Postpartum Hemorrhage (PPH): Prevention & Management

**Evidence and Action**

### Objectives
1. Describe the global mortality burden of PPH
2. Present current evidence and action to prevent PPH
3. Share key evidence and action to manage PPH
4. Discuss key elements in a comprehensive program to reduce deaths from PPH

### PPH: Leading Cause of Maternal Mortality
- Hemorrhage is a leading cause of maternal deaths
  - 35% of global maternal deaths
  - Estimated 132,000 maternal deaths
- 14 million women in developing countries experience PPH—26 women every minute

### Causes of Maternal Mortality
- Hemorrhage: 31%
- Unclassified: 5%
- Unsafe abortion: 5%
- Other direct causes: 8%
- Other direct causes include: anemia, hypertensive disorder, sepsis, and embolism.

### Maternal & Newborn Health: Scope of Problem
- 180–200 million pregnancies per year
- 75 million unwanted pregnancies
- 50 million induced abortions
- 20 million unsafe abortions (same as above)
- 342,900 maternal deaths (2008)
- 1 maternal death = 30 maternal morbidities
- 3 million neonatal deaths (first week of life)
- 3 million stillbirths

### Lifetime Risk of Maternal Death
- Risk that a woman will die from maternal causes at some point in her reproductive life
- Sweden: 1 in 17,400
- In Niger: 1 in 7
Where is Motherhood Less Safe?

Deaths of Women from Pregnancy and Childbirth: 99% in developing world

What is PPH?

- Blood loss >500mL in the first 24 hours after delivery
- Severe PPH is loss of 1000mL or more.
- Accurately quantifying blood loss is difficult in most clinical or home settings.
- Many severely anemic women cannot tolerate even 500 mL blood loss

Incidence of PPH

<table>
<thead>
<tr>
<th>Blood Loss (n = 434)</th>
<th>Mean ± SE 265.18 ± 10.95</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range 20-1600</td>
<td></td>
</tr>
<tr>
<td>Median 200</td>
<td></td>
</tr>
<tr>
<td>Mode 100</td>
<td></td>
</tr>
<tr>
<td>Acute PPH 57 (13.2 %)</td>
<td></td>
</tr>
<tr>
<td>Acute severe PPH 8 (1.8 %)</td>
<td></td>
</tr>
</tbody>
</table>

Why Do Women Die From Postpartum Hemorrhage?

- We cannot predict who will get PPH.
- Almost 50% of women deliver without a skilled birth attendant (SBA).
- 50% of maternal deaths occur in the first 24 hours following birth, mostly due to PPH
- PPH can kill in as little as 2 hours
- Anemia increases the risk of dying from PPH
- Timely referral and transport to facilities are often not available or affordable.
- Emergency obstetric care is available to less than 20% of women.

What Can Be Done?

- Prevention
- Management

PPH Prevention

1. In the facility: Active management of the third stage of labor (AMTSL)
   - During deliveries with a skilled provider
   - Prevents immediate PPH
   - Associated with almost 60% reduction in PPH occurrence
2. In the home/community: Misoprostol
   - During home births without a skilled provider
   - Community-based counseling and distribution of misoprostol
**TECHNICAL PRESENTATION: Postpartum Hemorrhage**

### Risk of PPH

**Management of third stage of labor**

- **Blood Loss** (> 500 ml)

<table>
<thead>
<tr>
<th>Physiologic</th>
<th>Active (oxytocin)</th>
<th>Misoprostol</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.8%</td>
<td>2.7%</td>
<td>3.6%</td>
</tr>
</tbody>
</table>

### PPH Prevention & Management

**WITHOUT AN SBA**
- Community awareness—BCC/IEC
- Prevention, detection and treatment of anemia
- Family planning and birth spacing
- Use of misoprostol to treat PPH

**WITH AN SBA**
- Community awareness—BCC/IEC
- Antenatal care (including BP/CR)
- Prevention, detection and treatment of anemia
- Family planning and birth spacing
- Use of partograph to reduce prolonged labor
- Limiting episiotomy in normal birth
- Active management of 3rd stage of labor (AMTSL)
- Routine immediate postpartum monitoring
- Vigilant monitoring during “4th stage” of labor

