Massive obstetric haemorrhage

Nuala Lucas
Epidemiology

Essentials of management

Anything new?
Epidemiology

Essentials of management

Anything new?
WHAT ARE PREGNANT WOMEN DYING FROM?

- **28%** Pre-existing medical conditions exacerbated by pregnancy (such as diabetes, malaria, HIV, obesity)
- **27%** Severe bleeding
- **14%** Pregnancy-induced high blood pressure
- **11%** Infections (mostly after childbirth)
- **8%** Abortion complications
- **3%** Blood clots
- **9%** Obstructed labour and other direct causes
MBRRACE-UK – maternal death rate due to haemorrhage

/100 000 maternities

Morbidity

• Recorded incidence of postpartum haemorrhage has nearly doubled from 7% of all maternities in 2005 to 13% in 2013

• Some regions report even greater increases
  – massive PPH (>2000 mls) twice per year ➔ once a fortnight

Quinn, AJOG, 2014
Morbidity

• Recorded incidence of postpartum haemorrhage has nearly doubled from 7% of all maternities in 2005 to 13% in 2013

• Some regions report even greater increases
  – massive PPH (>2000 mls) twice per year ➔ once a fortnight

• Not only have PPH rates increased dramatically but they appear to be less predictable and unrelated to traditional risk factors

Quinn, AJOG, 2014
Causes of obstetric haemorrhage

- Tone: 70%
- Trauma: 20%
- Tissue: 9%
- Thrombin: 1%
Causes of obstetric haemorrhage

- **Tone**: 70%
- **Trauma**: 20%
- **Tissue**: 9%
- **Thrombin**: 1%

**Massive PPH in UK**
- 3% followed uncomplicated vaginal delivery
- 69% followed CS
- Atony accounted for only 40%

Green, 2015
Stemming the global caesarean section epidemic

The major rise in caesarean sections around the world is called unprecedented and unjustified in a new Lancet Series on optimising caesarean section use published today.

When medically indicated, such as in placenta preavia, fetal distress, or abnormal positioning, caesarean sections save the lives of women and babies. Underuse due to lack of access clearly exists in some areas, and is associated with maternal and perinatal harms. But overuse and its implications are now of growing concern. Population rates above 10–15% are considered excessive. Women who do not need a caesarean section and their infants can be harmed or die from the procedure, especially when done in the absence of adequate facilities, skills, and comprehensive health care.

The Series shows that the global rate of caesarean birth has doubled in the past 15 years to 21%, and is increasing annually by 4%. While in southern Africa use of caesarean section is less than 5%, the rate is almost 60% in some parts of Latin America, including in Brazil where we will launch the Lancet Series at the World Congress of Gynecology and Obstetrics (FIGO) on Oct 18. Of the 6·2 million unnecessary caesareans done each year, half are in Brazil and China. The wide provider-side interventions will be crucial. The WHO guidance recommends mandatory second opinions for caesarean section indication, as well as audits and feedback loops within facilities. Financial strategies that remunerate equally for vaginal births and caesarean sections are also recommended. The guidance acknowledges barriers to evidence-based practice: cultures of medicine shifting toward surgical intervention, risk of litigation, the financial incentives of performing caesarean sections, and the convenience of scheduled deliveries. As the Series notes, young doctors are regrettably now more equipped and confident with the skills for surgical delivery than they are with managing vaginal births. Clearly, providers must also become better equipped and confident to have meaningful, evidence-based, and supportive discussions with women about their birth options and concerns.

To facilitate this better communication and woman-centred care, the best recommendation in the new WHO guidance is the collaborative midwifery-obstetrician model whereby care is provided primarily by midwives. The Series shows midwifery care to be associated with more vaginal births, safer outcomes, positive maternal experiences, and lower costs, and an accompanying

Lancet, 2018
• Sub-Saharan Africa, too few; in North America, too many

Appropriate use of caesarean section globally requires a different approach
Appropriate use of caesarean section globally requires a different approach

- FIGO Position Paper on stopping epidemic of CS
  - Matching costs for CS and vaginal birth (using a mean fee)
  - Ensuring hospitals publish their annual C-section rates
  - For very low income countries ensuring adequate access to skilled care, appropriate fetal surveillance and assisted births or operative delivery

- WHO nonclinical intervention to lower CS rates
  - Educational interventions for women and families to support meaningful dialogue with providers and informed decision-making on mode of delivery

- Lancet editorial
  - Involve midwives more

Oct, 2018
Maternal deaths due to ‘supoptimal care’ UK

- 52%: Good care
- 29%: Improvements to care which would have made no difference to outcome
- 19%: Improvements to care which may have made a difference to outcome
Maternal deaths due to ‘supoptimal care’ UK

