBP ↓ 80mmHg</td>
<td></td>
</tr>
<tr>
<td>SBP ↓ 80mmHg</td>
<td>Shock Index ↑ 1.1 (maternal pulse/SBP)</td>
<td></td>
</tr>
<tr>
<td>Urine output ↓ 30cc/hr times 2 hours</td>
<td></td>
<td></td>
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<tr>
<td>Any other findings identified as</td>
<td></td>
<td></td>
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<tr>
<td>placing the mother and/or fetus at risk</td>
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</tr>
</tbody>
</table>
# Obstetrical Hemorrhage Flow Sheet *(Use also as communication tool)*

<table>
<thead>
<tr>
<th>TIME</th>
<th>Monitor:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BP</td>
</tr>
<tr>
<td></td>
<td>Pulse</td>
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<tr>
<td></td>
<td>Shock Index</td>
</tr>
<tr>
<td></td>
<td>HR/Pulse</td>
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<tr>
<td></td>
<td>SPO2</td>
</tr>
<tr>
<td></td>
<td>O2</td>
</tr>
<tr>
<td></td>
<td>Supplemental</td>
</tr>
<tr>
<td></td>
<td>RR</td>
</tr>
<tr>
<td></td>
<td>Temp</td>
</tr>
<tr>
<td></td>
<td>Urine</td>
</tr>
<tr>
<td></td>
<td>Output</td>
</tr>
<tr>
<td></td>
<td>Bleeding in mL’s</td>
</tr>
<tr>
<td></td>
<td>Cumulative mL’s</td>
</tr>
<tr>
<td></td>
<td>LOC</td>
</tr>
<tr>
<td></td>
<td>A+Ox3, confused, lethargic</td>
</tr>
</tbody>
</table>

### Intake:
- IV Fluids
- Blood products

### Medications:
- Uterotonics
- Other

### Labs:
- HGB
- HCT
- Platelets
- PT
- PTT
- Fibrinogen
- pH
- Lactic acid

### Time:

### Notes:
Hemorrhagic Shock
- Communication -

Dg of PPH made → State clearly

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RN/1st responder

- Give cumulative EBL
- Describe previous interventions
- State V.S. Labs, clinical presentation
- Emphasize any change in patient status
- Ask for timely bedside evaluation
- Attending MD notification
- For Stage 3 Hemorrhage → escalate to Hemorrhage team, Anesthesia, Nurse manager

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Provider

- Suspected etiology of PPH
- Intervention to be performed
- Expected effect of the intervention, (time table)
- Time to re-assess patient's status
- Potential additional interventions for ongoing bleeding
- Intra-op (PPH) alert anesthesia regarding duration of procedure and additional blood loss expected
Maternal Mortality
- Safe Motherhood Initiative -

Educational process ➔

1- Risk assessment
   - Lowering the risk of PPH
2- Evaluating degree of PPH
   - Stages of Hemorrhage
   - Role of V.S. Labs, Clinical
3- Interventions
   - Hemostasis
   - Replacement therapy

Grand Rounds

Small working groups
Led by RN/MD clinical leaders

Online Presentations ➔ Post test

- Mandatory for all OB-Gyn health care providers
  (Att MD’s, Residents, RN’s Mid-level providers)
Hemorrhagic Shock

Management

1. Do not delay surgical intervention until Labs are corrected
2. Do not wait for Abn V.S. to replace losses (Crystalloids, RBC)
3. Do not wait for lab evidence of coagulopathy to admin FFP, Antifibrinolics

Hemostasis
- Uterotonics
- Surgery/IR

Maintain $O_2$ Delivery

Correct Coagulopathy