### Active vs. Expectant Management of Third Stage

- **4 studies 4,829 women**

<table>
<thead>
<tr>
<th>Postpartum hemorrhage (&gt;500 ml)</th>
<th>Loss of blood (&gt;500 ml)</th>
<th>Maternal hemoglobin 24-46 h postpartum</th>
<th>Need for transfusion</th>
<th>Postpartal maternal blood loss</th>
<th>Manual removal of placenta</th>
<th>Uterine atony</th>
<th>Antepartum hemorrhage</th>
</tr>
</thead>
<tbody>
<tr>
<td>95% CI</td>
<td>0.54 (0.47-0.62)</td>
<td>0.39 (0.33-0.45)</td>
<td>0.36 (0.31-0.41)</td>
<td>0.42 (0.36-0.48)</td>
<td>0.78 (0.71-0.84)</td>
<td>0.54 (0.49-0.59)</td>
<td>0.53 (0.49-0.57)</td>
</tr>
</tbody>
</table>

### AMTSL

- More effective than physiologic management
- 60% decrease in PPH and severe PPH
- Decreased need for blood transfusion
- Decreased anemia (<9 g/dl)
- **Uterotonic agent = most effective component**
  - Choice depends on cost, stability, safety, side effects, type of birth attendant, cold chain availability

### Choice of Uterotonic Drug

- **Oxytocin preferred**
  - Fast-acting, inexpensive, no contraindications for use in the third stage of labor, relatively few side effects
  - Requires refrigeration to maintain potency, requires injection (safety)
- **Misoprostol**
  - Does not require refrigeration or injection, no contraindications for use in the third stage of labor
  - Common side effects include shivering and elevated temperature, is less effective than oxytocin

### Active Management of the Third Stage of Labor (AMTSL)

1. Administration of a uterotonic agent within one minute after the baby is born (oxytocin is the uterotonic of choice);
2. Controlled cord traction while supporting and stabilizing the uterus by applying counter traction;
3. Uterine massage after delivery of the placenta.
Technique Presentation: Postpartum Hemorrhage

Choice of Uterotonics

<table>
<thead>
<tr>
<th>Uterotonic</th>
<th>Dosage-Preservation</th>
<th>Dosage-Treatment</th>
<th>Storage Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxytocin</td>
<td>10 IU IM</td>
<td>10 IU IM</td>
<td>Store between 15 and 30°C; Protect from freezing. Not more than 3 L of IV fluids containing oxytocin. After 2–3 doses with no result, use alternate treatment.</td>
</tr>
<tr>
<td>Ergometrine</td>
<td>0.2 mg IM</td>
<td>0.2 mg IM</td>
<td>Store between 2 and 8°C; Protect from light and freezing. Never use if hypertension or cardiac disease.</td>
</tr>
<tr>
<td>Misoprostol</td>
<td>600 μg po</td>
<td>600 μg po</td>
<td>Store in closed container at room temperature. Not as effective as oxytocin or ergometrine. Shivering is a common side-effect. Combined dose should not exceed 1000 μg.</td>
</tr>
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More Evidence

- Double-blind placebo controlled WHO multi-center RCT: Oxytocin vs. Misoprostol in hospital
  - 8 countries
  - Oxytocin (n = 9266); Misoprostol (n = 9264)
  - Severe PPH (1000cc): 3% vs. 4%
  - Misoprostol—higher incidence of shivering
  - Conclusion: Oxytocin preferred over Misoprostol
- Double blind placebo controlled RCT in rural Guinea Bissau: Misoprostol vs. Placebo
  - Misoprostol alone reduces severe PPH (1000mls+) 11% vs. 17% RR 0.66 (0.44–0.98)

Misoprostol: Evidence

- Clinical demonstration study
  - Oral Misoprostol reduced PPH incidence to 6%
- Double-blind placebo controlled study
  - Oral Misoprostol reduced need for treatment of PPH from 8.4% → 2.8%
- Rectal Misoprostol vs. Syntometrin for 3rd stage
  - Similar reduction in length of 3rd stage, postpartum blood loss and postpartum hemoglobin; Higher BP with Syntometrin
- Oral Misoprostol vs. Placebo
  - PPH: 7% vs. 15%
  - Need for Therapeutic Oxytocin: 16% vs. 38%

A Randomized Placebo-Controlled Trial of Oral Misoprostol 600 mcg for Prevention of PPH at Four Primary Health Center Areas of Belgaum District, Karnataka India

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<tr>
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<th>Misoprostol (N = 812*)</th>
<th>Placebo (N = 808)</th>
<th>Relative Risk (95% CI) NNT</th>
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<tr>
<td>Postpartum Hemorrhage (blood loss ≥ 500 ml)</td>
<td>53 (6.5)</td>
<td>97 (12.0)</td>
<td>0.53 (0.39, 0.74)</td>
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<td>Severe Postpartum Hemorrhage (blood loss ≥ 1,000 ml)</td>
<td>2 (0.2)</td>
<td>10 (1.2)</td>
<td>0.20 (0.04, 0.91)</td>
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Source: Derman et al., Lancet 2006

