

**Imperial College  
London**

# **Neonatal Data Analysis Unit**

**2007-2009**

**Report**



## Foreword

On behalf of the staff and Steering Board of the Neonatal Data Analysis Unit, I am pleased to introduce our latest report containing analyses employing information gathered from over 50,000 babies admitted to neonatal units between October 2007 and June 2009. They provide a unique description of the newborn babies receiving specialist care in the National Health Service at the end of the first decade of the 21<sup>st</sup> century, and the ethnic and socio-economic diversity of their mothers.

Principle 8 of the Toolkit for High Quality Neonatal Services (Department of Health, October 2009) states **“High-quality data offer the opportunity to provide accurate information to all clinicians, researchers and patients to improve the outcomes of care”**. The NDAU was established in 2007 to promote and develop best use of data held in neonatal electronic records by providing information to clinicians, managers and parents, and facilitating patient centred research. In addition to conducting neonatal unit and network based analyses, the NDAU analyse data for the Royal College of Paediatrics & Child Health National Neonatal Audit Programme, and have undertaken work for the NHS Information Centre. In 2009 the NDAU were awarded a 4 year research programme grant, Medicines for Neonates, to develop the use of electronic clinical data to support the care provided by neonatal units and networks and improve newborn outcomes.

This report reflects only a small proportion of the information held in the electronic neonatal record. I hope you will find it of interest and that you will provide feedback to NDAU Manager Richard Colquhoun ([r.colquhoun@imperial.ac.uk](mailto:r.colquhoun@imperial.ac.uk)), to me ([n.modi@imperial.ac.uk](mailto:n.modi@imperial.ac.uk)) or to any of the NDAU Board. We would like to know what analyses you find helpful, and where you perceive limitations and omissions. The data you collect are a national resource; I hope that together we can use them to improve clinical services for babies and their health outcomes.

I would like to acknowledge the contribution of the NDAU Steering Board and the organisations they represent, many clinical and non-clinical colleagues, and our funders. This report, and the vision we intend realising, would not have been possible without their support. I would also like to thank Network Managers for co-ordinating Caldicott Guardian and Clinician approvals for Trust data to be included in NDAU analyses, the NDAU team, our funders, and Neonatal Unit staff around the country.

Neena Modi  
Chair, NDAU Steering Board  
March 2010

# **Contents**

## **Neonatal Data Analysis Unit**

|   |              |
|---|--------------|
| <b>Staff</b>                                    | <b>4</b>     |
| <b>Students</b>                                 | <b>4</b>     |
| <b>Steering Board</b>                           | <b>4</b>     |
| <b>Funders</b>                                  | <b>4</b>     |
| <b>Analyses</b>                                 | <b>5</b>     |
| <b>Introductory Comments</b>                    | <b>5</b>     |
| <b>Interpretation of Analyses</b>               | <b>5</b>     |
| <b>Contributing Neonatal units and Networks</b> | <b>6-8</b>   |
| <b>List of Figures and Tables</b>               | <b>8-11</b>  |
| <b>Figures and Tables</b>                       | <b>12-63</b> |

## Neonatal Data Analysis Unit

### Staff

|                   |                                       |
|-------------------|---------------------------------------|
| Manager           | Richard Colquhoun                     |
| Data Analyst      | Eugene Statnikov                      |
| NNAP Data Analyst | TBA                                   |
| Statisticians     | Shalini Santhakumaran, Brad Manktelow |
| Research Nurse    | TBA                                   |

### Students

|                          |  |
|--------------------------|--|
| Clinical Research Fellow | Hilary Wong (Imperial College London)      |
| PhD Student              | Joanna Murray (Imperial College London)    |
| PhD Student              | Dimitrios Rovithis (University of Oxford)  |
| Research Associate       | Victoria Foster (University of Manchester) |

### Steering Board

|                    |  |
|--------------------|--|
| Jane Abbott        | BLISS  |
| Peter Brocklehurst | Professor of Perinatal Epidemiology,<br>University of Oxford and<br>Director, National Perinatal Epidemiology Unit                 |
| Kate Costeloe      | Professor of Paediatrics,<br>Queen Mary University of London   |
| Elizabeth Draper   | Professor of Perinatal Epidemiology, University of<br>Leicester and Chair, British Association of Perinatal<br>Medicine Data Group |
| Jacquie Kemp       | London Perinatal Director  |
| Azeem Majeed       | Professor of Public Health, Imperial College London  |
| Neena Modi (Chair) | Professor of Neonatal Medicine,<br>Imperial College London   |
| Andrew Wilkinson   | Professor of Paediatrics, University of Oxford   |

### Funders

|  |
|--|
| Abbott   |
| Danone   |
| Department of Health   |
| National Institute of Health Research (Medicines for Neonates Programme) |

## **Analyses**

Data management and analyses were carried out by Eugene Statnikov, Shalini Santhakumaran and Brad Manktelow.

