**BJOG Commentary (1800 words max – now 1734)**

**Reducing maternal deaths from haemorrhage: seeking the low hanging fruit.**

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In an attempt to reignite the reduction in maternal deaths that has stalled since 2015,1 WHO has recently published a postpartum haemorrhage (PPH) roadmap following wide consultation.2 The roadmap seeks to reduce mortality through progress in 4 areas: research, standards, advocacy and implementation. But some have argued that global maternal deaths are primarily a result of poverty and global inequity, and that there will be little improvement until that fundamental problem is addressed. So how much can really be achieved, and are there practical interventions that can be made despite limited resources?

**Causes of maternal deaths**

Although rates of PPH are much higher in high resource settings and increasing with time, death from PPH is closely associated with poverty, both on an individual and health system level. As a result, of the estimated 80,000 PPH deaths annually, nearly 90% occur in countries with low- and low-middle socio-demographic indexes.3 India, Pakistan, DRC, Ethiopia and Nigeria together have nearly 30,000 haemorrhage deaths annually, accounting for 37% of the global total. The same inequity is seen within countries as well, with maternal deaths occurring largely within the poorest in the society.4

Whilst the classic PPH is an atonic bleed after an attended spontaneous vaginal birth, these are relatively easily cured with uterotonics and account for few deaths. Confidential enquiries show how PPH deaths come largely from two groups, representing the well-recognised split of ‘too little too late’ and ‘too much too soon’.5,6 The first group is those who frequently give birth outside of the health system for reasons of distrust, poverty, ignorance, or lack of transport. They are typically anaemic, malnourished and commonly have infectious disease comorbidities. They present in a moribund state after tortuous journeys with untreated atonic uterus, ruptured uterus, genital tears or retained placenta, and the local health system cannot rescue them. Tragically, sometimes this group also includes some women who have given birth in facilities and who have relatively minor, easily-treatable complications, but whose care is delayed and inadequate. Death results from delays, a lack of adequately trained staff, and shortages of blood, drugs and consumables.7 An increasing group is those whose PPHs occur after current or prior intervention: those undergoing emergency caesarean sections, or who have placenta praevia / accreta or rupture following previous CSs. With intervention rates spiralling worldwide in an attempt to protect mothers and babies, this is becoming a critical group worldwide.

**Implementation priorities**

What can be done to address this terrible toll? Without doubt, the long-term solution is country-wide economic growth, unhindered by conflict, and with services provided for those who are do not have the means to obtain them privately. Economic growth allows governments to lift the poorest out of poverty and to improve their provision of maternal healthcare, education and transport. All countries who currently enjoy low maternal mortality rates (e.g., Sweden, UK, Poland) have used this method to progress through this process of obstetric transition,8 thereby reducing their MMR from the levels seen in much of sub-Saharan Africa today. But this is not easy, and neither is it in the hands of health workers. And so, as politicians work to eradicate world poverty and uplift services, there is a need to identify high impact interventions that provide the very best care for the available money. They also need to be able to reach the women who need them most.

Given these broad principles, there are 5 broad areas that provide the best value for money and that would make a real change.

1. **Quality intrapartum care by midwifes supported by doctors**. Care during labour and birth is the front-line of the battle against PPH. In some settings, this is primarily the role of doctors. But not only is this unnecessary for healthy women having normal births, repeated studies have shown that scaling up midwifery is a cost-effective way of reducing maternal and perinatal mortality.9 It also has the effect of reducing intervention rates which are themselves causes of PPH. But a midwifery-led system requires extensive support around it. Well-trained medical staff are critical to deal with high-risk women, complications of labour, and provide interventions when necessary. Their clinical skills are needed to correctly identify those women who need a caesarean and then carry it out rapidly and safely, as well safely assisting vaginal births with forceps or ventouse. Ongoing multi-disciplinary training of this maternity team in emergency obstetric care is required along with clear-sighted, compassionate leadership to teach and conduct ongoing audit and review. Managers are needed to ensure that staff, medicines and consumables are readily available when needed. This all needs to be wrapped in respectful care for staff and pregnant women as without it, women (and staff) will stay away.
2. **PPH management** – For many years, the focus of PPH research has been on the optimal way to prevent PPH. Repeated studies have shown the importance of atonic uterus as a cause of PPH and that oxytocin (usually given intramuscularly, but as an intravenous infusion in high-risk cases) is highly effective in reducing PPH rates.10 Attention has turned now to PPH treatment. The E-MOTIVE study demonstrated that routine, real-time measurement of blood loss, and the provision of a bundle of care (oxytocic, tranexamic acid (TXA) and iv infusion) before blood loss reaches 500mls (or 300mls in high-risk cases) not only reduces blood loss but PPH deaths as well.11 The investigators found that many women with excessive blood loss remained untreated and the use of a routine blood loss collection drape improved treatment rates. Although the study was conducted in 4 sub-Saharan African countries, the study has implications for births in all settings, and the search is on for the production of low-cost, reusable, environmentally-friendly blood loss measurement techniques. Ongoing studies will identify the optimal initial oxytocic to be used, and whether TXA can be given intramuscularly.

