Standardisation of multidisciplinary obstetric emergency training nationally.
Postpartum Haemorrhage

Bridgette Byrne MD FRCPI FRCOG
Senior Lecturer and Consultant in Obstetrics and Gynaecology
Coombe Women and Infants University Hospital, Dublin.
Recent publications

CEMACE (UK and NI 2006-2008) 2011

Maternal Death Enquiry (Ireland 2009-2011) 2012

Scottish Confidential Audit of Severe Maternal Morbidity 9th Annual Report 2013

Irish Confidential Audit of Severe Maternal Morbidity 2013

National Guidelines in Obstetrics and Gynaecology No. 17: Prevention and Management of primary PPH 2013 (Updated 2014)
Outline

- To establish the clinical significance of PPH in an Irish context
  - Definition of PPH
  - Recognition of PPH
  - Appropriate clinical management of PPH
  - Team working
  - Quality standards
18 deaths
8.4/100,000 (95% CI 4 -11.8)
[CSO – 4/100,000]
Direct maternal deaths = 31.6%
Indirect maternal deaths = 68.4%
Cause of ‘direct’ maternal deaths: thromboembolic disease continues to feature prominently
MOH in 2 cases of AFE and uterine rupture
Severe Maternal Morbidity Audit

- 260 women identified (3.8/1000)
- Major Obstetric Haemorrhage (2.3/1000)

Report available at:
## Morbidity-specific rates, 2011/12

<table>
<thead>
<tr>
<th>Event</th>
<th>2011</th>
<th>2012</th>
<th>Rate per 1,000 maternities (2011+2012)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major obstetric haemorrhage</td>
<td>159</td>
<td>164</td>
<td>2.38</td>
</tr>
<tr>
<td>ICU/coronary care unit admission</td>
<td>111</td>
<td>130</td>
<td>1.78</td>
</tr>
<tr>
<td>Renal or liver dysfunction</td>
<td>26</td>
<td>22</td>
<td>0.35</td>
</tr>
<tr>
<td>Peripartum hysterectomy</td>
<td>23</td>
<td>21</td>
<td>0.32</td>
</tr>
<tr>
<td>Pulmonary embolism</td>
<td>12</td>
<td>18</td>
<td>0.22</td>
</tr>
<tr>
<td>Eclampsia</td>
<td>12</td>
<td>8</td>
<td>0.15</td>
</tr>
<tr>
<td>Pulmonary oedema</td>
<td>8</td>
<td>11</td>
<td>0.14</td>
</tr>
<tr>
<td>Cardiac arrest</td>
<td>7</td>
<td>11</td>
<td>0.10</td>
</tr>
<tr>
<td>Anaesthetic problem</td>
<td>7</td>
<td>5</td>
<td>0.09</td>
</tr>
<tr>
<td>Cerebrovascular event</td>
<td>6</td>
<td>4</td>
<td>0.07</td>
</tr>
<tr>
<td>Acute respiratory dysfunction</td>
<td>5</td>
<td>3</td>
<td>0.06</td>
</tr>
<tr>
<td>Septicaemic shock</td>
<td>4</td>
<td>4</td>
<td>0.06</td>
</tr>
<tr>
<td>Status epilepticus</td>
<td>3</td>
<td>0</td>
<td>0.02</td>
</tr>
<tr>
<td>Interventional radiology*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planned</td>
<td>8</td>
<td>3</td>
<td>0.08</td>
</tr>
<tr>
<td>Unplanned</td>
<td>8</td>
<td>0</td>
<td>0.06</td>
</tr>
</tbody>
</table>
Major Obstetric Haemorrhage Rates per maternity unit, 2011/12
### Causes of major obstetric haemorrhage, 2011/12