## **Introductory Comments**

The data in this report includes information on babies admitted to NHS neonatal units. As the period covers 7 quarters, in order to make visual representation easier, data are presented as a pair of overlying bars, the outer, wider bar representing the period 1<sup>st</sup> Oct 2007 to 30<sup>th</sup> September 2008, and the inner, narrower bar the period 1<sup>st</sup> October 2008 to 30<sup>th</sup> June 2009.

Data quality, completeness and definitions remain an issue. Fields such as infant sex, birth weight and gestational age are well completed; missing data are particularly problematic for morbidities such as necrotising enterocolitis and infection, and daily entries.

As neonatal units are not identifiable by the NDAU it has not been possible to check outliers and inconsistent entries with individual neonatal units.

## **Interpretation of Analyses**

Please interpret network analyses with caution as not all neonatal units within a network have contributed data for this period. Neonatal units commenced participation at different time and the reports do not therefore necessarily reflect complete network activity, not are all networks represented in every analysis.

Data need to be interpreted as a guide to potential areas for further investigation and not as evidence of quality of care. There are several reasons why a network may appear as an outlier in the data; these include errors in the data entered, inconsistencies in the type of data entered, missing data, incomplete network-wide participation and inadequate risk adjustment.

The definition of “transitional care” clearly remains a problem with the extent to which units have chosen to include “transitional care” infants in their “special care” returns, unclear.

## **Contributing Neonatal Units and Networks**

The analyses in this report include data from 94 English neonatal units and 17 Neonatal Networks. This contrasts with 45 contributing neonatal units from 13 networks in the previous NDAU report.

Contributing Neonatal Units are listed below in accordance with well-established terminology, where a Level 3 unit provides a full or near full range of intensive support for babies with the most complex problems, a Level 2 unit provides an intermediate degree of support, and a Level 1 unit provides care for all other babies who could not reasonably be expected to be looked after at home.

Units and networks are represented by codes. Their identity is not known to the NDAU. This code will have been notified to neonatal units by Clevermed. Please contact Clevermed ([hilary@clevermed.com](mailto:hilary@clevermed.com)) if you have not received this.

### **Level One**

|                                 |  |
|---------------------------------|--|
| Burnley General                 | Princess Royal University, Farnborough |
| Chase Farm                      | Queen Elizabeth II, Welwyn Garden      |
| Conquest                        | Queen Elizabeth the Queen Mother,      |
| Ealing                          | Margate                                |
| Eastbourne District General     | Queen Mary's, Sidcup                   |
| Furness General                 | Royal Free                             |
| Horton                          | Royal Surrey County                    |
| Maidstone General               | St John's                              |
| Milton Keynes General           | West Suffolk                           |
| North Devon District            | Yeovil District                        |
| Princess Royal, Hayward's Heath |  |

### **Level Two**

|                                 |                               |
|---------------------------------|-------------------------------|
| Barnet                          | Hillingdon                    |
| Basildon                        | Hinchingbrooke                |
| Basingstoke & North Hampshire   | Ipswich                       |
| Bedford                         | James Paget                   |
| Colchester General              | King George                   |
| Countess of Chester             | Kingston                      |
| Dorset County                   | Leighton                      |
| East Surrey                     | Lister                        |
| Great Western                   | Macclesfield District General |
| Mayday University               | Peterborough Maternity        |
| Newham General                  | Poole General                 |
| North Middlesex University      | Princess Alexandra, Harlow    |
| Northwick Park                  | Queen Elizabeth, Kings Lynn   |
| Ormskirk District General       | Queen's Romford               |
| Pembury                         | Royal Berkshire               |
| Royal Cornwall, Truro           | Taunton & Somerset            |
| Royal Devon & Exeter, Heavitree | University, Lewisham          |
| Royal Hampshire County          | Warrington                    |
| Royal Lancaster Infirmary       | Watford General               |
| Royal United                    | Wexham Park                   |
| Salisbury District              | Whipps Cross University       |
| Southend                        | Whiston                       |
| St Mary's, Isle of Wight        | Whittington                   |
| Stoke Mandeville                | Wycombe                       |

