UK Confidential Enquiries into Maternal Deaths
The first 60 years

Gwyneth Lewis OBE FACOG FRCOG FFPHM
UK Background
England and Wales maternity staff

Proportion of full time equivalents

- Midwives: 19,298
- Consultants: 1,432
- Doctors training: 2,892
- Other: 386

Source: NHS workforce census
Characteristics UK maternity services

• Nearly one million births a year in whole UK (E, W, S, NI and I)

• 99.9% for free in National Health Service facilities
  • Of these 70% in a hospital (often by midwife)
  • 25 % in a midwifery led unit (no OBGYNs)
  • 5% at home (two midwives no OBGYNs)

• Only two dedicated private hospitals for obstetrics in the UK.

• “All women need a midwife; some need a doctor too”

• All are cared for by a named midwife in pregnancy and postnatally and about half also receive some obstetric input

• 65% of women delivered by a midwife.
The study compared the safety of births planned at home, freestanding midwifery units, alongside midwifery units and obstetric units. The findings relate to healthy women screened as ‘low risk’.

**Giving birth is generally very safe** For ‘low risk’ women the incidence of adverse perinatal outcomes (intrapartum stillbirth, early neonatal death, neonatal encephalopathy, meconium aspiration syndrome, and specified birth related injuries including brachial plexus injury) was low (4.3 events per 1000 births).

**Midwifery units appear to be safe for the baby and offer benefits for the mother** For planned births in all midwifery units there were no significant differences in adverse perinatal outcomes compared with planned birth in an obstetric unit.

Women who planned birth in any midwifery unit had significantly fewer interventions, including substantially fewer intrapartum caesarean sections, and more ‘normal births’ than women who planned birth in an obstetric unit.

**For women having a second or subsequent baby, home births and midwifery unit births appear to be safe for the baby and offer benefits for the mother**

**For nulliparous women there is higher chance of poorer perinatal outcomes at home (not midwifery units)** There were 9.3 adverse perinatal outcome events per 1000 planned home births compared with 5.3 per 1000 lanned in obstetric units, and this was statistically significant.

Changing UK demographics leading to risker pregnancies and births

- Maternal age at first birth is rising: now 33
- 26% babies born in London in 2014 had parents who were born abroad
- Large rise in immigrants asylum seekers with poor and complex general health status; congenital and acquired cardiac disease, anaemia, TB, HIV etc
- Large rise in number from central and eastern Europe with different health seeking behaviours
- Increase in obesity and type 11 diabetes
- Poorer overall health of general population
Yet

Maternal deaths are at the lowest rate ever:
Direct death rate 2.9 per 100,000 maternities
Indirect deaths (*including suicide and influenza*) were 6.1

However:

• 74% of women who died had coexisting medical conditions
• 10% had coexisting mental health issues
• 14% declared domestic abuse (gross underestimate)
Example of care network for antenatal care

Mainly community based services
- Pre-conception clinic/advice
- Birth preparedness classes
  - Healthy pregnancy classes
  - Parentcraft classes
- Psychiatric services
- Translation services
- Substance misuse services
- Specialist support groups
- Social care and support services
- Physiotherapy
- Multi-agency domestic violence support

Mainly hospital out-patient based services
- Genetic clinic/counselling
- Early pregnancy unit
- Recurrent miscarriage clinic
- Screening services offered to all women
- Specialist diagnostic (tertiary)
- Counselling/bereavement
- Late pregnancy loss
- Joint specialist clinics, e.g.: Cardiology, Epilepsy, Diabetes, Psychiatry, Other
- Hospital-based obstetric services for higher risk pregnancies
- Routine care may still be possible by midwife in community
- Feto-maternal medicine clinic
- Anaesthetic pre-planning services
- Paediatric pre-planning services
National Clinical Guidelines

1. NICE guidelines
   - Antenatal care
   - Caesarean Section
   - Intrapartum care
   - Postnatal care
   - Mental health
   - Diabetes in pregnancy
   - Socially complex pregnancies

2. Royal College of Obstetricians and Gynaecologists

National Institute for Health and Clinical Excellence
www.nice.org.uk/guidelines
UK Care Quality Commission

National inspection standards include

- Patient satisfaction and user involvement
- Quality of care
- Staffing and resources
- Risk management
- Learning from adverse events
- Routine national and institutional audit and self review
- Notes and record keeping
Maternal deaths by major cause