<table>
<thead>
<tr>
<th>Reported causes</th>
<th>n (%)</th>
<th>% delivered by CS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uterine atony</td>
<td>130 (40.1%)</td>
<td>60%</td>
</tr>
<tr>
<td>Retained placental membranes</td>
<td>52 (16%)</td>
<td>4%</td>
</tr>
<tr>
<td>Bleeding from uterine incision</td>
<td>44 (13.6%)</td>
<td>100%</td>
</tr>
<tr>
<td>Placenta praevia</td>
<td>41 (12.7%)</td>
<td>100%</td>
</tr>
<tr>
<td>Morbidly adherent placenta</td>
<td>31 (9.6%)</td>
<td>97%</td>
</tr>
<tr>
<td>Vaginal laceration</td>
<td>26 (8%)</td>
<td>0%</td>
</tr>
<tr>
<td>Placental abruption</td>
<td>25 (7.7%)</td>
<td>78%</td>
</tr>
<tr>
<td>Cervical laceration</td>
<td>7 (2.2%)</td>
<td>43%</td>
</tr>
<tr>
<td>Broad ligament haematoma</td>
<td>4 (1.2%)</td>
<td>75%</td>
</tr>
<tr>
<td>Uterine rupture</td>
<td>4 (1.2%)</td>
<td>25%</td>
</tr>
<tr>
<td>Uterine inversion</td>
<td>1 (0.3%)</td>
<td>100%</td>
</tr>
<tr>
<td>Other specified cause</td>
<td>78 (24.1%)</td>
<td>81%</td>
</tr>
</tbody>
</table>
Temporal trends in PPH – Ireland 1999-2009

Source: Lutomski et al; BJOG 2011
Definition

- Primary / Secondary
- > 500 mls after vaginal birth
- > 1000 mls after CS (1)
- > 750 mls after CS (2)
- > 1000 mls Significant
- > 2500 mls Major (3)
- Irish Guideline  Minor 500-1000/ major >1000mls
- Major divided into Moderate 1000-2000 or Severe > 2000mls (4)

• Prevention

• Early recognition

• Early appropriate intervention
Prevention

Identification of antenatal risk factors

- Anaemia (<9 g/dl)
- Obesity (BMI >35)
- Age > 40 years
- Multiple Pregnancy
- History of PPH or retained placenta
- History of caesarean section
- Placenta praevia, percreta, accreta
- PET / PIH

*Women at risk of PPH should be delivered in a unit with access to blood*

*All women with a history of CS should have ultrasound identification of the location of the placenta.*

*When placenta accreta/ percreta is suspected there should be multidisciplinary planning of delivery in the most appropriate site with access to the most appropriate personnel and facilities.*
**Prevention**

**Identify intrapartum risk factors**
- IOL
- Placental abruption
- Prolonged labour (>12 hours)
- Operative vaginal birth or caesarean section
- Retained placenta
- Macrosomia
- Pyrexia in labour

*Active management of the third stage of labour*
*Prophylactic oxytocics*
*S syntocinon infusion 40 units in 500 mls N saline over 4 hours*
• Prevention

• Early recognition

• Early appropriate intervention
Early recognition

Identification of Blood Loss

- Calibrated vaginal drape markings
- Transparent plastic collection bags
- Weighing
- Staff training
## Early Recognition

### Clinical features of shock in pregnancy related to blood loss

<table>
<thead>
<tr>
<th>Blood loss (mls)</th>
<th>Signs</th>
<th>Symptoms</th>
<th>Level of shock</th>
</tr>
</thead>
<tbody>
<tr>
<td>500-1000</td>
<td>Normal blood pressure</td>
<td>Palpitations, dizziness.</td>
<td>Compensated</td>
</tr>
<tr>
<td></td>
<td>Tachycardia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1000-1500</td>
<td>Hypotension systolic 90-80 mmHg</td>
<td>Weakness, faintness, thirst</td>
<td>Mild</td>
</tr>
<tr>
<td></td>
<td>Tachycardia</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tachypnoea</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pallor, sweating.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1500-2000</td>
<td>Pallor / sweating</td>
<td>Restlessness, anxiety, confusion.</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>Hypotension 80-60 mmHg</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rapid, weak pulse &gt; 110 bpm</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tachypnoea</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pallor, cold clammy skin.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Poor urinary output &lt; 30 ml/hr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000-3000</td>
<td>Severe hypotension &lt; 50 mmHg</td>
<td>Confusion or unconsciousness, collapse</td>
<td>Severe</td>
</tr>
<tr>
<td></td>
<td>Pallor, cold clammy skin, peripheral cyanosis.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Air hunger.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Anuria</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Early recognition
Identification of Bleeding