Blood Loss Distribution

- Oral misoprostol can be delivered with efficacy and feasibility in a rural home delivery setting.
- Reduced acute PPH by almost 50% (compared to placebo)
- Associated with an 80% reduction in acute severe PPH

Misoprostol at Home Births: 2006

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Source: Derman et al., Lancet 2006

Blood Loss Distribution

Source: Derman et al., Lancet 2006
Feasibility for Misoprostol use at Homebirth

**Completed programs**
- Indonesia, Gambia, Guinea Bissau

**New programs underway**
- Pakistan, Nepal, Bangladesh, Kenya, Uganda, Afghanistan

**Indonesia Program**
- Safety: No women took medication at wrong time
- Acceptability: users said they would recommend it and purchase drug for future births
- Feasibility: 94% coverage with PPH prevention method achieved
  - 25% reduction in perceived excessive bleeding
  - OR 0.76 (0.55–1.05)
  - 45% reduction in need for referral for PPH
  - OR 0.53 (0.24–1.12)

**WHO Recommendations for the Prevention of PPH (WHO 2007)**

7. In the absence of AMTSL, should uterotonic be used alone for prevention of PPH?
- **Recommendation:**
  - In the absence of AMTSL, a uterotonics drug (oxytocin or misoprostol) should be offered by a health worker trained in its use for prevention of PPH (strong recommendation, moderate quality evidence)

**UTEROTONIC IN 3RD STAGE REDUCES PPH**

- Community based education and distribution of misoprostol
- AMTSL

**Combinations can prevent 30–60% of PPH**

**Emerging PPH Prevention Innovations**

- **Oxytocin Uniject™** for simpler dosing and improved infection prevention during AMTSL
- Angola study compared Uniject with expectant management
  - Intervention group experienced significantly decreased PPH (40.4% vs. 8.2%), severe PPH (7.5% vs. 1%) and blood loss (447 vs. 239mL)
  - Shortened the interval between birth of the baby and delivery of the placenta to less than 10 minutes for 87.4% vs. 4.4% of women in the expectant management group
  - No significant difference in manual removal of the placenta between the two groups
  - Some evidence from Mali
  - Midwives preferred Uniject over standard injection practices at home births
  - Uniject simplifies AMTSL practice significantly to expand uterotonic coverage and allow task-shifting to auxiliary nurse midwives

**Source:** Prevention of Postpartum Hemorrhage Study, 2004 Jhpiego

**PPH Management: A Comprehensive Approach**

**Survey Results: Universal Uterotonic Use**

- **10 countries surveyed**
- Use of uterotonic high
- Correct use of AMTSL was low: only 0.5 to 32 percent of observed deliveries
- Findings suggest that AMTSL was not used at 1.4 million deliveries per year

**Source:** POPPHI, 2009
Results: Improved Policy Environment to Support Evidence-based Practice—Uganda

- All SBAs authorized to practice AMTSL and use oxytocin for AMTSL
- AMTSL integrated into preservice: doctors, nurses, midwives
- Oxytocin and ergometrine on National Essential Drugs List for PPH prevention and treatment; not misoprostol
- Ergometrine first line drug
- 58% of selected facilities have oxytocin in stock

Results: Increased Uterotonic Coverage in Afghanistan

- Intervention areas (June 2006 - August 2007)

Results: Increased Uterotonic Coverage in Indonesia

- Uterotonic coverage: Oxytocin or misoprostol tablets

Results: Increased Uterotonic Coverage in Nepal

- Estimated total pregnancies—16,000
- Received misoprostol—11,700
- Took misoprostol—4,816
- Received oxytocin—100%
- SBA—73%
- 53% 22%

Results: Increased Attendance with SBA in Indonesia

- Prior Birth
- During Program

Results: Reduced PPH Rate in Niger

- Promotion of AMTSL, 33 government facilities
- Increased AMTSL coverage from 5% to 98% of births
- Dropped the PPH rate from 2.5% to 0.2%
TECHNICAL PRESENTATION: Postpartum Hemorrhage

Results: Reduced Cases & Costs in Afghanistan

- Training TBAs to administer misoprostol to treat PPH, 2 hypothetical cohorts of 10,000 women:
  - TBA referral after blood loss ≥500 ml
  - Administer 1,000 μg of misoprostol at blood loss ≥500 ml
- Misoprostol strategy could:
  - Prevent 1647 cases of severe PPH (range: 810–2920)
  - Save $115,335 in costs of referral, IV therapy and transfusions (range: $13,991–$1,563,593) per 10,000 births.