England and Wales, 1935-78

Deaths per 100,000 total births

- Abortion and miscarriage
- Toxaemia
- Haemorrhage
- Puerperal sepsis
- Puerperal phlebitis, thrombosis and embolism

Source: General Register Office and OPCS, Reproduced in *Birth counts*, Table A10.1.3
Maternal deaths by major cause

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Maternal deaths / 1,000 births

Source: General Register Office, OPCS and ONS mortality statistics

*Birth counts*, Tables A10.1.1-A10.1.4
Maternal deaths / 1,000 births

Source: General Register Office, OPCS and ONS mortality statistics

Birth counts, Tables A10.1.1-A10.1.4
A tale of two cities : London
Rochdale
Rochdale Maternal Death Review

MMR reduced from >900 per 100,000 pregnancies (1928) to 280 per 100,000 pregnancies (1934)

“It is important to note that the results were obtained by a change in spirit and method and without any substantial increase in public expenditure.”
THE death of a person long before the allotted span has been reached must always be a regrettable occurrence, where this death 

of a swab. It is well known that the death rate varies directly with the length of time the Ministry of Health. In Yorkshire with an average rate exceeding 5 per 1,000, which were embraced within this official survey were
“A maternity conscience”
“So far, all this procedure had been intended to do was to secure improvements by the local review of cases, but it was soon apparent that avoidable factors were too often present in antenatal and intra-natal care for the opportunity for central remediable action to be ignored. This led to the decision to undertake a national confidential enquiry”.

Sir George Godber: ex CMO England
90 per 100,000 maternities

1952-54

90 per 100,000 maternities *

11 per 100,000 Maternities *

2006-08

10 per 100,000 Maternities *

2009-12

9 per 100,00 Maternities *

2010-13

* UK definition Indirect deaths include suicides, hormone dependant malignancies etc
Quality improvement cycle

1. Set standards/guidelines
2. Teach and implement
3. Audit results
4. New evidence
5. Revise and update
6. Re-audit and start again

The cycle then repeats.
Quality spiral

UK Royal College of Physicians
Saving Mothers’ Lives

Reviewing maternal deaths to make motherhood safer: 2006-2008

March 2011

The Eighth Report of the Confidential Enquiries into Maternal Deaths on the United Kingdom
“Whose faces are behind the numbers? What were their stories? What were their dreams? They left behind children and families. They also left behind clues as to why their lives ended so early”.

Callaghan W. 2004
Husband in tears as he tells of wife’s death after giving birth

By Nicole Martin

A HUSBAND whose wife died from blood poisoning six days after giving birth to their second child has spoken of his grief as he honored the memory of his wife in a public inquiry.

Mrs. Palmer, 31, said that doctors discharged her daughter, but after she gave birth she was still ill. She went to her local hospital on the fifth day after giving birth, but the nurses did not recognize the signs of infection. While there, she developed a fever and complained of abdominal pain. She was discharged but went back to the hospital the next day, she suffered a heart attack in the operating theatre and died.

Mrs. Palmer's husband said that he was not told the full extent of her illness until she was taken to hospital. She was then taken to another hospital, where she died.

“Mrs. Palmer was discharged from the hospital on the fifth day after giving birth, but the nurses did not recognize the signs of infection. While there, she developed a fever and complained of abdominal pain. She was discharged but went back to the hospital the next day, she suffered a heart attack in the operating theatre and died.”

Mrs. Palmer was reported to have complained of abdominal pain and was discharged from the hospital. However, when she went back the next day, she was taken to another hospital, where she died.

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“Facts and figures are essential, but insufficient, to translate the data and promote the acceptance of evidence-based practices and policies…. narratives, when compared with reporting statistical evidence alone, can have uniquely persuasive effects in overcoming preconceived beliefs.

Stories help the public make sense of population-based evidence. Guideline developers and regulatory scientists must recognize, adapt, and deploy narrative to explain the science of guidelines to patients and families, health care professionals, and policy makers to promote their optimal understanding, uptake, and use.”

Marian Knight
Maternal Lead – MBRRACE-UK
Maternal Deaths – UK Definitions

- **Direct**: As a consequence of a disorder specific to pregnancy
  - E.g. Haemorrhage, pre-eclampsia, genital tract sepsis

- **Indirect**: Deaths resulting from previous existing disease, or diseases that developed during pregnancy, and which were not due to direct obstetric causes but aggravated by pregnancy
  - E.g. Cardiac disease, neuro etc, other infections (non-genital tract infections/sepsis), suicide, hormone dependant malignancies

- **Coincidental**: Incidental/accidental deaths not due to pregnancy or aggravated by pregnancy
  - E.g. Road traffic accident

- **Late**: Deaths occurring more than 42 days but less than one year after the end of pregnancy
Case identification and data collected

1. **Surveillance: death certificates:** Women with pregnancy-related conditions listed as the cause of death identified from death registration data.