Haemorrhage.....improvements to care which may have made a difference to care were noted in ALL deaths.
An anaemic woman had a CS after a very prolonged labour. She was of small stature and lost almost 1000mls. No blood was ordered. Three hours later when she then bled 2500mls vaginally from an atonic uterus she was initially resuscitated with fluids, receiving 8L of crystalloid and 2L of colloid before blood was available for her. She developed pulmonary oedema and was transferred to ITU where she died from ARDS, sepsis and multi-organ failure.
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Case 1
A woman had a ventouse delivery after the forceps blades had failed to lock. She immediately bled torrentially from vaginal tears and was taken to theatre. The extent of the bleeding in the room (2500ml) was not conveyed to the anaesthetist in theatre. After a further 2500ml of blood loss by the end of the repair in theatre she had only had ONE unit of blood as the anaesthetist had been reassured by a result from an acute point of care haemoglobin measurement which recorded a haemoglobin concentration of 110g/l.
Case 2

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Epidemiology

Essentials of management

Anything new?
Recognition

Uterine blood flow
12% CO
• 700-900 ml/min
Recognition

- Uterine blood flow
  - 12% CO
  - 700-900 ml/min

- Diagnosis not always easy
- Blood loss well tolerated
- May be concealed
Recognition

- Post delivery
  - Heart rate, blood pressure
Recognition

• Post delivery
  – Heart rate, blood pressure
  – Fundal height & urine output
  – Low threshold for serial hemocue assessments
Beware the CS at full cervical dilatation

Greater risk of haemorrhage, bladder trauma
Extension tears of uterine angle
Inadequate closure
- upper pole of incision to rim of cervix
- CONCEALED BLEED
## Effect of body weight on blood volume

<table>
<thead>
<tr>
<th>Weight</th>
<th>Total BV</th>
<th>15% BV loss</th>
<th>40% BV loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 kg</td>
<td>3500 mls</td>
<td>525 mls</td>
<td>1400 mls</td>
</tr>
<tr>
<td>55 kg</td>
<td>3850 mls</td>
<td>577 mls</td>
<td>1540 mls</td>
</tr>
<tr>
<td>60 kg</td>
<td>4200 mls</td>
<td>630 mls</td>
<td>1680 mls</td>
</tr>
<tr>
<td>65 kg</td>
<td>4550 mls</td>
<td>682 mls</td>
<td>1820 mls</td>
</tr>
<tr>
<td>70 kg</td>
<td>4900 mls</td>
<td>1050 mls</td>
<td>1960 mls</td>
</tr>
</tbody>
</table>
Midwives and doctors underestimate blood loss at delivery by 30 – 50%


Improving the accuracy of estimated blood loss at obstetric haemorrhage using clinical reconstructions

P Bose, a F Regan, b S Paterson-Brown a
Resuscitation

- Timing
- Fluids /blood
- How we give it
Resuscitation

• Timing
  – Call for help early!
  – In early stages of PPH 2° to uterine atony delaying care beyond 10 minutes increases risk of severe PPH

Driessen et al, Obstet & Gynecol 2011
Resuscitation

• How we give it?
• Flow is proportional to $r^4$

<table>
<thead>
<tr>
<th>Cannula</th>
<th>Flow rate L/hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>X’Illoid Blood</td>
<td></td>
</tr>
<tr>
<td>14G</td>
<td>16.2</td>
</tr>
<tr>
<td>16G</td>
<td>10.8</td>
</tr>
</tbody>
</table>
Resuscitation

• How we give it?
• Flow is proportional to $r^4$

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</tr>
<tr>
<td>14G</td>
<td>16.2 10.3</td>
</tr>
<tr>
<td>16G</td>
<td>10.8 7.1</td>
</tr>
</tbody>
</table>

Ensure adequate iv access
A woman became hypotensive after a forceps delivery. The trainee anaesthetist was called to assist with additional IV access but was unable to insert a cannula. Fluid resus continued through the single existing large bore cannula and she received 3 litres of crystalloid over the next hour. Her hypotension persisted and a point of care hb measurement recorded a hb of 49g/L. Only at this time was blood ordered, and only one unit of blood was initially given due the woman feeling breathless. Two hours after the anaesthetist first attended, the woman was transferred to theatre for the insertion of a central line. After several failed attempts at CVP access and at the request of the consultant obstetrician the consultant anaesthetist was called to attend. By the time the consultant anaesthetist arrived the woman had already had a cardiac arrest due to hypovolaemia. The woman died from intra-abdominal bleeding secondary to a ruptured uterus.

