This annotated bibliography is the result of an evidence review of nearly 200 articles on topics related to postpartum hemorrhage (PPH) prevention and management. After an extensive technical review, the 20 most important articles are abstracted in Section 1 to highlight the key findings and implications for public health programming. Other important articles are listed as references in Section 2.

To guide the use of this document, the following table identified where to find key evidence on various topics:

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This annotated bibliography has been prepared for MCHIP in December 2010 by Vandana Tripathi, from the Johns Hopkins University Bloomberg School of Public Health.
SECTION 1: ABSTRACTS

A. General PPH: Statistics, Guidelines, Risks and Strategies


**Background:** Meeting the Millennium Development Goal regarding maternal health requires a reduction in mortality from PPH. To achieve this reduction, “countries need evidence-based guidelines on the safety, quality and usefulness” of interventions related to PPH management. “These will provide the foundation for the strategic policy and program development needed to ensure realistic and sustainable implementation of appropriate interventions.”

**Objectives/Aims:** To present guidelines, including care pathways, on high-priority questions related to the management of PPH.

**Methods:** Relevant WHO departments drafted questions “on interventions and a list of possible outcomes.” These questions were shared with an international panel of experts, who rated these in terms of priority. The Centro Rosarino de Estudios Perinatales (CREP), a WHO collaborating center in maternal and perinatal health, reviewed the published research evidence to answer these questions, using the Grading of Recommendations, Assessment, Development and Evaluation (GRADE) methodology.

**Key Points:** The Guidelines present recommendations on key questions related to:
- Diagnosis of PPH
- Management of atonic PPH
- Management of retained placenta
- Choice of fluid for replacement or resuscitation
- Health systems and organizational interventions

Among the topics addressed are: estimating blood loss; choice of uterotonics; non-medical interventions such as uterine packing and compression; and antibiotics after manual extraction of retained placenta. GRADE table summaries are provided of the evidence related to each question.

In addition to providing recommendations related to specific questions, the guidelines provide an insert detailing care pathways (algorithm) for PPH management. These pathways assume “the presence of a skilled caregiver and a facility with basic surgical capacity.” The pathways use a stepwise approach building on the Algorithm of the Society of Obstetricians and Gynecologists, Canada. The steps include: patient assessment; immediate non-specific lifesaving measures; and directive therapy following a PPH diagnosis. The guidelines also discuss local adaptation and highlight research questions that need further evidence: accuracy of blood loss measurement; misoprostol dosage (in places where oxytocin is not available); non-medical procedures (e.g., uterine massage); training programs; and implementation research.
B. Active Management of third stage labor (AMTSL): evidence and obstacles

|---|---|

**Background:**
The third stage of labor is defined as the time from the birth of the baby to the expulsion of the placenta. Some women experience “considerable blood loss during or after” this stage, including PPH. Expectant management of the third stage is a “hands-off” approach, in which the placenta is delivered “spontaneously or with the aid of gravity, maternal pushing or, sometimes, nipple stimulation.” AMTSL includes the “routine administration” of a prophylactic uterotonic drug, early cord clamping and cutting, and controlled cord traction “to deliver the placenta.” Variations in AMTSL include the choice of uterotonic and timing of other interventions. Mixed management involves elements of both expectant management and AMTSL.

**Objectives/Aims:**
“To compare the effects of active versus expectant management of the third stage of labor on severe primary PPH, blood loss and other maternal and infant outcomes.... To compare variations in the packages of active and expectant management of the third stage of labor....”

**Review Design:**
Review including all randomized and quasi-randomized controlled trials comparing active vs. expectant management of the third stage of labor.

**Included Studies:**
5 hospital-based studies were included, involving 6,486 women. The studies were conducted in the United Kingdom, Ireland and Abu Dhabi.

**Results:**
Compared with expectant management, “active management reduced the average risk of maternal primary hemorrhage (>1000 mL blood loss) (RR=0.34, CI: 0.14–0.87) and... maternal hemoglobin <9 g/dl following birth (RR=0.50, CI: 0.30–0.83).” AMTSL was not associated with differences in Apgar scores <7 at 5 minutes. Among secondary outcomes, AMTSL was associated with significant reductions in primary blood loss >500 mL, mean maternal blood loss, and maternal blood transfusion, iron therapy, and therapeutic uterotonics. “Active management showed significant increases in maternal diastolic blood pressure, after-pains, use of analgesia, more women returning to hospital with bleeding” and decreases in infant birth weight “reflecting the lower blood volume from interference with placental transfusion.” Analysis restricted to women at low risk of bleeding showed similar findings, but there was no significant difference in risk of severe hemorrhage.”

**Conclusions/Discussion:**
The authors note, “active management reduced the risk of severe bleeding, but it would be important to investigate if this benefit arose from the uterotonic component of the active management alone.” They suggest that negative effects of AMTSL may be related to uterotonic choice, controlled cord traction, and/or early cord clamping. The authors note that their interpretation is less positive than an earlier Cochrane Review (Prendiville 2000), largely because of concerns regarding hypertension and reduced infant birth weight. The authors note, “The evidence shows a balance of benefits and harms for active management... it is now critical to look at the advantages and disadvantages of the individual components of third stage management to see if the benefits can be achieved with fewer harms.” The authors suggest that modifications of AMTSL may be useful (e.g., deferring cord clamping and avoiding ergot) to avoid hypertension and interference with placental transfusion, and that women should be given information on the benefits and harms to support informed choice.

**Background:** AMTSL has been proven effective in preventing blood loss, PPH and prolonged third stage of labor. AMTSL is recommended by the International Confederation of Midwives (ICM), the International Federation of Gynecology and Obstetrics (FIGO) and WHO. However, data on AMTSL practices are limited and show wide variation in facility-specific studies.

**Objectives/Aims:** "To document the use of AMTSL in a nationally representative sample of facility-based deliveries in a diverse group of developing countries and to identify common practices and policies associated with such use. The ultimate aim is to promote the development of international strategies to decrease PPH through expanded use of AMTSL."

**Study Design:** Observational study with nationally representative facility sampling

**Setting:** Facilities in Benin, El Salvador, Ethiopia, Honduras, Indonesia, Nicaragua and the United Republic of Tanzania. In non-African countries, the facilities were district hospitals or higher level. In the African countries, they included health centers.

**Sample:** 1,810 deliveries observed at 173 facilities in the study countries.

**Methods:** Review of national policy documents and the observation of a nationally representative sample of 180 to 408 facility-based vaginal deliveries in each country to assess the performance of AMTSL.