2. **Record linkage deaths and births:** Birth registration data also linked with data on deaths of all women of reproductive age and any additional maternal deaths identified.

3. **Case reporting (doctors, pathologists, midwives, coroners, press etc)**

4. **In depth review. Assessment of case notes, critical incident reports and questionnaires**
## UK international comparative MMR*

<table>
<thead>
<tr>
<th>Triennium</th>
<th>No. of deaths identified through death certificates</th>
<th>MMR</th>
<th>95% CI</th>
<th>Denominator number of live births</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985-87</td>
<td>174</td>
<td>7.67</td>
<td>6.61-8.90</td>
<td>2,268,766</td>
</tr>
<tr>
<td>1988-90</td>
<td>171</td>
<td>7.24</td>
<td>6.24-8.42</td>
<td>2,360,309</td>
</tr>
<tr>
<td>1991-93</td>
<td>150</td>
<td>6.48</td>
<td>5.52-7.60</td>
<td>2,315,204</td>
</tr>
<tr>
<td>1997-99</td>
<td>128</td>
<td>6.03</td>
<td>5.70-7.17</td>
<td>2,123,614</td>
</tr>
<tr>
<td>2000-02</td>
<td>136</td>
<td>6.81</td>
<td>5.76-8.05</td>
<td>1,997,472</td>
</tr>
<tr>
<td>2003-05</td>
<td>149</td>
<td>7.05</td>
<td>6.00-8.27</td>
<td>2,114,004</td>
</tr>
<tr>
<td>2006-08</td>
<td>155</td>
<td>6.76</td>
<td>5.78-7.92</td>
<td>2,291,493</td>
</tr>
<tr>
<td>2009-11</td>
<td>134</td>
<td>5.57</td>
<td>4.67-6.60</td>
<td>2,405,251</td>
</tr>
</tbody>
</table>

*Deaths identified solely from death certificates, live births used as denominator.
The women who died 2010-13

240 women died during pregnancy or up to 42 days postpartum in 2009-12

325 women died between 43 days and one year after the end of pregnancy

26 deaths were classified as coincidental

_Constribution of H1N1 this period was 0.5/100,000_
Maternal Mortality UK 1985-2013
rates per 100,000 maternities

Direct
Indirect
Total


Direct
Indirect
Total
Maternal Mortality 2003-13

Graph showing trends in Direct and Indirect Maternal Death Rates from 2004 to 2012.
Direct maternal deaths UK per 100,000 maternities UK 2003-2013

three year periods

53% reduction. \( P = 0.005 \)
Leading causes of direct maternal deaths
UK 1985-2013
per million maternities

Pregnancy induced hypertension
Thromboembolism
Haemorrhage
AFE
Sepsis
Indirect maternal deaths UK per 100,000 maternities UK 2003-2013 three year periods

No significant decrease p=0.028
Causes of Maternal Deaths 2010-13
per 100,000 maternities UK/Eire

74% of women who died 2009-12 had a pre-existing medical disorder
Causes of maternal death UK/I
2010-2013

White bars indirect causes, red show direct causes
Indirect Maternal Deaths 2011-13

- 68% of maternal deaths in the UK
- Cardiac disease the leading cause
  - 49 maternal deaths 2011-13
    (2.06 per 100,000 maternities)
    - 12 Sudden Adult Death Syndrome
    - 10 Acute Coronary Syndrome
    - 6 Cardiomyopathy
    - 11 Other cardiac conditions
- Epilepsy deaths unchanged
  - 0.30 per 100,000 maternities
Indirect Maternal Deaths 2011-13

- 68% of maternal deaths in the UK
- Deaths due to mental health-related causes
  - 0.8 per 100,000 maternities
  - 1 in 11 of all maternal deaths during or up to six weeks after the end of pregnancy
Late Maternal Deaths 2009-13