Source: K.E.A. Read et al., CCHP, 2005

Results: Anecdotal Mortality Impact

- Indonesia: 1 district
  - Before program (2004): 19 PPH cases; 7 maternal deaths
  - During program (2005): 8 PPH cases; 2 maternal deaths
- Nepal: 1 district
  - Expected # maternal deaths for the period: 45
  - Observed # maternal deaths for the period: 29
- Afghanistan:
  - Expected # maternal deaths in intervention area: 27
  - Actual # maternal deaths: 1 (postpartum eclampsia)

Source: S.E.K. Bradley et al., IJOG, 2006

Results: PPH Reduction Modeling

- Sub-Saharan Africa
  - Comprehensive intervention package (health facility strengthening and community-based services) reduces deaths due to PPH or sepsis after delivery by 32%—compared to just health facility strengthening alone (12% reduction)

Source: Pagel et al., Lancet 2009

PPH Management: WHO Guidelines

- WHO (2009) provides countries with evidence-based guidelines on the safety, quality and usefulness of interventions related to PPH management
- These guidelines are focused on facility-based care and PPH management in facilities with CEmONC capacity.


Management of PPH

- Early detection—rapid management
  - Severe bleeding after birth is NOT normal
  - Most emergency measures can be managed by a nurse or midwife (who has been trained)
  - Uterine massage
  - Administer uterotonics
  - Bimanual compression
  - Manual removal of placenta
  - Suture tears
  - Uterine/ovarian artery ligation or hysterectomy (by MD)


Atonic Uterus! First Action Is Massage Uterus

<table>
<thead>
<tr>
<th>DRUG</th>
<th>DOSE &amp; ROUTE</th>
<th>CONT. Dose</th>
<th>MAX DOSE</th>
<th>CONTRA-INDICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>OXYTOCIN</td>
<td>IM or IV 50 U in 1000 ml NS or 1000 ml 5% dextrose at &gt;60 drp/min or 5-50 U/m2 IV push</td>
<td>IV 20 U in 1000ml at 40 drps/min</td>
<td>Not &gt; 40 U infused at rate of 0.02-0.04 U/min.</td>
<td>No IV admin., not even slow IV push unless IV fluids are running</td>
</tr>
<tr>
<td>ERGO-METRINE</td>
<td>IM or IV 0.2mg</td>
<td>Repeat 0.2mg after 15 mins # required every four hours</td>
<td>Five doses (total 1.0 mg)</td>
<td>High BP, Heart Disease</td>
</tr>
</tbody>
</table>

TECHNICAL PRESENTATION: Postpartum Hemorrhage

### Atonic Uterus (continued)

<table>
<thead>
<tr>
<th>DRUG</th>
<th>DOSE &amp; ROUTE</th>
<th>CONT. DOSE</th>
<th>MAX DOSE</th>
<th>CAUTIONS &amp; CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MISOPROSTOL</strong></td>
<td>ORAL/SL INTRAVAG RECTAL 200-800mcg (600mcg)</td>
<td>200mg Every 4 hours</td>
<td>2000mg Asthma Heart Dis*</td>
<td></td>
</tr>
<tr>
<td><strong>PROSTAGLANDIN F2a</strong></td>
<td>IM only 0.25mg</td>
<td>0.25mg Every 15 Minutes</td>
<td>Total 8 Doses = 2 mg</td>
<td>Asthma Heart Dis*</td>
</tr>
</tbody>
</table>

Source: IMPAC MCPC, 2003, Begley et al., 2010

### Manual Removal of Placenta

- Wearing HLD gloves, insert hand into vagina along the cord.
- Locate edge of placenta and slowly using edge of hand with fingers tightly together detach placenta from placental bed.
- Hold on to placenta while providing counter-traction with other hand, and remove it.

Source: IMPAC MCPC, 2003

### Bimanual Compression of the Uterus

- Wearing HLD gloves, insert hand into vagina; form fist.
- Place fist into anterior fornix and apply pressure against anterior wall of uterus.
- With other hand, press deeply into abdomen behind uterus, applying pressure against posterior wall of uterus.
- Maintain compression until bleeding is controlled and uterus contracts.