**Results:** Use of a uterotonic drug in the third or fourth stage of labor was common (95.7% or more) in all countries but El Salvador (60%). However, only 0.5% to 32% of deliveries received correct AMTSL using the ICM-FIGO definition. Even correct use of a uterotonic drug varied widely; e.g., in Tanzania, the correct dose of ergometrine 0.2mg was not used in any delivery because ampoules of this dose were not available. There was also great variation in the practice of AMTSL elements such as immediate fundal massage with follow-up palpation and controlled cord traction. A harmful practice related to AMTSL (e.g., controlled cord traction without uterine support) was observed in 48–94% of deliveries. Overall, AMTSL performance was better in national hospitals than in lower-level facilities; in Benin, Ethiopia, and Honduras, “deliveries in lower-level facilities were approximately 40–80% less likely to receive correct AMTSL.” While AMTSL training was widespread, in many countries and facilities, it was provided to inappropriate staff (e.g., physicians in contexts where midwives perform over 90% of births. Every country but Indonesia had multiple, conflicting, and/or outdated AMTSL.

**Conclusions/Discussion:** This study found that prophylactic use of a uterotonic drug in the third or fourth stage of labor was nearly universal. However, the majority of deliveries are not managed with correct AMTSL, as defined by ICM/FIGO or Cochrane. Additionally, harmful practices related to AMTSL are widespread, and the limited practice of other AMTSL interventions suggests “insufficient surveillance of women during the hours when most maternal deaths occur worldwide.” Due to these gaps, the authors estimated that there are 1.4 “lost opportunities to prevent PPH in these seven countries alone.” The study has implications for policy reform as well as training and behavior change interventions in settings where correct use of AMTSL has not yet become universal.
### C. Controlled Cord Traction (CCT) and Other Non-Uterotonic PPH Prevention

**[NO ABSTRACTS]**

### D. Oxytocin (Including in Uniject)

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<tr>
<td><strong>Background:</strong></td>
<td>The third stage of labor is the “period from delivery of the baby until delivery of the placenta.” PPH is the major complication that can occur at this stage. Uterotonic drugs, which increase the tone of uterine muscles, were initially introduced for PPH treatment. At the time of this review, less was known about their role in routine prophylaxis against PPH.</td>
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<tr>
<td><strong>Objectives/Aims:</strong></td>
<td>“To examine the effect of oxytocin given prophylactically in the third stage of labor... on outcomes such as maternal blood loss and the length of the third stage of labor, other effects on the mother, and the outcome for the newborn baby.”</td>
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<td><strong>Review Design:</strong></td>
<td>The review considered all randomized or quasi-randomized controlled trials; trials were excluded “if there was potential for significant exclusion bias after trial entry.”</td>
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<td><strong>Included Studies:</strong></td>
<td>The review included 14 trials.</td>
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<td><strong>Results:</strong></td>
<td>In 7 trials (n&gt;3,000), prophylactic oxytocin was associated with reduced blood loss compared to no uterotonics (RR=0.50, CI: 0.38–0.64). In 6 trials (n&gt;2,800), there was “little evidence of differential effects for oxytocin vs. ergot alkaloids,” however, oxytocin was associated with fewer manual removals of placenta (RR=0.57, CI: 0.41–0.79) and less raised blood pressure (RR=0.53, CI: 0.19–1.52). In 5 trials (n&gt;2,800), “there was little evidence of a synergistic effect of adding oxytocin to ergometrine versus ergometrine alone.”</td>
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<td><strong>Conclusions/Discussion:</strong></td>
<td>Despite limitations in data, “there appears to be a clear practice implication in favor of using oxytocin.... Oxytocin used routinely after birth... can reduce blood loss, but more research is needed on possible adverse effects.” The authors note that there is insufficient information on side effects and that all included trials were conducted in developed country or hospital settings. The authors note the need for further research on active management, including in home delivery settings, as well as research on dosing and alternative uterotonics. Finally, the authors note that “the balance of evidence does not support the prophylactic use of ergot alkaloids alone (in contrast to either oxytocin alone or to ergometrine-oxytocin).”</td>
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**Background:** PPH is the most common cause of maternal mortality. While AMTSL has been recognized as reducing the risk of PPH, much of the evidence base comes from developed country or high-resource settings. In developing countries, AMTSL may improve postpartum care; this “expected improvement might be further enhanced by the choice of method for oxytocin administration.” The Program for Appropriate Technology in Health (PATH) has “developed the UniJect device, which holds a prefilled dose of 1.0ml (10IU) oxytocin in a disposable, cushion-like package with a sterile needle attached.” At the time of this study, oxytocin in UniJect had not been tested in a low-income country as part of AMTSL.

**Objectives/Aims:** “To introduce the new device for administration of oxytocin to evaluate its efficacy and acceptability in clinical practice in an African setting” and to “elucidate whether this approach could help decrease the prevalence of PPH among women in obstetric care with extremely limited resources.”

**Study Design:** Non-randomized prospective comparison study with pre-intervention phase controls

**Setting:** Maternidade Lucrécia Paim, a university maternity hospital in Luanda, Angola.


**Intervention:** Pre-intervention controls received expectant management—no element of AMTSL, including a uterotonic, was routinely provided after delivery. Following a comprehensive provider training on AMTSL including administration of oxytocin with UniJect, women giving birth during the intervention phase received AMTSL with intramuscular (IM) oxytocin delivered through UniJect.

**Results:** The intervention group experienced significantly decreased blood loss and decreased interval between birth of the baby and delivery of the placenta. Mean blood loss was 447mL in the pre-intervention group vs. 239mL in the intervention group (p<0.001). 40.4% (n=316) of the women in the pre-intervention group experienced PPH vs. 8.2% (n=67) of those in the intervention group. 5.4% of women in the pre-intervention group delivered the placenta in less than 10 minutes vs. 89.4% of the women in the intervention group (p<0.001). 7.5% (n=59) of the pre-intervention group experienced severe PPH compared with 1% (n=8) of the intervention group. There was no significant difference in manual removal of the placenta between the two groups. There was “an unexpectedly high” prevalence of PPH in the pre-intervention group. The authors speculate that this may due to liver damage related to hepatitis.

