Minnesota

- Minnesota population 2015: 5.49m
- Average age: 37
- 81% white Minnesotan
- 19% other mainly 6 other racial groups
- 225,181 Km²

Cork

Pregnancy Loss Research Group

- Communication skills in Obstetrics: what can we learn from bereaved parents?
Definitions

Overview of perinatal mortality in Ireland
Intrapartum deaths – importance
Intrapartum deaths and intrapartum event related neonatal deaths - the Irish situation
Recommendations from our study

Stillbirth (SB)
Baby delivered without signs of life from 24 weeks gestation or with a birth weight ≥ 500g
Stillbirth rate
Number of stillbirths per 1000 births

Early neonatal death (eNND)
Early (eNND): death of a live born baby occurring within first 7 days of life
Neonatal death rate
Number of eNNDs per 1000 births

Perinatal death
Stillbirth or early neonatal death
Overall perinatal mortality rate
Number of stillbirths and early neonatal deaths per 1000 births
Corrected rates
Calculated by excluding deaths secondary to a major congenital anomaly
Intrapartum death (IPD)
Death of a baby after the onset of labour and before birth
Intrapartum event-related neonatal death
Death of a baby as a result of an event that occurred during labour
Perinatal Mortality in Ireland

National Perinatal Epidemiology Centre

NPEC founded in 2007

In 2008 it began to collect, analyse and audit data pertaining to all stillbirths and neonatal deaths in Ireland

Data is collected and submitted by nominated individuals from each of the 19 maternity units in Ireland to the NPEC via an online secure database

Dataset is based on the previously validated CMACE (Centre for maternal and child enquiries) perinatal death notification form – UK

Published first perinatal mortality report in 2008

The nominated individuals in each hospital are asked to identify any maternal, fetal or neonatal conditions that may have contributed to the infants death

They are also asked to provide a main cause of death with reference to available post-mortem and placental reports

Published first perinatal mortality report in 2008
Perinatal Mortality in Ireland 2015

19 Maternity Units
65,904 births ([2015]

460 perinatal deaths
- Perinatal mortality rate (PNMR) 7 per 1000 births
- Corrected PNMR 4.3 per 1000 births

Stillbirths 294/460 (63.9%)
Early neonatal deaths 166/460 (36.1%)

Stillbirth rate 4.5 per 1000 births*
Early neonatal death rate 2.5 per 1000 births

Perinatal Mortality in the United States

United States 2013
SB rate 5.96/1000 births
PNMR 6.24/1000 births

Minnesota 2013
SB rate 5.04/1000*
PNMR 5.90/1000
Ireland - Context

Major Congenital Anomaly
• Primary cause of stillbirth in Ireland (79/294, 26.9%)
• Primary cause of neonatal death in Ireland (98/166, 59%)

The Coroner’s jurisdiction in Ireland
• “Unnatural stillbirths and intra-uterine deaths”
• “All unexplained deaths”

Intrapartum Deaths and Intrapartum Event Related Neonatal Deaths
Intrapartum Deaths

Far reaching and long-lasting impact
- Not just on parents but also siblings, grandparents and extended family members
- Less likely to consent to perinatal post-mortem examination
- If cause is uncertain may be associated with possible litigation
  - Communication important
Intrapartum Deaths and Healthcare Professionals

“...you have witch-hunts for doctors but it is not the doctor’s fault, the system is never blamed... there should be a way to protect clinicians from this, from being vilified in the papers.”

“I think it is upsetting. I know all my colleagues. We do the best and we give the best and then we are portrayed as killers out there and not caring and it is very soul destroying.”

“...for us it is really frustrating as we never hear the full clinical story and I think this ability for the papers to publish stuff that isn’t factually correct without any clinical basis behind it needs to stop.”

