

# Why are so many mothers dying of postpartum haemorrhage?

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Post-partum haemorrhage (PPH) is a major cause of maternal morbidity and mortality in both the developed and developing world. In South Africa, obstetric haemorrhage is the second most common cause of maternal death resulting in 688 deaths between 2008-2010.<sup>1</sup> The institutional maternal mortality rate (MMR) for obstetric haemorrhage during this period was 24.9 deaths per 100 000 live births. This is an increase from the previous triennium when the total deaths due to obstetric haemorrhage was 491 and the MMR 18.8.<sup>2</sup> Countries such as Australia, Canada, United States and Ireland have reported increasing trends in post-partum haemorrhage over the last decade.<sup>3-6</sup> However the rise in post-partum haemorrhage rates in these countries have not been associated with increasing haemorrhage-related maternal mortality rates.<sup>7</sup>

Post-partum haemorrhage has traditionally been defined as blood loss of more than 500ml after vaginal delivery and 1000ml after caesarean section. The clinical relevance of these volumes of blood loss in fit, healthy women has been questioned.<sup>8</sup> The clinical impact of blood loss is also influenced by maternal health and diseases such as pre-existing anaemia and other medical conditions which make women more vulnerable to decompensation with bleeding. An international expert panel has suggested that the following definition for post-partum haemorrhage would identify women at high risk of adverse clinical outcomes:

“ Persistent (ongoing) PPH is active bleeding >1000ml within 24 hours following birth that continues despite the use of initial measures including first-line uterotonic agents and uterine massage.”<sup>8</sup>

## Causes of PPH deaths in South Africa

During the 2008-2010 triennium bleeding at or after caesarean section, haemorrhage associated with abruptio placenta and ruptured uterus were leading causes of haemorrhage deaths in South Africa.<sup>1</sup> The proportion of deaths and MMR due to bleeding at caesarean section is exceptionally high accounting for 26.2% of haemorrhage deaths between 2008-2010. This rate has increased to 27.5% in 2011 and to 35.3% in 2012. The National Committee for the Confidential Enquiries into Maternal Deaths in South Africa has therefore described bleeding at caesarean section as a “national crisis.” Most of the women who died had inadequate surgical haemostasis during caesarean section either due to uterine atony, lower segment tears or bleeding from the placental site. Frequently caesarean sections were performed too late when

labour had become obstructed or when the second stage had proceeded for too long.<sup>2</sup> There were also several unnecessary caesarean sections performed such as for fetal distress when only early decelerations were recorded.<sup>2</sup> Factors such as advanced maternal age, positive HIV status, pre-existing anaemia and prolonged labour contributed to haemorrhage deaths.<sup>1</sup>

## Preventing caesarean-related maternal morbidity and mortality

Two ways in which we can prevent morbidity and mortality at caesarean section are:

- Safe prevention of primary caesarean delivery
- Evidence-based surgical techniques for caesarean delivery

## Safe prevention of primary caesarean delivery

There has been a rapid increase in caesarean section rates since 1996. Caesarean delivery can be lifesaving for both the mother and fetus, however the rapid increase in rate of caesarean deliveries without any evidence of reduction in maternal and neonatal morbidity and mortality rates have raised concern that caesarean delivery is overused.<sup>9</sup> It is therefore important to understand the short- and long-term trade-offs between caesarean and vaginal delivery as well as safe measures to prevent overuse of caesarean delivery. Caesarean section is firmly established as the safest route of delivery for certain conditions such as placenta praevia and uterine rupture. However the majority of pregnancies are low risk and caesarean delivery poses a greater risk of maternal morbidity and mortality than vaginal delivery.<sup>10</sup> Primary caesarean section also poses long-term risks for future pregnancies. The risk of placenta praevia increases from 1% with 1 prior caesarean delivery to 3% with 3 or more prior caesarean deliveries.<sup>11</sup> After 3 caesarean deliveries, the risk that placenta praevia is complicated by placenta accreta is 40% and there is also an increased risk of stillbirth in subsequent pregnancies.<sup>12</sup>