In those with refractory PPH, external uterine compression and intrauterine devices (balloons of various types, packing with gauze or suction) are widely used, although both their absolute and relative efficacy are unknown. For those with surgical and placental causes of PPH, skilled surgery is needed to repair tears and ruptures and to remove adherent placentas. At district hospitals, generalist doctors must be taught the relatively simple surgical skills needed to manage refractory PPH short of hysterectomy: uterine compression sutures, uterine artery ligation, and uterine tourniquet. All can be done prior to referral to higher level hospital if required.

1. **Blood transfusion**. Although expensive and logistically complex to achieve, the provision of safe blood for transfusion so important for saving women’s lives that it enters the list of critical interventions. In many low-income settings, the arrival of un-booked women in shock from PPH is a common occurrence, and whilst atonic uterus may respond to uterotonics and tamponade, many have retained placenta or uterine rupture and require immediate surgery. Taking these women to theatre when shocked, hypovolaemic and with coagulation abnormalities carries a very high mortality and pre-operative blood transfusion is transformative. To achieve this, central and tertiary hospitals need high quality blood banks with cross-matched blood and blood components (fresh frozen plasma, platelets and fibrinogen). All district hospitals need functional fridges with backup generators to store O Neg and group-specific blood for emergency transfusion. Freeze-dried plasma (that can be reconstituted with sterile water) is an accessible form of clotting factors as it can be stored unrefrigerated for 2 years.
2. **Health systems**. In the countries where most maternal deaths occur, health care workers work against the odds to provide safer services for women. But fully staffed primary and secondary health services free at the point of use are rare, and there is often inadequate emergency transport between levels of care. Weak governance structures mean that the already precarious rural government health systems are often further depleted by corruption, disrespectful care and staff non-attendance, with women needing to provide bribes to obtain even basic care. This burden disproportionately affects the poorest and leads to their reluctance to attend health centres. It also results in long delays in obtaining effective emergency care as women seek money, functioning health units, and taxi drivers willing to transport bleeding or dying women in their vehicles.

Strengthening fragile health systems will take increased funding along with powerful national leadership. Low cost transport systems are a priority, along with anti-shock garments to keep women alive during transfer. Community mobilisation through women’s groups can empower women, leading to mutual support, improved emergency transport and care-seeking behaviour. Effective local management is also needed so that staff themselves receive respectful care and are appropriately paid.

1. **Antenatal anaemia treatment**. Antenatal anaemia is very common worldwide and is one of the mechanisms by which PPH mortality is linked to poverty. Anaemia not only makes atonic PPH more likely, but also makes women more vulnerable to death when bleeding does occur. Thankfully, the detection and treatment of anaemia in antenatal clinics is a low-cost midwifery intervention and should be a priority if PPH deaths are to be prevented. Ongoing studies will compare the efficacy of oral and intravenous iron.

Over the last decades, many researchers have sought the ‘magic bullet’, a single intervention that will solve the problem of maternal mortality from PPH. Sadly, however, there are no simple fixes as PPH deaths largely result from system failures that are not easily solved. PPH death rates can be viewed as a marker of an effective healthcare system, testing not only the accessibility and function of rural maternity services, but also their ability to rapidly escalate care in cases of emergency so that women receive timely high level surgical and anaesthetic interventions. The WHO PPH Roadmap provides a robust way forward to achieve this with its four pillars of advocacy, implementation, research and standard setting. But of these, implementation is key. Academics have been justifiably criticised for spending too much time focussing on trying to find new solutions, and forgetting the lessons of history that saw massive reductions in PPH deaths in Western countries 100 years ago despite relatively primitive levels of care.12 We may argue over what are the optimal components of the intervention, but we should keep in mind the saying that ‘the best is the enemy of the good’. We cannot wait until we are sure what ‘perfect care’ looks like before we start making changes. The PPH Roadmap may set the agenda up to 2030, but the implementation of packages to improve PPH care must start now.

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ADW was the sole author of this work.

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