Source: IMPAC MCPC, 2003

### Compression of Abdominal Aorta

- Apply downward pressure with closed fist over abdominal aorta through abdominal wall (just above umbilicus slightly to patient’s left)
- With other hand, palpate femoral pulse to check adequacy of compression
  - Pulse palpable = inadequate
  - Pulse not palpable = adequate
- Maintain compression until bleeding is controlled

Source: IMPAC MCPC, 2003

### Emerging PPH Management Innovations

- Use of misoprostol for treatment of PPH that occurs at home
- A non-pneumatic anti-shock garment (NASG) to stabilize and prevent/treat shock during transport and management of PPH
- Condom tamponade to treat PPH at facilities

Source: Georgiou et al., 2009, IMPAC MCPC 2003, Ojengbede et al., 2011

### Misoprostol for PPH Treatment in Home

A 2005 study in Kigoma, Tanzania demonstrated that:
- Traditional birth attendants (TBAs) can correctly diagnose and treat PPH with misoprostol after home births.
- Only 2% of women in the intervention area (compared to 19% in the control group) were referred for further PPH treatment.
- Of those referred, only 1% from the intervention area but 95% from the non-intervention area needed additional PPH treatment.

TECHNICAL PRESENTATION: Postpartum Hemorrhage

Treatment with Misoprostol vs. Oxytocin

A study of PPH treatment options compared misoprostol (800 μg sublingual) with intravenous oxytocin (40 IU) to treat PPH in women who were not exposed to oxytocin prophylactically in three countries:

- In both groups over 90% of women who had active bleeding were controlled within 20 minutes (90% misoprostol, 96% oxytocin)
- Oxytocin more effective at reducing median additional blood loss
- Women receiving misoprostol more frequently needed additional uterotonic drugs or blood transfusion and experienced shivering and fever
- Conclusion: Intravenous oxytocin should be used when available, with misoprostol as treatment alternative when oxytocin is not available.


Doing it Right: Technologies that can expedite care for PPH where it occurs

<table>
<thead>
<tr>
<th>Need</th>
<th>Potential Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPH detection</td>
<td>Brass V drape, Pad</td>
</tr>
<tr>
<td>Prevention</td>
<td>Misoprostol, Oxytocin in Uniject</td>
</tr>
<tr>
<td>Treatment</td>
<td>Misoprostol, Hydrostatic (condom) Tamponade</td>
</tr>
<tr>
<td>Safe Transfer</td>
<td>Anti-shock Garment</td>
</tr>
<tr>
<td>Retained Placenta</td>
<td>Intramembilical Oxytocin</td>
</tr>
<tr>
<td>“Cool” storage for Oxytocin</td>
<td>Clay-water Pots (used extensively in Africa for storing HIV test kits</td>
</tr>
</tbody>
</table>

Technologies appropriate for peripheral level services, even for homebirth.

PPH Intervention: Anti-shock Garment

- The Non-pneumatic Anti-Shock Garment (NASG) applies circumferential counter pressure to the lower body, legs, pelvis and stomach with pressure limits
- Study among 1442 women in Egypt and Nigeria
  - Use of the NASG reduced median blood loss (from 400 mL in the pre-intervention phase to 200 mL)
  - Halved emergency hysterectomies (8.9% to 4.0%)
  - Decreased mortality (from 6.3% to 3.5%)


PPH Treatment: Uterine Tamponade

- Uses a condom inflated with 250–500 mL normal saline
- An inexpensive option when medical treatment has failed or before major surgical intervention
- A small study in Bangladesh found
  - Effective in stopping PPH within 15 minutes and no additional interventions were required for all 23 patients.
  - Inflation was stopped when bleeding ceased.
  - Kept in place for 24–48 hours, depending on initial blood loss.
- Use of the tamponade is identified in the WHO guidelines (2009) as a research priority.


Condom Tamponade

INFLATE CONDOM with 300-350MLS Water

Big syringe

Vaginal bleeding after childbirth

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Programming to Reduce Deaths from PPH

Elements of a comprehensive program:
- Strong government commitment
- Sound MNH policy and strategy with focus on PPH
- Consensus among stakeholders
- Effective monitoring component
- Efficient use of available resources
- Appropriate innovations
Programming to Prevent Deaths from PPH

- Build consensus among stakeholders effective PPH prevention approaches
- Develop a comprehensive PPH strategy that addresses prevention and management in community and facility
- Procure and register necessary drugs (misoprostol)
- Develop M&E plan that uses existing data collection systems with additions as necessary
- Implement strategy, including logistics, training, BCC, service delivery, community involvement, and referrals

Results of PPH-Focused Programming

- Increased uterotonic coverage, especially in areas with low levels of skilled attendance
- Increased skilled attendance at birth
- Decreased PPH cases
- Reduced maternal and newborn mortality
- Increased awareness of danger signs
- Strengthened health systems and improved quality of services

Conclusions

- PPH is the leading cause of maternal mortality.
- PPH is preventable.
- A range of interventions are available for PPH prevention and management for situations with and without skilled attendance at birth—but need to be implemented at scale.

We may have a long way to go….

But we have solutions at hand

Let us TAKE ACTION NOW!