Case 3
CASE REPORT

Resuscitation in massive obstetric haemorrhage using an intraosseous needle*

D. J. Chatterjee,1 B. Bukunola,2 T. L. Samuels,3 L. Induruwage4 and D. R. Uncles5

1 Specialist Trainee, 2 Specialty Doctor, 3 Research Registrar, 4 Core Trainee, 5 Consultant, Department of Anaesthesia, Worthing Hospital, Worthing, UK

Summary

A 38-year-old woman experienced a massive postpartum haemorrhage 30 minutes after emergency caesarean delivery. The patient became severely haemodynamically compromised with an unrecordable blood pressure. Rapid fluid resuscitation was limited by the capacity of the intravenous cannula in place at the time and inability to establish additional vascular access using conventional routes in a timely manner. An intraosseous needle was inserted in the proximal humerus at the first attempt and administration of resuscitation fluid by this route subsequently enabled successful placement of further intravenous lines. Blood and blood products were deployed in conjunction with intra-operative cell salvage and transoesophageal Doppler cardiac output monitoring was used to assess adequacy of volume replacement. Haemorrhage control was finally achieved with the use of recombinant factor VIIa and hysterectomy.
High oxygen partial pressure decreases anemia-induced heart rate increase equivalent to transfusion.

Feiner et al, Anesthesiology 2011
Resuscitation

- How we give it?
- Maintain temperature

**Effect of hypothermia on the coagulation cascade**
Rohrer, Crit Care Med, 1992

<table>
<thead>
<tr>
<th></th>
<th>37°C</th>
<th>34°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>PT</td>
<td>11.9±.5s</td>
<td>12.8±0.5s</td>
</tr>
<tr>
<td>APTT</td>
<td>36±0.7s</td>
<td>39.4±1s</td>
</tr>
</tbody>
</table>
Transfusion strategy

• Data from trauma related haemorrhage indicate that survival is increased for patients who receive warm whole blood compared to those who receive component therapy.

• This finding has been echoed with:
  – Severe bleeding 2 ruptured AAA
    Johansson et al, Transfusion 2007
  – Emergency general surgical patients
    James et al, Transfusion Alternatives in Transfusion Medicine 2008
Whole blood vs component therapy
Whole blood vs component therapy

- Haematocrit 38-50%
- Platelets 150-400 K/µL
- Plasma coagulation factors 100%

- Packed red cells - hematocrit 55% (280ml)
- 75 x10⁹ platelets (75ml)
- FFP 80% coagulation activity compared with whole blood (275ml)
Whole blood vs component therapy

- Haematocrit 38-50%
- Platelets 150-400 K/µL
- Plasma coagulation factors 100%

- Packed red cells - hematocrit 55% (280ml)
- 75 x10⁹ platelets (75ml)
- FFP 80% coagulation activity compared with whole blood (275ml)

1 unit PRC +
1 unit platelets +
1 unit FFP =
635ml
Hematocrit 24%
Platelets 118k/ul
Coag activity 35%
Stopping the bleeding – treating the cause

‘Uterotonic ladder’

- Syntocinon
- Ergometrine
- Carboprost
- Misoprostil
- Carbetocin

Problems
- Prophylaxis vs management
- Randomisation/blinding
- Control groups
- Outcomes
## A consistent approach?

**Prevention and management of postpartum hemorrhage: a comparison of 4 national guidelines**

Joshua D. Dahlke, MD; Hector Mendez-Figueroa, MD; Lindsay Maggio, MD; Alisse K. Hauspurg, MD; Jeffrey D. Sperling, MD; Suneet P. Chauhan, MD; Dwight J. Rouse, MD

<table>
<thead>
<tr>
<th></th>
<th>ACOG</th>
<th>RANZCOG</th>
<th>RCOG</th>
<th>SOGC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxytocin</td>
<td>10-40 U IV</td>
<td>Dose not specified</td>
<td>5 U</td>
<td>10 U IM/5 U IV</td>
</tr>
<tr>
<td></td>
<td>10 U IM</td>
<td></td>
<td>40 u /4 hours</td>
<td></td>
</tr>
<tr>
<td>Carbetocin</td>
<td></td>
<td></td>
<td></td>
<td>100 mcg IV</td>
</tr>
<tr>
<td>Ergots</td>
<td>Methyl-ergonovine 0.2mg IM</td>
<td>Ergometrine No dose specified</td>
<td>Ergometrine 0.5mg IV/IM</td>
<td>Ergonovine 0.25mg IM/IV</td>
</tr>
</tbody>
</table>