**Conclusions/Discussion:** The authors note that parallel studies in the same setting found that women and midwives had a positive response to UniJect and that midwives had no trouble using the device. “This study demonstrates a more dramatically beneficial effect of AMTSL than in the quoted meta-analysis from more affluent countries.” The authors note that “by using UniJect, the logistical problems of syringes and needles are avoided,” an important consideration in low-income countries with concerns related to supply chain, disposal and reuse.
### E. Misoprostol for PPH Prevention

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<td><strong>Background:</strong></td>
<td>No large randomized controlled trial has evaluated whether misoprostol can be safe, efficacious and feasible for prevention of PPH in a community setting. While oxytocin has been the preferred drug for PPH prevention in the context of AMTSL, misoprostol has practical advantages in the community setting and in the absence of a skilled provider (e.g., it is shelf-stable and does not require injection).</td>
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<td><strong>Objectives/Aims:</strong></td>
<td>To test the hypothesis that 600 µg oral misoprostol administered by auxiliary nurse midwives (ANMs) in a rural community setting would reduce the rate of acute PPH by 50%, compared with women given a placebo.</td>
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<td><strong>Study Design:</strong></td>
<td>Randomized controlled trial</td>
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<td><strong>Setting:</strong></td>
<td>Belgaum District, Karnataka State, India</td>
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<td><strong>Sample:</strong></td>
<td>1,620 pregnant women randomized to receive misoprostol (n=812) or placebo (n=808)</td>
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<td><strong>Intervention:</strong></td>
<td>Single oral dose of 600 µg of misoprostol (3 tablets) or placebo (identical tablets) administered by an ANM after delivery and within 5 minutes of clamping and cutting the umbilical cord.</td>
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<td><strong>Results:</strong></td>
<td>The incidence of acute PPH was 6.4% among women who received misoprostol (n=52) vs. 12.0% among women who received the placebo (n=97). Both incidence of severe PPH and mean blood loss were also significantly lower in the misoprostol group. The mean blood loss was 214.3 mL in the misoprostol group vs. 262.3 mL in the placebo group (p-value &lt; 0.0001). Women who received misoprostol were also less likely to need an emergency transfer, blood transfusion, or surgical interventions. Women receiving misoprostol experienced transient increases in shivering, but “there were no differences in rates of nausea, vomiting or diarrhea.”</td>
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<td><strong>Conclusions/Discussion:</strong></td>
<td>This study found that misoprostol could be delivered with efficacy and feasibility in a rural delivery setting (home or sub-center). Misoprostol reduced acute PPH by almost 50% compared to placebo, and was associated with an 80% reduction in acute severe PPH. Misoprostol reduced mean blood loss by 20% overall, with greater decreases in the second hour postpartum. Side effects were minor and transient, with no evidence of longer-term adverse effects or effects on the newborn.</td>
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**Background:**
PPH is a major cause of mortality and morbidity worldwide. AMTSL, including the administration of a uterotonic, is associated with less blood loss. The most commonly used uterotonic are oxytocin and ergot preparations, but these require temperature stability, syringes and trained staff for administration. Ergot preparations also have a high incidence of side effects. Prostaglandins, including misoprostol, may be an alternative for use in AMTSL; they have their own advantages (e.g., availability in tablet form) and disadvantages (side effects).

**Objectives/Aims:**
“To determine the effectiveness of prophylactic prostaglandin use compared to placebo or conventional uterotonic as part of the routine management of the third stage of labor.”

**Review Design:**
Review of randomized controlled trials with a comparison between a prostaglandin and either another uterotonic agent or no uterotonic agent.

**Included Studies:**
46 trials were included (n=42,621 women). 37 evaluated misoprostol and the remainder evaluated injectable prostaglandins (including 1 trial comparing misoprostol with IM prostaglandin).

The largest trial included was the WHO 2001 trial with 18,530 women from 9 countries. Most trials were conducted in hospitals, but 2 trials (Gambia, India) involved interventions at the community level. The primary outcomes were blood loss of ≥1000 mL or more and use of additional uterotonic.

**Results:**
Oral or sublingual misoprostol compared to placebo may be effective in reducing severe PPH and blood transfusion. Compared to injectable uterotonic, oral misoprostol was associated with higher risk of severe PPH (RR=1.32, CI: 1.16–1.51) and use of use of additional uterotonic. Although oral misoprostol was associated with fewer blood transfusions (RR=0.81, CI: 0.64–1.02), this was not statistically significant. Misoprostol use is associated with significant increases in shivering and fever (RR ranging from 1.43–69.10). A number of outcomes were not aggregated across trials for analysis due to heterogeneity between trials.

**Conclusions/Discussion:**
The review concluded that “misoprostol orally or sublingually at a dose of 600 µg shows promising results when compared to placebo in reducing blood loss after delivery.” Positive results (compared to placebo) have also been reported in trials using 400 µg orally and 600 µg sublingually. The review recommended research to establish the lowest effective dose and optimal route of administration. However, the review also stated that oxytocin should be the drug of choice in settings where AMTSL is practiced and that “getting oxytocin used as widely as possible should be the primary aim for deliveries occurring outside hospitals.” The review concluded that misoprostol could be used in settings where conditions for oxytocin use cannot be met.

Background: Uterotonic drugs during the third stage of labor can reduce blood loss and the risk of PPH. However, they are associated with side effects (particularly ergot preparations) and require injection as well as refrigeration and protection from light. In this context, misoprostol has “attracted widespread attention because of its strong uterotonic effects and ease of administration.”

Objectives/Aims: “To test the hypothesis that misoprostol use in the AMTSL is equivalent to that of oxytocin in terms of measured blood loss of 1000 mL or more and the use of additional uterotonics without an unacceptable level of side-effects.”

Study Design: Multi-center randomized controlled trial

Setting: Hospitals in Argentina, China, Egypt, Ireland, Nigeria, South Africa, Switzerland, Thailand, and Vietnam.

Sample: 18,530 women, including 9,264 women randomized to misoprostol and 9,266 randomized to oxytocin.

Intervention: Women received either 600 µg misoprostol (3 tablets) or 10 IU oxytocin plus placebo tablets. All women received AMTSL, including “use of a uterotonic, clamping and cutting of the umbilical cord immediately after delivery of the infant, and either fundal or suprapubic pressure with cord traction after signs of placental separation.” Hospitals followed their own standard procedures in case of PPH.

Results: Of women who received misoprostol, 4% had measured blood loss ≥1000 mL vs. 3% in the oxytocin group (RR= 1.39, CI: 1.19–1.63). More women who received misoprostol than who received oxytocin (15% vs. 11%) needed additional uterotonics (usually oxytocin). Across centers, the misoprostol group had a high risk for blood loss ≥500 mL (RR range: 1.0–2.6). “There were no significant differences between misoprostol and oxytocin with regard to other secondary outcomes such as delayed PPH or manual removal of the placenta” and interventions related to severe bleeding. “Fewer women in the misoprostol group needed postpartum blood transfusion,” although this was only marginally significant (0.8% vs. 1.0%, RR=0.74, CI: 0.55–1.01). Misoprostol was associated with significantly higher rates of shivering, fever, nausea, vomiting and diarrhea.