To understand the degree to which caesarean deliveries are preventable, it is important to know why caesarean deliveries are performed. In an audit of caesarean sections in the Central and Eastern Tshwane using the Robson Ten Classification system, the most common indications for caesarean section were Group 1 (nulliparous, single, >37 weeks in spontaneous labour), Group 3 (multiparous excluding previous caesarean section, single cephalic, >37 weeks in spontaneous labour) and Group 5 (previous CS, single, cephalic > 37 weeks).<sup>13</sup> The largest contributor in this study was Group 5 suggesting that once a caesarean is performed it is likely that another will follow. Groups 1 and 3 reflect normal labour with a caesarean section rate of 15.3% for Group 1 and 9.6% for Group 3. Caesarean section rates

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**Table 1: ACOG recommendations for safe prevention of primary caesarean delivery<sup>11</sup>**

Recommendations	Grade of recommendations
<b>First stage of labour</b>	
A prolonged latent phase (e.g., > 20h in nulliparous women and > 14h in multiparous women) should not be indication for caesarean delivery	1B Strong recommendation, moderate-quality evidence
Slow but progressive labour in first stage of labour should not be indication for caesarean delivery	1B Strong recommendation, moderate-quality evidence
Cervical dilation of 6cm should be considered threshold for active phase for most women in labour. Thus, before 6cm of dilation is achieved, standards of active-phase progress should not be applied	1B Strong recommendation, moderate-quality evidence
<b>Second stage of labour</b>	
A specific absolute maximum length of time spent in second stage of labour beyond which all women should undergo operative delivery has not been identified	1C Strong recommendation, low-quality evidence
Operative vaginal delivery in second stage of labour by experienced and well-trained physicians should be considered safe, acceptable alternative to caesarean delivery. Training in, and ongoing maintenance of, practical skills related to operative vaginal delivery should be encouraged	1B Strong recommendation, moderate-quality evidence
Manual rotation of fetal occiput in setting of fetal malposition in second stage of labour is reasonable intervention to consider before moving to operative vaginal delivery or caesarean delivery. To safely prevent caesarean deliveries in setting of malposition, it is important to assess fetal position in second stage of labor, particularly in setting of abnormal fetal descent	1B Strong recommendation, moderate-quality evidence
<b>Fetal heart rate monitoring</b>	
Amnioinfusion for repetitive variable fetal heart rate decelerations may safely reduce rate of caesarean delivery	1A Strong recommendation, high-quality evidence
Scalp stimulation can be used as means of assessing fetal acid-base status when abnormal or indeterminate (formerly, non-reassuring) fetal heart patterns (e.g., minimal variability) are present and is safe alternative to caesarean delivery in this setting	1C Strong recommendation, low-quality evidence
<b>Induction of labor</b>	
Before 41 0/7 wks of gestation, induction of labour generally should be performed based on maternal and fetal medical indications. Inductions at >41 0/7 wks of gestation should be performed to reduce risk of caesarean delivery and risk of perinatal morbidity and mortality	1A Strong recommendation, high-quality evidence
Cervical ripening methods should be used when labour is induced in women with unfavourable cervix	1B Strong recommendation, moderate-quality evidence
If maternal and fetal status allow, caesarean deliveries for failed induction of labour in latent phase can be avoided by allowing longer durations of latent phase (up to >24h) and requiring that oxytocin be administered for at least 12 – 18h after membrane rupture before deeming induction failure	1B Strong recommendation, moderate-quality evidence
<b>Fetal malpresentation</b>	
Fetal presentation should be assessed and documented beginning at 36 0/7 wks of gestation to allow for external cephalic version to be offered	1C Strong recommendation, low-quality evidence
<b>Suspected fetal macrosomia</b>	
Caesarean delivery to avoid potential birth trauma should be limited to estimated fetal weights of at least 5000g in women without diabetes and at least 4500g in women with diabetes. Prevalence of birth weight of >5000g is rare, and patients should be counselled that estimates of fetal weight, particularly late in gestation, are imprecise	2C Weak recommendation, low-quality evidence
<b>Excessive maternal weight gain</b>	
Women should be counselled about IOM maternal guidelines in attempt to avoid excessive weight gain	1B Strong recommendation, moderate-quality evidence
<b>Twin gestations</b>	
Perinatal outcomes for twin gestations in which first twin is in cephalic presentation are not improved by caesarean delivery. Thus, women with either cephalic/cephalic-presenting twins or cephalic/non-cephalic presenting twins should be counselled to attempt vaginal delivery	1B Strong recommendation, moderate-quality evidence
<b>Other</b>	
Individuals, organisations, and governing bodies should work to ensure that research is conducted to provide better knowledge base to guide decisions regarding caesarean delivery and to encourage policy changes that safely lower rate of primary caesarean delivery	1C Strong recommendation, low-quality evidence

reported for Dublin Maternity Hospital are 7.3% and 1.1% respectively and 15.8% and 2.4% respectively in Queensland.<sup>13</sup> This data therefore suggests that the general management of labour in this district may be improved.