Am J Obs & Gyn, 2015
Stopping the bleeding – treating the cause

‘Uterotonic ladder’
- Syntocinon
- Ergometrine
- Carboprost
- Misoprostil
- Carbetocin

+ Organised & responsive emergency care
+ Availability of blood products
+ High quality clinical care
Stopping the bleeding – treating the cause

- Organised & responsive emergency care
- Availability of blood products
- High quality clinical care

**MOH call**

**Collaboration with transfusion**

- High quality clinical care

**Senior involvement, early**
Epidemiology

Essentials of management

Anything new?
The future

• Imox study
  – Comparison of intramuscular carbetocin, syntocinon & syntometraine for 3rd Stage

• COPE study
  – Comparison of syntocinon & carboprost for the management of PPH
PPH prevention bundles

- Optimise red cell mass
- **Minimise blood loss**
- Manage anaemia

• Change our perspective
  – PRO-ACT *not* REACT
**PPH Risk Assessment**

Complete on admission in labour, prior to second stage and following delivery

### Antenatal Risk Factors

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Placenta Previa/Accreta</td>
<td>10</td>
</tr>
<tr>
<td>Placenta Abruption - significant</td>
<td>10</td>
</tr>
<tr>
<td>Multipare Pregnancy</td>
<td>6</td>
</tr>
<tr>
<td>Current HTN q5</td>
<td>6</td>
</tr>
<tr>
<td>Intravascular Death</td>
<td>2</td>
</tr>
<tr>
<td>Pre-eclampsia/gestational hypertension</td>
<td>4</td>
</tr>
<tr>
<td>Maternal Clotting Disorder</td>
<td>3</td>
</tr>
<tr>
<td>Previous PPH or Retained Placenta</td>
<td>3</td>
</tr>
<tr>
<td>Parity &gt;4</td>
<td>3</td>
</tr>
<tr>
<td>Parity &gt;6</td>
<td>2</td>
</tr>
<tr>
<td>Current BMI 40</td>
<td>2</td>
</tr>
<tr>
<td>Uterine Fibroids</td>
<td>2</td>
</tr>
<tr>
<td>Recurrent APH (minor)</td>
<td>2</td>
</tr>
<tr>
<td>Elective Caesarean Section / recurrent Caesarean Section</td>
<td>2</td>
</tr>
</tbody>
</table>

**Antenatal Score**

Induction of labour/ Augmentation of labour

Sepsis /Preeclampsia in labour

Prolonged 1st stage of labour > 22 hours (active)

> 12 hours of Syntocinon

Prolonged 2nd stage of labour > 4 hours

**Perinatal Risk Factors**

Total Score (Antenatal + Perinatal + Postnatal)

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retained Placenta</td>
<td>6</td>
</tr>
<tr>
<td>Emergency Caesarean Section</td>
<td>6</td>
</tr>
<tr>
<td>Baby &gt;4kg</td>
<td>2</td>
</tr>
<tr>
<td>Operative Vaginal Delivery</td>
<td>2</td>
</tr>
</tbody>
</table>

**Perinatal Score**

Management for 3rd stage and following delivery – alternative plans should be documented in the notes

<table>
<thead>
<tr>
<th>Score less than 6</th>
<th>Score 6 - 9</th>
<th>Score 10 or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>Follow Green action PLUS:</td>
<td>2nd Grey Fever:</td>
<td>Follow Amber action PLUS:</td>
</tr>
<tr>
<td>- Intravenous</td>
<td>- Osmitom IV</td>
<td>- Osmitom IV</td>
</tr>
<tr>
<td>- Oxytocin in</td>
<td>- Osmitom IV</td>
<td>- Osmitom IV</td>
</tr>
<tr>
<td>- Paclitaxel IM</td>
<td>- Osmitom IV</td>
<td>- Osmitom IV</td>
</tr>
<tr>
<td>- Measure all blood loss</td>
<td>- Osmitom IV</td>
<td>- Osmitom IV</td>
</tr>
<tr>
<td>- Routine postnatal observations</td>
<td>- Osmitom IV</td>
<td>- Osmitom IV</td>
</tr>
</tbody>
</table>

**DECREASE OF THE CONTRA-INDICATIONS USING DEXMEDETOMINE**

Health Improvement Scotland
Key takeaways

Post partum haemorrhage is increasing
Causes uncertain (maybe > one of the ‘4 Ts’)

Recognition not always easy

Prevention before management – PPH bundles