Conclusions/Discussion: This trial did not compare misoprostol to placebo; trials of such comparisons have found that misoprostol reduces the risk of blood loss of ≥1000 mL. However, misoprostol did not perform within the pre-specified range to establish clinical equivalence with oxytocin. The authors conclude that, “In settings in which AMTSL with oxytocin is the norm, we do not recommend a change in practice.” In health facilities, “oxytocin should be considered as the uterotonic of choice over oral misoprostol 600 µg.”
## Full citation:

## Background:
Misoprostol has drawn “considerable attention” as an intervention to reduce the risk of PPH because it is inexpensive and stable. “Caution has been urged” because of misoprostol’s dose-dependent and “potentially life-threatening” side-effects and its pharmacological effects on organ systems. “Because of its enormous potential benefits as an effective, oral uterotonic during the third stage of labor, and its likely use on a large scale worldwide, it is important to monitor misoprostol’s benefits as well as its potential risks, both direct and indirect.”

## Objectives/Aims:
“To investigate maternal deaths and severe morbidity in connection with the use of misoprostol for preventing or treating PPH during the third stage of labor, as well as to see whether side effects were dose-related. A secondary objective was to determine the relative effectiveness of 600 µg of misoprostol versus smaller doses.”

## Review Design:
Included randomized controlled trials that compared misoprostol given to prevent or treat PPH with either placebo or another uterotonic.

## Included Studies:
46 trials (n>40,000 women) were included.

## Results:
**Adverse outcomes:** In 5 trials reporting maternal deaths, 8 of 11 deaths were among women receiving misoprostol (Peto OR\(^2\): 2.49, CI: 0.76–8.13). “When misoprostol was compared with other uterotonics, a similar number of adverse events were reported in both prevention and treatment trials. **Blood loss:** Misoprostol was associated with less blood loss compared to placebo (RR=0.77, CI: 0.59–1.00). 400 µg misoprostol was also associated with less blood loss compared to placebo (RR=0.63, CI: 0.44–0.91). When given additionally to routine care, 600–1000 µg of misoprostol “in split doses orally, sublingually and/or rectally was more effective than placebo at reducing an additional blood loss ≥1 500 ml after PPH (RR=0.57, CI: 0.34–0.96).” However, 600-800 µg misoprostol was less effective than other uterotonics (RR: 1.36; 95% CI: 1.17–1.58). Notably, there was no evidence of “a benefit of 600 µg over 400 µg of misoprostol for reducing blood loss ≥1000 ml (RR=1.02, CI: 0.71–1.48).” **Pyrexia (fever):** 600 µg of misoprostol produced pyrexia more often than 400–500 µg compared to both placebo and other uterotonics. Pyrexia was more common in those receiving 600 µg vs. 400 µg misoprostol (RR=2.53, CI: 1.78–3.60).

## Conclusions/Discussion:
The authors note the need for research to “establish the smallest dose of (misoprostol) that is effective and safe” given the dose-dependent nature of side effects. They also caution that “the use of misoprostol should not detract from international efforts to ensure that all childbearing women have access to conventional uterotonics that have been proven safe and effective.”

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\(^1\) A Peto Odds Ratio is a statistical measure that can be used when events are very infrequent.
Background: Almost half of maternal deaths in Nepal are attributed to PPH. Coverage with AMTSL remains low. Given low use of institutional deliveries, efforts to increase AMTSL coverage must be complemented with “simpler, less resource-intensive interventions with the potential to reach women who otherwise would not receive skilled care.” One such intervention is misoprostol, whose oral administration and shelf-stability makes it “suitable in the absence of skilled care and/or when oxytocin is not available.” At the time of this study, there had been no “documented community-based distribution at scale of misoprostol through public sector cadres.”

Objectives/Aims: “To investigate: (1) the feasibility (including service coverage and uptake of promoted self-care practices); (2) acceptability (to providers and beneficiaries); and (3) safety of community-based distribution of misoprostol to pregnant women.” A secondary aim was “to show that making misoprostol available for self-administration at home delivery would not undermine efforts to increase skilled care at birth.”

Study Design: A prospective intervention study

Setting: Banke district, Nepal

Sample: 18,761 misoprostol recipients; 840 baseline and 840 endline survey respondents.

Intervention: Peripheral health workers and female community health workers (FCHVs) were trained to “identify pregnant women in their area, provide prenatal health education, dispense misoprostol (3 200 µg tablets) late in pregnancy (eighth month), and make early postnatal home visits.” Prenatal education included information on timing of misoprostol use and expected side effects. Data came from program records and household surveys.

Results: Survey data: “73.2% of recently delivered women reported having received misoprostol from an FCHV during pregnancy.” Uterotonic coverage among women with vaginal births increased from 11.6% at baseline to 74.2% at endline (OR=25.0, CI: 15.6–40.1); the greatest increase was among women in the two lowest wealth quintiles. There was a significant difference at baseline in uterotonic protection of literate vs. illiterate mothers (19.8% vs. 6.9%, OR=3.3, CI: 2.1–5.1); at endline, there was no significant difference between the two groups (76.9% vs. 73.4%, OR=1.2, CI: 0.8–1.8). Among women who received misoprostol but did not take it (26.5%), 75.6% said this was due to delivering at a health facility, being attended by a health provider, and/or receiving an injection after delivery from a health provider. A greater, but statistically insignificant, proportion of misoprostol users (18.3% vs. 14.2%) reported shivering. No women surveyed reported taking misoprostol before delivery. Program data: 74.5% (n=13,969) of women who received misoprostol took it. One woman reported taking misoprostol before delivery. There were 10 maternal deaths among women who received misoprostol vs. 35 deaths among women in the program location/information system who did not receive misoprostol (n=12,031).