Intrapartum Deaths and Intrapartum Event Related Neonatal Deaths in Ireland 2011-2014; a Descriptive Study
Study Aims

- To describe the national intrapartum death rate
- To describe both maternal and infant demographics pertaining to antenatal, intrapartum and postpartum care
- To ascertain causation for each death
- To identify if any or all or none of these cases could have been prevented

Methods

Detailed descriptive analysis of intrapartum deaths and intrapartum event-related neonatal deaths; 2011-2014

Data obtained from NPEC
- Maternal and infant demographics
- Available intrapartum details
- Postnatal investigations
Methods

Information obtained on all intrapartum deaths and unexpected neonatal deaths; 2011-2014

IPD: the death of any infant in labour

Unexpected neonatal death; early neonatal period death, >34 weeks, no major congenital anomaly

Data available on the IPDs for 2011-2014 but only 2012-2014 for the NNDs

Results

Intrapartum Deaths

- 81 Intrapartum deaths (2011 – 2014)
- Overall IPD rate 0.29 per 1000 births
- Corrected IPD rate 0.16 per 1000 births

Unexpected Neonatal Deaths

- 36 unexpected neonatal deaths (2012 – 2014)
- Unexpected neonatal death rate 0.17 per 1000 live births

Total deaths - 117
Results – The Mothers

Mean maternal age – 31 years
Predominant ethnic group – white Irish (97/117, 82.9%)
Occupation documented for 105/117
  10.3% (n=12) unemployed

At booking 21.4% (25/117) of mothers smoked
  16 continued for duration of pregnancy

Median BMI was 25 kg/m²
  Range 17 kg/m² - 42.6 kg/m²
  49/117 (42%) were overweight or obese

33% (39/117) had a pre-existing medical condition

Booking gestation
  No data for 22/117 (18.8%)
  50% (59/117) booked before 16 weeks of gestational age
  20% (23/117) booked after 16 weeks of gestational age

Past obstetric history
  Nulliparous 56/117 (47.9%)
  Multiparous 61/117 (52.1%)
  First pregnancy 41/117 (35%)
  Prior miscarriage 35/117 (29.9%)
    3 recurrent
  Previous C-section 11/117 (9.4%)
Results - The infants

The Infants (N=117)

- Male infants – 62/117 (53%)
- Female infants – 54/117 (46.2%)
- One sex indeterminate

Most singletons – four infants were from a twin pregnancy
  - 2 DCDA
  - 1 MCDA
  - 1 unknown chorionicity

- Normally formed infants – 82/117 (70%)
- Infants with a major congenital anomaly – 35/117 (30%)

Results - The Infants (n=117)

- Gestational age (weeks) at birth, all infants (n=117)
- Gestational age (weeks) at birth, normally formed infants (n=82)
Results – The Infants (N=117)

Centile chart - all deaths (n=117)

Median birth weight:
- All infants - 2280g
- IQR 2424g
- Infants who died in labour (n=81)
  - 1300g (IQR 1745g)

Results – The Infants (N=117)

Mean birth weight of infants who died in neonatal period
- 3370g
- SD 577g

5/36 (18.5%) <10th percentile for gestational age

Centile chart – neonatal deaths (n=36)

Results – The Infants (N=117)

82 infants - normally formed
- 17/82 (20.7%) birth weight <10th percentile for gestational age

40 infants – normally formed with a gestational age at birth greater than 37 weeks
- 7/40 (17.5%) <10th percentile for gestational age

Centile chart – term normally formed (n=40)
Results - Labour and Delivery

Mode of delivery | IPDs (n=81, %) | eNNDs (n=36, %) | All deaths (n=117, %)
--- | --- | --- | ---
SVD | 56 (69.4) | 8 (22.2) | 44 (37.3)
Vacuum | 3 (3.7) | 6 (16.7) | 9 (7.7)
Forceps | 9 (11.1) | 0 | 4 (3.5)
AB delivery | 28 (34.6) | 0 | 28 (23.9)
CS after onset of labour | 10 (12.4) | 22 (61.3) | 32 (27.3)
Total | 81 (100) | 36 (100) | 117 (100)

Spontaneous onset labour in 80/117 (68%)

Six mothers had a pre-existing plan for delivery via CS
• 2 – assisted breech (AB) deliveries
• 4 – CS after onset of labour