- MOEWS
- 676 obs admissions
- 200 triggered
- Sensitivity 89% (95% CI 81 – 95)
- Specificity 79% (95% CI 76 – 82)

Singh et al Anaesthesia 2012: 67 ; 12-8
- Prevention
- Early recognition
- Early appropriate intervention
Early appropriate intervention

• Once PPH recognised
  ▫ Communication
  ▫ Resuscitation
  ▫ Monitoring
  ▫ Investigating / arresting the bleeding

  ▫ All of the above must be undertaken SIMULTANEOUSLY
Early appropriate intervention

CALL FOR HELP
- Senior Midwife
- Obstetric On call team
- Anaesthetic On call team
- Porter

Alert
- Haematologist
- Blood Transfusion service
- Theatre Staff

Assign
- A midwife for communication & documentation
Initial management: key principles

Assessment

Resuscitation

Stop the bleeding
Initial Assessment

Vital signs - A B C

Extent of bleeding

Cause of bleeding

Blood investigations
Resuscitation

- Lie flat
- Ensure airway and breathing
- O2 by mask, 10-15 L/min
- IV access: 2 x 14 or 16 gauge cannulae

- Blood (22ml) for:
  - Cross match (4-6 units)
  - Full blood count
  - Clotting screen (Fibrinogen, APTT, PTT)
  - Base line RFTs / LFTs

- Foley catheter (monitor hourly urine output)/ fluid balance
- Monitor: pulse, blood pressure, O₂ saturation, ECG, pulse oximetry x every 15 min.
- Central line
Resuscitation
Volume Replacement

- **Fluid**: Crystalloid / Colloid 1lt in each cannula (max 3.5 lts)
- **Blood**
  - Preferably cross matched but O Rh- Negative or group specific blood if life threatening blood loss

**Blood products**
- Fresh frozen plasma if PT/ APTT > 1.5 x normal or 4 units for every 6 units of RCC.
- Fibrinogen concentrate if Fibrinogen < 1.5 g/L
- Platelets if platelet level < 50 x 10⁹ / L

*Blood product administration should be guided by the clinical picture and not by blood tests alone.*
*Keep fluids and patient warm.*
Stop the bleeding

Massage the uterus/bimanual compression

Urinary catheter

Syntocinon 5 units i.v.

Ergometrine* 500ugs i.v. or i.m

* Syntometrine and ergometrine contraindicated with raised BP
Stop the bleeding

Syntocinon infusion
40 Units in 500ml N saline over 4 hours

Carboprost (Haemabate)
250 ugs im every 15 min x max 8 doses

Carboprost (Haemabate)
500 ugs direct intramyometrial

Misoprostol
600 ugs po/sl
Surgical Management

EUA

Tone

Tissue

Trauma

Thrombin
Monitoring and investigation
Continual Assessment

Airway Breathing Circulation

Cause of bleeding

Extent of bleeding

Blood investigations
Surgical Management

Advanced
Balloon tamponade
B-Lynch suture
Uterine devascularisation
Internal iliac artery ligation
Hysterectomy
Abdominal packing
Interventional radiology
COOK MEDICAL
Bakri Postpartum Balloon

Cook OB/GYN (www.cookmedical.com)
Uterine compression sutures

- B-Lynch suture
  Place in lithotomy
  Exteriorize uterus
  Bimanual compression
  70-80mm round bodied needle
  Monocril

19 / 1600 successful

Internal iliac artery ligation for arresting postpartum haemorrhage.