Conclusions/Discussion: “This study has shown that it is feasible to achieve high population coverage of misoprostol through distribution at the community level by public sector cadres.” Poorer, illiterate and more remote women experienced the greatest expansion of uterotonic protection. The authors note that community-based efforts did not detract from efforts to increase institutional delivery and improve quality of care. The Banke district experienced a substantial increase in institutional deliveries during the period of the intervention, as well as in the proportion of institutional births in which oxytocin was provided after delivery.
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<td>Background:</td>
<td>AMTSL reduces the risk of PPH. Conventional uterotonics for AMTSL include oxytocin and ergot derivatives. Newer uterotonics include prostaglandin analogs such as misoprostol and 15-methyl PGF2α. WHO recommends oxytocin for prophylaxis as part of AMTSL. However, oxytocin presents challenges related to storage and health worker capacity in the developing world.</td>
</tr>
<tr>
<td>Objectives/Aims:</td>
<td>“To compare the efficacy of conventional oxytocic 0.2 mg IM methyl-ergometrine with 400 µg sublingual misoprostol and 125 µg IM 15-methyl PGF2α” in AMTSL.</td>
</tr>
<tr>
<td>Study Design:</td>
<td>Randomized trial (control arm not identified)</td>
</tr>
<tr>
<td>Setting:</td>
<td>All-India Institute of Medical Science, New Delhi, India</td>
</tr>
<tr>
<td>Sample:</td>
<td>200 women, including 66 women randomized to misoprostol, 67 randomized to methyl-ergometrine, and 67 randomized to 15-methyl PGF2α.</td>
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<tr>
<td>Intervention:</td>
<td>Women were randomized to one of three groups when “vaginal delivery was imminent.” Group 1 received 400 µg sublingual misoprostol, Group 2 received 0.2 mg IM methyl-ergometrine, and Group 3 received 125 µg IM 15-methyl PGF2α. The BRASS-V calibrated drape and blood-soaked gauze pieces were used to measure blood loss. Oxytocin infusion was provided if bleeding “was excessive.”</td>
</tr>
<tr>
<td>Results:</td>
<td>The median blood loss and proportion of women experiencing blood loss &gt;500 mL were not significantly different between the groups. 12.1% of the misoprostol group, 17.9% of the methyl-ergometrine group, and 19.4% of the 15-methyl PGF2α group experienced blood loss &gt; 500 mL. Mean blood loss was 223.5 mL in the misoprostol group, 194.0 mL in the methyl-ergometrine group, and 227.0 mL in the 15-methyl PGF2α group. There were also not significant differences in the need for additional oxytocic requirement, change in hemoglobin concentration, or duration of the third stage of labor between the three groups. Significantly more women in the misoprostol group experienced fever, vomiting and shivering; significantly more women in the 15-methyl PGF2α group experienced diarrhea.</td>
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<tr>
<td>Conclusions/Discussion:</td>
<td>“Our study showed that sublingual misoprostol appears to be as effective as IM methyl-ergometrine and IM 15-methyl PGF2α in the prevention of PPH.” The authors indicate that this is the first study to “compare two prostaglandin analogs to conventional uterotonic simultaneously.”</td>
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F. Misoprostol for PPH management


**Background:** “Although oxytocin is regarded as the gold standard for treatment of PPH, misoprostol, a prostaglandin E1 that induces uterine contractions, has been proposed as a low-cost, easy-to-use alternative.” At the time of the study, evidence regarding misoprostol for PPH treatment was weak, despite the ad hoc use of the drug in clinical practice.

**Objectives/Aims:** “To establish whether 800 µg sublingual misoprostol is non-inferior to (40 IU) oxytocin delivered intravenously for treatment of primary PPH due to suspected uterine atony in women who have received prophylactic oxytocin during the third stage of labor.”

**Study Design:** Double-blinded, randomized, non-inferiority trial

**Setting:** 5 hospitals in: Burkina Faso (1); Egypt (1); Turkey (1); and Vietnam (2).

**Sample:** 809 women with PPH; 407 treated with misoprostol, 402 treated with oxytocin.

**Intervention:** The study was set in hospitals that routinely used oxytocin in the third stage of labor. Postpartum blood loss was measured using the BRASS-V calibrated drape. Need for treatment of PPH due to suspected uterine atony “was determined by clinical judgment or blood loss reaching 700 mL in the calibrated drape during the first hour after delivery.” Women were randomized to receive either 800 µg sublingual misoprostol or 40 IU intravenous oxytocin. “If active bleeding did not stop within 20 minutes of initial treatment, providers were instructed to give standard care,” but asked to avoid providing misoprostol beyond an additional 200 µg ....

**Results:** “Active bleeding was controlled within 20 minutes with the initial treatment” for 89% of women who received misoprostol and 90% of women who received oxytocin (RR=0.99, CI: 0.95–1.04). 34% of women who received misoprostol and 31% of women who received oxytocin experienced additional blood loss of ≥300 mL (RR=1.12, CI: 0.92–1.37). There was also no difference between the groups in additional blood loss of ≥500 mL after treatment (RR=1.09, CI: 0.77–1.54). However, more women who received misoprostol experienced additional blood loss of ≥1000 mL after treatment (RR=3.62, CI: 1.02–12.89). There was no difference between the misoprostol and oxytocin groups in the proportion of women in whom active bleeding restarted or who needed additional uterotonics. There was also no difference in the proportion who received blood transfusions (6% misoprostol, 4% oxytocin; RR=1.32, CI: 0.73–2.39). However, women given misoprostol “were more likely to undergo intrauterine exploration under anesthesia” than those given oxytocin (RR=1.66, CI: 1.00–2.76). Shivering and fever were also significantly more frequent among women who received misoprostol. The difference in uncontrolled bleeding between women who received misoprostol and oxytocin fell within the pre-specified non-inferiority range.

**Conclusions/Discussion:** “These findings provide evidence that 800 µg sublingual misoprostol is a viable alternative to 40 IU intravenous oxytocin for treatment of primary PPH after oxytocin prophylaxis during the third stage of labor.” Although there was no difference between groups in most outcomes, women who received misoprostol were more likely to experience additional bleeding of ≥1000 mL compared to those receiving oxytocin. Women in this trial received prophylactic oxytocin; “very little is known about treatment for PPH in women given misoprostol prophylactically in the third stage of labor” and whether misoprostol would be effective treatment in such cases.
Background: Uterotonic drugs are a “crucial aspect” of PPH treatment. “To date, there is insufficient evidence to support the use of misoprostol for routine treatment of PPH.”

Objectives/Aims: To conduct a literature review to “determine whether misoprostol is an effective treatment for PPH and in what dose.”