The American College of Obstetricians and Gynaecologists (ACOG) have made the following recommendations for safe prevention of primary caesarean delivery (Table I).<sup>11</sup>

### Evidence-based surgical techniques for caesarean delivery

The following surgical techniques have been shown to decrease bleeding at caesarean section:<sup>14</sup>

- **Skin incision type** – A Cochrane review of 14 trials involving 2906 patients found significant improvement in short term outcomes (blood loss, post-operative fever and pain) when Joel-Cohen-based techniques were used.
- **Dissection of fascia off the rectus** – Non-dissection of the inferior rectus fascia is associated with a lower decline of pre- and post- surgical haemoglobin levels (-1.2 g/dL vs -1.6g/dL, p=0.05)
- **Expansion of uterine incision** – Blunt expansion of the uterine incision is preferred to sharp expansion and cephalad-caudad expansion is preferred to transversal expansion. In a trial of > 800 women unintended extension of the uterine wound edge and blood loss of more than 1500ml was significantly higher in the transversal expansion group. (7.4% vs 3.7%; p=0.03 and 2.0% vs 0.2%; p=0.04)
- **Prevention of postpartum haemorrhage** – Oxytocin infusion (10-40IU in 1L crystalloid is effective in preventing uterine atony. In a trial comparing misoprostol to misoprostol plus routine oxytocin infusion, the combination treatment was associated with a reduced need for additional uterotonic agents at caesarean section (43% vs 26%; RR 1.3; 95% CI 1.10-1.50). Misoprostol is not superior to oxytocin in uterine atony prevention and its use is complicated by side-effects such as maternal shivering and pyrexia. Tranexamic acid (10mg/kg intravenous prior to incision) has been evaluated for postpartum prevention in 3 randomised trials. Intraoperative and postpartum blood loss was significantly decreased in all 2 trials. In one trial, blood loss of > 1000ml and the need for additional uterotonics was significantly reduced in the tranexamic group (2.1% vs 5.8%; RR 2.7; 95% CI 1.1-6.3; and 8.5% vs 14.5%; RR 1.7; 95% CI 1.1-2.6, respectively). Carbetocin has been compared to oxytocin in 2 randomised trials. Women allocated to carbetocin required fewer additional oxytocic agents but there was no significant differences in major postpartum haemorrhage, blood transfusion or fall in haemoglobin.
- **Closure of uterine incision** – The role of single- vs double-layer uterine closure for reducing the risk of subsequent uterine rupture remains controversial. Two-layer closure has been found to be superior in cohort or case-controlled studies but this has not been tested in randomised controlled trials.

The National Committee for the Confidential Enquiry into Maternal Deaths (NCCEMD) has requested the following actions from all doctors involved in the care of pregnant women<sup>15</sup>:

- Ensure you are trained in Essential Steps in managing Obstetric Emergencies (ESMOE) and participate in EOST exercises in particular haemorrhage drills

- Ensure you are able to complete and interpret a partogram
- Ensure you are able to interpret a CTG
- Ensure you are able to perform a caesarean section safely
- Ensure that you are trained in additional medical and surgical procedures eg oxytocic agents, compression sutures, balloon tamponade to treat excessive bleeding at caesarean section
- Ensure you are able to perform an assisted delivery safely
- Ensure you conduct yourself in a professional way.

### Conclusion

Postpartum haemorrhage represents a significant disease burden in South Africa. All health care workers involved in the care of pregnant women are urged to be aware of the consequences of this condition and thus institute management protocols early and aggressively. If these steps are not followed South Africa will probably not reach its requirements for fulfilling millennium development goal 5.

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