Hysterectomy

- 0.24 – 1.4/1000
- 0.3/1000
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Caesarean Section</td>
<td>6%</td>
<td>19%</td>
</tr>
<tr>
<td>Peripartum hysterectomy</td>
<td>0.85</td>
<td>0.2/1000</td>
</tr>
<tr>
<td>Placenta accreta</td>
<td>5.4%</td>
<td>46.5%</td>
</tr>
</tbody>
</table>

*Flood et al AJOG 2010*
## Uterotonic Agents Used 2011

<table>
<thead>
<tr>
<th>Uterotonic</th>
<th>NPEC SMM 2011</th>
<th>SCASMM SMM 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syntocinon 5-10 units (IM/IV)</td>
<td>50 (73.5)</td>
<td>56%</td>
</tr>
<tr>
<td>Syntocinon infusion (40 units)</td>
<td>63 (92.6)</td>
<td>89%</td>
</tr>
<tr>
<td>Ergometrine 0.5mg (IM/IV)</td>
<td>22 (32.4)</td>
<td>55%</td>
</tr>
<tr>
<td>Syntometrine 5mg (IM)</td>
<td>22 (32.4)</td>
<td>NR</td>
</tr>
<tr>
<td>Carboprost 0.25mg (IM)</td>
<td>46 (67.6)</td>
<td>70%</td>
</tr>
<tr>
<td>Misoprostol 200 µg/mcg(PO/PV)</td>
<td>57 (83.8)</td>
<td>20%</td>
</tr>
<tr>
<td>Tranexamic acid 1g</td>
<td>6 (8.8)</td>
<td>NR</td>
</tr>
</tbody>
</table>

Note: Categories are not mutually exclusive and may add up to over 100%. NR: Not reported
### Incidence of Haemostatic Surgical Procedures

<table>
<thead>
<tr>
<th>Procedure</th>
<th>NPEC SMM 2011: Women undergoing procedure N (%)</th>
<th>NPEC SMM 2011: Hysterectomy ultimately required N (% of subcategory)</th>
<th>SCASMM SMM 2011 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intra-uterine balloon tamponade</td>
<td>47 (29.6)</td>
<td>8 (17.0)</td>
<td>24.9%</td>
</tr>
<tr>
<td>Manual removal of placenta/retained tissue</td>
<td>36 (22.6)</td>
<td>2 (5.6)</td>
<td>--</td>
</tr>
<tr>
<td>Repair of vaginal/cervical lacerations</td>
<td>33 (20.8)</td>
<td>1 (3.0)</td>
<td>--</td>
</tr>
<tr>
<td>Intra-myometrial carboprost</td>
<td>25 (15.7)</td>
<td>6 (24.0)</td>
<td>--</td>
</tr>
<tr>
<td>Hysterectomy</td>
<td>22 (13.8)</td>
<td>--</td>
<td>10%</td>
</tr>
<tr>
<td>Re-suturing caesarean section uterine incision and/or suturing of lateral extension</td>
<td>15 (9.4)</td>
<td>2 (13.3)</td>
<td>--</td>
</tr>
<tr>
<td>Haemostatic brace uterine suturing</td>
<td>12 (7.5)</td>
<td>2 (16.7)</td>
<td>6.6%</td>
</tr>
<tr>
<td>Bilateral ligation of uterine arteries</td>
<td>4 (2.5)</td>
<td>1 (25.0)</td>
<td>0.9%</td>
</tr>
<tr>
<td>Uterine artery embolization [Interventional Radiology]</td>
<td>8 (5.0)</td>
<td>1 (12.5)</td>
<td>4.3%</td>
</tr>
<tr>
<td>Bilateral ligation of iliac arteries</td>
<td>1 (0.6)</td>
<td>1 (100.0)</td>
<td>0.9%</td>
</tr>
</tbody>
</table>
Table 4: Comparison of EBL, blood results, blood product usage and duration of stay.