Review Design: No information

Included Studies: 7 uncontrolled studies and 3 randomized controlled trials

Results: Uncontrolled studies used a wide range of doses (200 to 1200 µg) and routes of administration of misoprostol to treat PPH, and reported success rates of 88% to 100% among small samples (1-44 women). 1 RCT “suggests that 800 µg rectal misoprostol may be more effective than syntometrine for treatment of PPH.” Meta-analysis of data from two trials comparing misoprostol vs. placebo for treatment found a significant reduction in blood loss >500 mL (RR=0.57, CI: 0.34–0.96). Recent studies also suggest that, “in settings in which no injectable uterotonic are available, misoprostol 800 µg in 30 mL saline injected into the umbilical vein may be used for the treatment of retained placenta.” However, evidence regarding this use is very limited.

Conclusions: The authors note that, “Given the limited evidence... the strong recommendation is that providers continue to use all available standard methods for PPH treatment and use misoprostol when other methods are not available or have failed.” The authors note that there is insufficient evidence to recommend the use of misoprostol for treatment, but propose 600 µg orally or sublingually for the primary treatment of PPH “in settings where no other uterotonic are available.” The authors also discuss common side effects and their management. Several cautions are also advised, including when “using misoprostol for PPH in instances where the woman may have already received misoprostol as prophylaxis for PPH prevention. Misoprostol should not be used for PPH treatment if it was already given for PPH prevention within the last two hours. If the initial dose was associated with pyrexia or marked shivering, then at least six hours should lapse before the second dose is given. All potential causes of PPH should be explored to assure that the PPH is not due to another factor besides uterine atony.”

Background: Administration of a uterotonic drug “immediately after delivery is an effective way of preventing PPH and is strongly recommended around the world.” There has been controversy regarding the “relative place” of misoprostol and oxytocin in PPH prevention and treatment. This commentary discusses recent research findings and their implications for PPH programs.

Key Points: Reviews of research have shown that oxytocin reduces the risk of PPH “by at least 50%.” Misoprostol has also shown to “reduce the frequency of PPH.” However, at least one hospital-based trial has found misoprostol to be less effective than oxytocin and to cause more side effects.

Therefore, oxytocin is the drug of choice, and misoprostol is an alternative when the use of oxytocin is not possible. Oxytocin could be used more widely, including in settings with less skilled health providers, through its delivery in pre-filled, disposable UniJect devices. The authors of the commentary interpret recent research as confirming that oxytocin is the drug of choice for both prevention and treatment in hospital settings. “The risk of additional blood loss of 300 mL or more was 78% more frequent with misoprostol. The higher frequency of PPH (10%) in this trial compared with the trial of women receiving prophylactic oxytocin (3%) also confirms that prophylactic oxytocin for the prevention of PPH should be universal.”

The authors agree with recent research concluding that misoprostol should be used for treating PPH if oxytocin is not available; however, they note that “extreme caution should be the rule if women have already received prophylactic misoprostol during the third stage of labour” because of concerns regarding both side effects and efficacy. “If oxytocin UniJect is available for prevention of PPH in the community, the use of multiple UniJect IM injections for treating the remaining cases of PPH should be explored as a potential new approach.” The authors also note the need for research regarding the safety and effectiveness of lower doses of misoprostol for prevention and treatment. “We should avoid a confrontation between misoprostol and oxytocin... However, oxytocin is the drug of choice, and every effort should be made to make it widely accessible, including at the community level. Misoprostol is an option when oxytocin is not available, which hopefully should become increasingly uncommon.”
**Background:** "The WHO recommends ATMSL with uterotonics, preferably oxytocin." In a context of high-levels of home delivery and limited access to oxytocics and health workers trained to provide injections, misoprostol has been identified as "as an underused technology to reduce maternal mortality." Currently, "where a trained health professional is not present, misoprostol is the only option... to prevent or treat PPH."

**Objectives/Aims:** "To determine whether traditional birth attendants (TBAs) can diagnose and treat PPH with misoprostol."

**Study Design:** Non-randomized prospective intervention study with geographically non-adjacent controls.

**Setting:** Kigoma, Tanzania

**Sample:** 849 women; 454 in the intervention group and 395 in the control group.

**Intervention:** Blood loss was measured using kangas (local cloths); "two kangas soaked with blood (after delivery of the baby) represented slightly more than 500 ml." TBAs were trained to follow inclusion criteria, deliver the specified intervention, and stay with the delivering woman for "at least 4-hour after delivery, or until referring the women to the health facility." In the intervention group, TBAs delivered 5 tablets of misoprostol rectally (1000µg) "to all women delivering vaginally with subsequent blood loss of 500 ml or more." "TBAs were instructed to refer women to the nearest facility 20-30 minutes after administration of misoprostol if no significant change in blood loss was observed," or if other clinical signs of deterioration were observed. In the control group, TBAs were trained to refer women with postpartum blood loss of ≥500 ml to the nearest facility.

**Results:** "Eight women (2%) in the intervention area and 76 (19%) in the non-intervention area were referred to health facilities after delivery (OR=0.1, CI 0.0–0.2). Of those referred, 1% from the intervention area and 95% from the non-intervention area needed additional interventions due to PPH." None of the women who received misoprostol experienced lasting side effects or needed referral to a facility as a result of those effects.

**Conclusions/Discussion:** The authors conclude that "Kigoma TBAs diagnosed PPH satisfactorily and those in the intervention area used rectal misoprostol effectively to treat PPH after home births. This technically simple intervention can have a powerful effect in preventing death during home delivery,... The therapeutic use of misoprostol also saves health service resources and saves families from spending money on transportation and hospitalization." The authors suggest that, "where TBAs can dispense misoprostol, treatment is likely to remain preferable to prevention as it lowers the cost and avoids subjecting every woman to possible side effects." The kanga provided a fairly reliable and accurate low-tech way to measure blood loss. The authors also note that TBAs in the control area began to ask for misoprostol as they heard about it and observed an increase in status for TBAs in the intervention area. Study limitations beyond the lack of randomization are not discussed.
### Full citation:

### Background:
Although oxytocin is “the drug of choice drug of choice to treat excessive post-partum bleeding,” constraints related to storage and the need for skilled health care personnel limit its availability in low-resource settings. Misoprostol has been found to be “more effective than placebo in prevention of PPH in community-based settings but less effective than injectable oxytocin.” However, there is less evidence regarding its role in treatment. “The present study was undertaken because of the need for alternative treatment options for use in settings in which oxytocin is not available or its use is not feasible.”

### Objectives/Aims:
“To establish the non-inferiority of misoprostol (800 µg sublingual) compared with intravenous oxytocin (40 IU) when administered as treatment for PPH in women who were not exposed to oxytocin in the second or third stages of labor.”