- Malignancy
- Suicide
- Drug & alcohol/other psychiatric
- Acute myocardial infarction
- Aortic dissection
- Cardiomyopathy
- SIRS
- Other cardiac
- Stroke
- Epilepsy
- Other neurological
- Pulmonary embolism
- Acute sinusitis/other sinusitis
- Respiratory disorders
- Other medical conditions
- Group A streptococcus
- Influenza
- Pneumonia/other infections
- Sepsis
- Accidents including IULS
- Premature birth/perinatal death/early pregnancy death/ eclampsia
Assessment of clinical care

<table>
<thead>
<tr>
<th>Classification of care received</th>
<th>Deaths within 42 days</th>
<th>Late deaths 43-365 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good care</td>
<td>41%</td>
<td>31%</td>
</tr>
<tr>
<td>Improvements to care which would have made no difference to outcome</td>
<td>21%</td>
<td>26%</td>
</tr>
<tr>
<td>Improvements to care which would have made a difference to outcome</td>
<td>38%</td>
<td>43%</td>
</tr>
</tbody>
</table>

Improvements in care are interpreted to include adherence to guidelines, where these exist and have not been followed, as well as other improvements which would normally be considered part of good care, where no formal guidelines exist.
Vulnerability
Antenatal care

- Only 29% of women who had antenatal care received the recommended level of care according to antenatal care guidelines (booking at 10 weeks or less and no routine antenatal visits missed);

- Almost two thirds received a minimum level of antenatal care (booking at less than 12 weeks and three or fewer antenatal visits missed);

- 25% did not receive even this minimum level of care.
## Maternal mortality rate by area of residence (IMD quintile)

<table>
<thead>
<tr>
<th>IMD Quintiles (England only)</th>
<th>Rate per 100,000 maternities</th>
<th>95% CI</th>
<th>Relative risk (RR)</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>I (Least deprived/ highest 20%)</td>
<td>8.2</td>
<td>5.6 to 11.6</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>II</td>
<td>8.2</td>
<td>5.6 to 11.4</td>
<td>1.00</td>
<td>0.60 to 1.67</td>
</tr>
<tr>
<td>III</td>
<td>8.9</td>
<td>6.4 to 12.0</td>
<td>1.09</td>
<td>0.67 to 1.77</td>
</tr>
<tr>
<td>IV</td>
<td>11.0</td>
<td>8.5 to 14.0</td>
<td>1.34</td>
<td>0.87 to 2.12</td>
</tr>
<tr>
<td>V (Most deprived/ lowest 20%)</td>
<td>12.1</td>
<td>9.7 to 14.9</td>
<td>1.48*</td>
<td>1.00 to 2.29</td>
</tr>
</tbody>
</table>

*Significantly raised compared to women in least deprived areas
Maternal mortality rate by ethnic group

<table>
<thead>
<tr>
<th>Ethnicity (England only)</th>
<th>Rate per 100,000 maternities</th>
<th>95% CI</th>
<th>Relative risk (RR)</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>White (inc. not known)</td>
<td>9.0</td>
<td>7.8 -10.4</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Indian (Asian)</td>
<td>20.5</td>
<td>11.9-32.8</td>
<td>2.27*</td>
<td>1.30-3.74</td>
</tr>
<tr>
<td>Pakistani</td>
<td>13.9</td>
<td>7.8-22.8</td>
<td>1.53</td>
<td>0.84-2.60</td>
</tr>
<tr>
<td>Bangladeshi</td>
<td>11.1</td>
<td>3.0-28.4</td>
<td>1.23</td>
<td>0.33-3.20</td>
</tr>
<tr>
<td>Other Asian</td>
<td>8.1</td>
<td>2.9-17.6</td>
<td>0.90</td>
<td>0.32-1.99</td>
</tr>
<tr>
<td>Caribbean</td>
<td>18.5</td>
<td>6.0-43.2</td>
<td>2.05</td>
<td>0.66-4.87</td>
</tr>
<tr>
<td>African</td>
<td>26.9</td>
<td>17.6-39.4</td>
<td>2.98*</td>
<td>1.90-4.51</td>
</tr>
<tr>
<td>Others/ mixed</td>
<td>10.2</td>
<td>5.6-17.1</td>
<td>1.13</td>
<td>0.61-1.94</td>
</tr>
</tbody>
</table>

*Significantly raised compared to white women
A promise to learn

“Because human error is normal and, by definition, unintended, well-intentioned people who make errors or who are supported in systems that have failed around them need to be supported, not punished, so they will report their mistakes and the system defects they observe so that all can learn from them”.

“Aggregated data may camouflage variations (between or) within organisations that would be revealed by intelligent fine grained analysis at local level.”