Results – Post-mortem Investigations
Results - Post-mortem Investigations

<table>
<thead>
<tr>
<th>Investigation</th>
<th>Stillbirths (n=81, %)</th>
<th>NNDs (n=36, %)</th>
<th>All deaths (n=117, %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coroner v PM</td>
<td>9 (11.1)</td>
<td>31 (86.1)</td>
<td>40 (34.2)</td>
</tr>
<tr>
<td>Total</td>
<td>22 (27.2)</td>
<td>34 (94.4)</td>
<td>56 (47.9)</td>
</tr>
<tr>
<td>Offered and declined</td>
<td>49 (60.5)</td>
<td>2 (5.6)</td>
<td>51 (43.6)</td>
</tr>
<tr>
<td>Placental Histology</td>
<td>76 (93.8)</td>
<td>31 (86.1)</td>
<td>107 (91.5)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Investigation</th>
<th>n=81, MCA (n=35, %) Normally formed</th>
<th>n=36, Normally formed</th>
<th>n=117, Normally formed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coroner v PM</td>
<td>0</td>
<td>40 (100)</td>
<td>37 (100)</td>
</tr>
<tr>
<td>Total</td>
<td>6 (17)</td>
<td>50 (61)</td>
<td>37 (92.5)</td>
</tr>
<tr>
<td>Offered and declined</td>
<td>22 (62.9)</td>
<td>29 (35.4)</td>
<td>3 (7.5)</td>
</tr>
<tr>
<td>Placental Histology</td>
<td>30 (85.7)</td>
<td>77 (93.9)</td>
<td>34 (90)</td>
</tr>
</tbody>
</table>

Results - Placental Findings

<table>
<thead>
<tr>
<th>Investigation</th>
<th>Stillbirths (n=81, %)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Velamentous Insertion</td>
<td>2 (2.5)</td>
<td>2 (5.6)</td>
<td>4 (3.4)</td>
</tr>
<tr>
<td>Vasa Pravna</td>
<td>0</td>
<td>3 (8.3)</td>
<td>3 (2.6)</td>
</tr>
<tr>
<td>Placental Infarction</td>
<td>3 (3.7)</td>
<td>0</td>
<td>3 (2.6)</td>
</tr>
<tr>
<td>Chorioamnionitis</td>
<td>17 (21)</td>
<td>3 (8.3)</td>
<td>20 (17.5)</td>
</tr>
<tr>
<td>Fetel Vasculitis</td>
<td>2 (2.4)</td>
<td>2 (4.2)</td>
<td>4 (3.4)</td>
</tr>
<tr>
<td>Retroplacental Haemorrhage</td>
<td>8 (9.9)</td>
<td>1 (2.8)</td>
<td>9 (7.7)</td>
</tr>
<tr>
<td>Villitis</td>
<td>1 (1.2)</td>
<td>3 (8.3)</td>
<td>4 (3.4)</td>
</tr>
<tr>
<td>Other</td>
<td>19 (23.5)</td>
<td>13 (36.1)</td>
<td>32 (27.4)</td>
</tr>
<tr>
<td>No findings</td>
<td>35 (43.2)</td>
<td>10 (27.8)</td>
<td>45 (38.5)</td>
</tr>
</tbody>
</table>

Results - Cause of Death
Results – Intrapartum Deaths: Cause of Death (n= 81)

<table>
<thead>
<tr>
<th>Cause of Death</th>
<th>(n, %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCA</td>
<td>35 (43.2)</td>
</tr>
<tr>
<td>Chorioamnionitis</td>
<td>18 (22.2)</td>
</tr>
<tr>
<td>Placental Abruption</td>
<td>8 (9.9)</td>
</tr>
<tr>
<td>Intrapartum Asphyxia</td>
<td>8 (9.9)</td>
</tr>
<tr>
<td>Unexplained</td>
<td>4 (5)</td>
</tr>
<tr>
<td>Specific placental</td>
<td>3 (3.7)</td>
</tr>
<tr>
<td>Mechanical</td>
<td>2 (2.5)</td>
</tr>
<tr>
<td>Placenta praevia</td>
<td>1 (1.2)</td>
</tr>
<tr>
<td>Cord accident</td>
<td>11 (1.2)</td>
</tr>
<tr>
<td>PPROM</td>
<td>1 (1.2)</td>
</tr>
<tr>
<td>Total</td>
<td>81 (100)</td>
</tr>
</tbody>
</table>