### Study Design:
Double-blinded, randomized, non-inferiority trial

### Setting:
Four hospitals in: Ecuador (1); Egypt (1); and Vietnam (2).

### Sample:
978 women with primary PPH; 488 treated with misoprostol and 490 treated with oxytocin.

### Intervention:
The study was set in hospitals that did not engage in routine administration of oxytocin during the third stage of labor. Postpartum blood loss was measured using the BRASS-V calibrated drape. Providers were counseling to initiate treatment upon diagnosis of PPH or immediately upon observation of blood loss >700 mL. Women were randomized to receive either 800 µg sublingual misoprostol or 40 IU oxytocin (with the appropriate placebo in each case). “For women whose active bleeding did not stop with first-line treatment or whose condition deteriorated within the first 20 minutes, providers were instructed to give care in accordance with hospital protocol. Providers were asked to restrict additional use of misoprostol to 200 µg.”

### Results:
“Active bleeding was controlled within 20 minutes” for 90% of women given misoprostol and 96% of women given oxytocin (RR=0.94, CI: 0.91–0.98). More women in the misoprostol group experienced ≥300 mL additional bleeding (RR=1.78, CI: 1.40-2.26) and ≥500 mL additional bleeding (RR=2.84, CI: 1.63–5.01). Consistent with these findings, the median additional blood loss was greater among women who received misoprostol (misoprostol 200 mL, oxytocin 150 mL; p<0.0001). The mean time to cessation of postpartum bleeding was two minutes shorter in the oxytocin group (p=0.001). “Provision of additional uterotonics drugs, blood transfusion, and fluids or plasma expanders was more frequent for women given misoprostol than for those given oxytocin.” More women in the misoprostol group experienced shivering and fever, although all side effects were transient. “Active bleeding restarted in 16 (3%) women given misoprostol compared with nine (2%) given oxytocin,” although the difference was not significant (RR=1.79, CI: 0.80–4.00).

### Conclusions/Discussion:
Misoprostol and oxytocin were both highly effective in controlling postpartum bleeding. However, oxytocin performed better on several measures; misoprostol non-inferiority could not be established within pre-specified ranges established by the study. Comparing this study to a parallel study among women who did receive prophylactic oxytocin suggests that “both treatments were more effective and faster acting in women with a uterus not previously exposed to oxytocin for prophylaxis.” The authors conclude that “intravenous oxytocin should be used when available, but 800 µg sublingual misoprostol could be an effective first-line treatment alternative when oxytocin is not available.”

Background: To reduce the risk of PPH, the WHO recommends AMTSL “be offered to all women delivered by skilled birth attendants.” WHO defines AMTSL to include “administration of oxytocin (10 IU units by injection), clamping and cutting of the cord at around 3 minutes after birth, and delivery of the placenta by controlled cord traction.”

Objectives/Aims: “To explain current WHO position regarding misoprostol use after childbirth.”

Key Points: Misoprostol has strong uterotonic activity and is inexpensive and stable at room temperature. However, systematic reviews of randomized controlled trials show that misoprostol is less effective than oxytocin and other injectable uterotonics and has side-effects such as high temperature and shivering. WHO considers oxytocin the “recommended uterotonic for the prevention and treatment of atonic PPH.” However, as AMTSL interventions cannot be offered in settings without skilled caregivers, WHO “recommends the use of misoprostol in settings where it is not possible to use oxytocin or another injectable uterotonic such as ergometrine or an oxytocin and ergometrine fixed-dose combination.” Such administration requires training health workers to administer misoprostol correctly and to identify and manage its side effects. 600 µg orally is the recommended dose. The statement also includes WHO justification (based on concerns about side effects and other risks, as well as inconsistencies in the research evidence) for the exclusion of misoprostol from the WHO Model List of Essential Medicines for this indication. Regarding treatment, WHO notes that, when other oxytocics are unavailable “or measures fail, misoprostol can be offered at a dose between 200 and 800 µg orally or sublingually as a last resort.” WHO reports that temperature above 40 degrees Celsius (40°C) and altered consciousness have been observed with doses of 800 micrograms or higher. Finally, WHO does not recommend distribution of misoprostol to community-based health workers, women or their families.
## G. Tamponade for PPH management

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<td><strong>Background:</strong></td>
<td>“After medical treatment has failed and before major surgical intervention and hysterectomy are envisaged, uterine tamponade is a reasonable option for the management of PPH.” A condom may provide a lower-tech alternative to technologies (e.g., Sengstaken—Blakemore tube and the Rush urologic hydrostatic balloon catheter) that are expensive and not always available in low-resource settings.</td>
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<tr>
<td><strong>Objectives/Aims:</strong></td>
<td>“To establish the efficacy of this inexpensive device to control massive PPH and to evaluate postpartum morbidity related to this intervention.”</td>
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<tr>
<td><strong>Study Design:</strong></td>
<td>Non-randomized prospective study comparing treatments</td>
</tr>
<tr>
<td><strong>Setting:</strong></td>
<td>Obstetric units in Dhaka Medical College and Hospital, Bangladesh</td>
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<tr>
<td><strong>Sample:</strong></td>
<td>23 women with PPH</td>
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<tr>
<td><strong>Intervention:</strong></td>
<td>“A sterile rubber catheter fitted with a condom was introduced into the uterus. The condom was inflated with 250–500 mL normal saline.” Inflation was stopped when bleeding ceased. The vaginal cavity was filled with gauze and a sanitary pad to keep the balloon in place. The condom catheter was used for women whose PPH could not be controlled medically; however, oxytocin was still administered while the condom catheter was introduced. Prophylactic antibiotics were also administered. The condom catheter was kept in place for 24–48-hours, depending on initial blood loss. The condom catheter was introduced within 0–4-hours after delivery in more than half of cases.</td>
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<td><strong>Results:</strong></td>
<td>“In all 23 patients, bleeding was stopped within 15 minutes.” Patients were followed up for another 48–72 hours; no patient needed additional interventions. The mean volume of saline required to inflate the balloon was 336.4 mL. No patient went into irreversible shock and no intrauterine infection was documented.</td>
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<td><strong>Conclusions/Discussion:</strong></td>
<td>“When medical treatments are not readily available” or have failed, most surgical techniques entail delays and risks of their own, while requiring skilled personnel and infrastructure. The condom catheter intervention “can be done cheaply, easily, and quickly, and it does not require highly skilled personnel.” In this study, in every case, “massive bleeding was controlled very quickly by inserting and inflating the condom.”</td>
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H. Non-pneumatic anti-shock garment (NASG)


Background: Obstetric hemorrhage is the leading cause of maternal mortality. In low-resource settings, access to blood transfusions and surgery can be limited and involve major delays. An anti-shock garment can stabilize women and help them survive. The NASG is a lower-tech version of this device that “that delivers circumferential counter pressure to the lower body, legs, pelvis and abdomen” but does not have the more complicated controls of devices used in developed countries. The NASG has pressure limits that prevent it from causing adverse outcomes.