<table>
<thead>
<tr>
<th></th>
<th>Cryoprecipitate Group (n=14)</th>
<th>Fibrinogen Group (n=21)</th>
<th>Sig Level (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SEM</td>
<td>Mean</td>
</tr>
<tr>
<td>EBL (Litres)</td>
<td>5.19</td>
<td>1.07</td>
<td>3.34</td>
</tr>
<tr>
<td>Min Haematocrit</td>
<td>0.206</td>
<td>0.017</td>
<td>0.192</td>
</tr>
<tr>
<td>Min Platelets (X10⁹g/L)</td>
<td>92.9</td>
<td>12.98</td>
<td>105.0</td>
</tr>
<tr>
<td>Min Fibrinogen Level (g/L)</td>
<td>1.04</td>
<td>0.13</td>
<td>1.35</td>
</tr>
<tr>
<td>RCC (Units)</td>
<td>7.21</td>
<td>1.23</td>
<td>5.86</td>
</tr>
<tr>
<td>Octaplas (Units)</td>
<td>4.07</td>
<td>0.74</td>
<td>3.10</td>
</tr>
<tr>
<td>Platelets (Pool)</td>
<td>1.00</td>
<td>0.36</td>
<td>1.05</td>
</tr>
<tr>
<td>Fibrinogen Post Treatment (g/L)</td>
<td>3.35</td>
<td>0.19</td>
<td>3.34</td>
</tr>
<tr>
<td>Duration of HDU Stay (Hours)</td>
<td>34.1</td>
<td>4.32</td>
<td>33.1</td>
</tr>
<tr>
<td>Duration of Hospital Stay (Days)</td>
<td>5.2</td>
<td>0.33</td>
<td>6.5</td>
</tr>
</tbody>
</table>

Mean, SEM = Standard error of mean, Significance testing by Independent Samples t-test.
Managing PPH on the ground!

- Protocol / Guidelines
- Training of Staff
- Rehearsals / Fire drills
- Senior Staff Involvement
- Emergency PPH Box
**HEAD**
- Airway Breathing
- Oxygen
- Lie flat

**HELP**
- Call for help
- Communicates
- Records
- Evaluates

**ARMS**
- Circulation
- IV access
- Bloods
- Fluids
- Drugs

**UTERUS**
- Deliver placenta
- Rub up contraction
- Bimanual compression
- Urinary catheter
- Drugs
Documentation

- Staff in attendance and the time of arrival
- Sequence of events
- Timing of administration of pharmacological agents
- Timing and sequence of surgical interventions
- Timing of fluid and blood products
- Condition of mother
Care following the event

Close monitoring of vital signs, blood loss and urine output
HDU or ICU setting
Multidisciplinary input
Care of the newborn
Thromboprophylaxis
Debriefing
Clinical incident reporting
Quality standards and improvement

- Monitor all cases of blood loss > 1000mls
- Appropriate identification and management of women at risk of PPH
- Documentation
- Appropriate management of cases
- Notification to risk management
- Regular training of team
Summary

Women at increased risk of PPH should be identified and a care plan for delivery put in place.

Management of PPH requires Communication; Resuscitation; Monitoring and investigation; and arresting the bleeding.

Good team work is essential and promoted by multidisciplinary skills and drills sessions.
Looking forward

- PPH rates are increasing
- We are delivering more complex patients
- We need multidisciplinary planning for delivery
- We need to recognize the signs and symptoms of haemorrhage, call for help and work as a cohesive team to resuscitate the patient and stop the bleeding.
- If you do only one thing when you return to your unit, *Set up sporadic haemorrhage drills and analyse a case of MOH monthly*