Major Congenital Abnormalities
- CNS (45%) and chromosomal (42%) most common

Chorioamnionitis
- Most (16/18) delivered < 28/40
- 2/18 – delivered at 41/40

Intrapartum Asphyxia
- Coroner PM – 5/8
- Most (6/8) had some contributing obstetric condition – uterine rupture, PPROM, specific placental condition

Unexplained deaths
- 3 PMs
- 3 – 40/40
- 1 Forceps, SVD, CS
- 1 – 23/40 – 600g - no placental findings

Intrapartum event-related neonatal deaths

<table>
<thead>
<tr>
<th>Cause of Death</th>
<th>(n, %)</th>
</tr>
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<tbody>
<tr>
<td>HIE</td>
<td>21 (58.3)</td>
</tr>
<tr>
<td>Unexplained</td>
<td>6 (16.6)</td>
</tr>
<tr>
<td>Other</td>
<td>9 (25.1)</td>
</tr>
<tr>
<td>Total</td>
<td>36 (100)</td>
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</table>

Some of the main associated obstetric conditions included: APH, Uterine rupture, shoulder dystocia, pathological CTG
Intrapartum event-related neonatal deaths

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<td>9 (25.1)</td>
</tr>
<tr>
<td>Total</td>
<td>36 (100)</td>
</tr>
</tbody>
</table>

Unexplained deaths
- All Coroner PMs
- 1 late Booker, 1 unbooked
- All normal growth
- 2 infants – home birth (SVD)
- 4 EMCS

Other NNDs included: perinatal infection, ruptured vasa praevia

Discussion – Main Findings

- First detailed descriptive analysis of IPD and unexpected eNNDs in the ROI
- Intrapartum fetal death rate 0.16 per 1000 births
- 6.4% of all stillbirths are intrapartum
  - Compares favourably with other high-income countries*
    - England 0.35/1000
    - Scotland 0.30/1000
- Areas for improvement in antenatal and postnatal care have been identified

Intrapartum Deaths
- Most common cause of death – major congenital anomaly
  - 35/81 (43.2%)
- Intrapartum asphyxia
  - 8/81 (9.9%)
- Unexplained deaths
  - 4/81 (5%)

Neoatal Deaths
- Most common cause of death – hypoxic ischaemic encephalopathy
  - 21/36 (58.3%)
- Unexplained deaths
  - 6/36 (16.5%)
Discussion – Areas for Improvement

**Lifestyle**
- Maternal smoking (21% smoked)
- Maternal obesity (42% overweight or obese)
- Timely booking to a hospital or midwife (over 20% late bookers)
- Improved antenatal recognition of fetal growth restriction
  - 20% (17/82) of normally formed infants were less than 10th centile
  - 13/17 not suspected antenatally
- Antenatal education
- Public engagement
- Acceptance of risks associated with lifestyle choices
- Customised growth centiles
- Staff education surrounding risk factors and management of IUGR

**Discussion – Limitations**

- Original Aim:
  - To identify if any or all or none of these cases could have been prevented
- Unable to identify if these deaths could have been prevented
  - No access to chart level data
  - Unable to appraise intrapartum care
  - High-lights the need for a confidential enquiry process into all intrapartum deaths in Ireland

- Normally formed infants – 60% had a post-mortem examination
- Unclear from dataset if all appropriate cases were reported to the Coroner
- Improved uptake of post-mortem investigations needs to be encouraged
  - Reporting deaths to Coroner where appropriate
  - Staff training and education pertaining to post-mortem consent and communication
Main Recommendations

- Confidential Enquiries
  - Used extensively in the UK
  - Ireland maternal death enquiry since 2009
  - Learning both nationally and locally
  - Transparent
  - Protective for all stakeholders

- Each baby Counts - RCOG

Acknowledgements

- NPEC
  - Professor Richard Greene
  - Dr Sarah Meaney
  - Dr Linda Drummond

- PhD Supervisor
  - Dr Keelin O’Donoghue

INTERNATIONAL STILLBIRTH ALLIANCE ANNUAL CONFERENCE

CORK, IRELAND
22nd - 24th September 2017

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