Objectives/Aims: “To examine whether adding the NASG to the standard protocol for managing hypovolemic shock secondary to obstetric hemorrhage of any etiology would improve maternal outcomes at the tertiary care level.”

Study Design: Non-randomized intervention studies with pre-intervention phase controls.

Setting: 4 tertiary facilities: 2 in Nigeria and 2 in Egypt.

Sample: 1442 women; 607 controls, 835 intervention phase.

Intervention: Pre-intervention (control): Standardized, evidence-based hemorrhage and shock protocol including: oxygen; IV fluids; and establishing etiology of hemorrhage, including laboratory tests. For uterine atony, uterotonics were administered and uterine massage or bimanual compression performed. Other procedures, performed as needed, included: repair of lacerations; vaginal procedures; exploratory laparotomy; salpingectomy; or emergency hysterectomy. Blood transfusion was provided for signs of shock.

Intervention: The standard protocol, plus the NASG (left on/closed as much as possible during other procedures. Blood loss was measured with the Brass V drape.

Results: Median blood loss was 400 mL in the pre-intervention phase vs. 200 mL in the NASG phase (p < 0.001). Emergency hysterectomies decreased from 8.9% in the pre-intervention phase to 4.0% in the NASG phase (56% reduction, RR = 0.44, CI: 0.23–0.86). End-organ dysfunction decreased in the NASG phase (0.7%) compared to the pre-intervention phase (3.7%, RR=0.20, CI: 0.08–0.50). Mortality decreased from 6.3% in the pre-intervention phase to 3.5% (during the NASG phase (44% reduction, RR=0.56, CI: 0.35–0.89). The number needed to treat to benefit (NNTb) was 36 to prevent 1 maternal death, 34 to prevent 1 severe morbidity, and 20 (among those with uterine atony) to prevent 1 emergency hysterectomy. In a stratified analysis, NASG was significantly associated with reduced odds of death in women with mean arterial blood pressure (MAP) <60 (OR=0.46, CI: 0.26–0.80), but not women with MAP ≥60 (OR=0.68, CI: 0.14–3.22). This may be because women with MAP ≥60 had lower rates of mortality.

Conclusions/Discussion: “In six tertiary care facilities in Nigeria and Egypt, women with hypovolemic shock secondary to obstetric hemorrhage treated with standard protocol plus the NASG had improved outcomes” despite the fact that women in the intervention phase were, on average, in worse condition. The authors suggest that women may have been in worse condition in the NASG group because of clinicians’ hesitancy to put on the NASG until women “really needed” it. The authors note that more research is needed outside tertiary-level facilities, but affirm that use of the NASG appears to mitigate the effect of the delays in accessing care.
I. Aortic compression

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<td>Background:</td>
<td>This case study provides “a reminder of an old but lifesaving technique which was used recently at this hospital with dramatic effect in a case of life threatening PPH.”</td>
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<tr>
<td>Study Design:</td>
<td>Case report</td>
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<td>Setting:</td>
<td>King Edward Memorial Hospital, Western Australia</td>
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<tr>
<td>Patient:</td>
<td>30-year-old woman in her third pregnancy booked for elective C-section delivery at 37 weeks with high likelihood of hysterectomy. Vaginal bleeding at 28 weeks gestation and ultrasound confirmation of major placenta previa and placenta percreta involving the bladder.</td>
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<td>Intervention:</td>
<td>Delivery was followed by “torrential” bleeding from a pelvic mass composed of “placenta, dilated vessels, and bladder.” Bleeding could not be controlled and blood pressure fell rapidly. To respond, the provider initiated aortic compression using a fist to “compress the aorta against the vertebral column below the renal arteries with sufficient force to exceed systolic blood pressure. The effect was dramatic, causing immediate and marked reduction of blood loss, restoring systolic blood pressure to respectable levels.” Providers were able to resuscitate the patient and conduct remaining procedures (hysterectomy and bladder repair), with intermittent release of aortic pressure. The providers describe aortic compression as a “lifesaving procedure in a situation when surgical control of the bleeding was going to be time-consuming.” The patient experienced a transient postoperative complication (left-sided foot drop) that resolved without treatment. The authors note that it may have been related to the aortic compression but believe that this is unlikely given the location of compression.</td>
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<td>Conclusions/ Discussion:</td>
<td>The authors note that this technique can also be used when PPH follows a normal delivery, as the “relatively flaccid abdominal musculature allows trans abdominal compression of the aorta using the closed fist... in the same way.” The authors discuss the potential for PPH to be “sudden and dramatic” as “20% of cardiac output [is] directed to the uterus at term.” The authors suggest that aortic compression is the type of “temporizing measure” that can stabilize patients “prior to definitive treatment,” especially in remote areas lacking specialists. “Assessment of the adequacy of aortic compression can be made by noting the absence of femoral pulsation.” This case report provides a “graphic demonstration of the benefits of this valuable technique in providing control of bleeding... and allowing adequate resuscitation...” while preparation is made for definitive treatments such as surgical management.</td>
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Note: External aortic compression devices also exist and are described in an additional citation in Section 2 below. However, such devices may not be widely available at many health facilities managing PPH.
SECTION 2: CITATIONS

A. General PPH: Statistics, Guidelines, Risks, and Strategies


B AMTSL: Evidence and Obstacles


C CCT and Other Non-Uterotonic PPH Prevention


D Oxytocin (Including in Uniject)


**E** MISOPROSTOL FOR PPH PREVENTION


Walraven, Gijs; Blum, Jennifer; Dampfa, Yusupha; Sowe, Maimuna; Morison, Linda A.; Winikoff, Beverly; Sloan, Nancy L. Misoprostol in the management of the third stage of labour in the home delivery setting in rural Gambia: A randomized trial. *BJOG: An International Journal of Obstetrics and Gynaecology.* 2005;112(9): 1277–1283.

**F** MISOPROSTOL FOR PPH MANAGEMENT


**G TAMPODANE FOR PPH MANAGEMENT**


**H NASG**


**I AORTIC COMPRESSION**