### **Level Three**

Addenbrooke's

Arrowe Park

Barts & Royal London (Neonatal Unit  
Elizabeth Ward)

Barts & Royal London (Surgical Neonatal  
Unit Constance Green Ward)

Chelsea & Westminster

Derby City General

Derriford

Guy's & St Thomas'

Homerton

John Radcliffe

Liverpool Women's

Luton & Dunstable

Medway Maritime

Norfolk & Norwich University

Princess Anne

Queen Alexandra

Royal Blackburn

Royal Preston

Royal Sussex County

Southmead

St George's

St Mary's (Imperial NHS Trust)

St Michael's

St Peter's

University College London

Victoria Blackpool

## Figures

|  |           |
|--|-----------|
| <b>Birth weight by gestational age, all infants, all contributing units<br/>(1 October 2007 - 30 June 2009)</b>  | Figure 1  |
| <b>Admissions by birth weight category, neonatal unit and network<br/>(1 October 2007 - 30 September 2008 and 1 October 2008 - 30 June 2009)</b>                   |           |
| Level One Units  | Figure 2a |
| Level Two Units  | Figure 2b |
| Level Three Units  | Figure 2c |
| <b>Admissions by gestational age category, neonatal unit and network<br/>(1 October 2007 - 30 September 2008 and 1 October 2008 - 30 June 2009)</b>                |           |
| Level One Units  | Figure 3a |
| Level Two Units  | Figure 3b |
| Level Three Units  | Figure 3c |
| <b>Admissions by reason for admission, neonatal unit and network<br/>(1 October 2007 - 30 September 2008 and 1 October 2008 - 30 June 2009)</b>                    |           |
| Level One Units  | Figure 4a |
| Level Two Units  | Figure 4b |
| Level Three Units  | Figure 4c |
| <b>Reason for admission as a percentage of total admissions by network of admission<br/>(1 October 2007 - 30 September 2008 and 1 October 2008 - 30 June 2009)</b> | Figure 4d |
| <b>Babies receiving respiratory support by neonatal unit and network<br/>(1 October 2007 - 30 September 2008 and 1 October 2008 - 30 June 2009)</b>                |           |
| Level One Units  | Figure 5a |
| Level Two Units  | Figure 5b |
| Level Three Units  | Figure 5c |
| <b>Care days by neonatal unit and network<br/>(1 October 2007 - 30 September 2008 and 1 October 2008 - 30 June 2009)</b>   |           |
| Level One Units  | Figure 6a |
| Level Two Units  | Figure 6b |
| Level Three Units  | Figure 6c |
| <b>Levels of care as a percentage of total days of care, by network of booking<br/>(1 October 2007 - 30 September 2008 and 1 October 2008 - 30 June 2009)</b>      | Figure 6d |

**Admissions by discharge destination, neonatal unit and network**

**(1 October 2007 - 30 September 2008 and 1 October 2008 - 30 June 2009)**

|                   |           |
|-------------------|-----------|
| Level One Units   | Figure 7a |
| Level Two Units   | Figure 7b |
| Level Three Units | Figure 7c |

**Admission temperature, babies  $\leq 32^{+6}$  weeks gestational age, by neonatal unit and network of first admission**

**(1 October 2007 - 30 September 2008 and 1 October 2008 - 30 June 2009)**

|                   |           |
|-------------------|-----------|
| Level One Units   | Figure 8a |
| Level Two Units   | Figure 8b |
| Level Three Units | Figure 8c |

**Feeding at discharge by neonatal unit and network**

**1 October 2007 - 30 September 2008 and 1 October 2008 - 30 June 2009)**

|                   |           |
|-------------------|-----------|
| Level One Units   | Figure 9a |
| Level Two Units   | Figure 9b |
| Level Three Units | Figure 9c |

**Feeding at discharge by network of booking**

**(1 October 2007 - 30 September 2008 and 1 October 2008 - 30 June 2009)** Figure 9d

**Admissions by Index of Multiple Deprivation, by neonatal unit and network**

**(1 October 2007 - 30 September 2008 and 1 October 2008 - 30 June 2009)**

|                   |            |
|-------------------|------------|
| Level One Units   | Figure 10a |
| Level Two Units   | Figure 10b |
| Level Three Units | Figure 10c |

**Multiple births by neonatal unit and network**

**(1 October 2007 - 30 September 2008 and 1 October 2008 - 30 June 2009)**

|                   |            |
|-------------------|------------|
| Level One Units   | Figure 11a |
| Level Two Units   | Figure 11b |
| Level Three Units | Figure 11c |

**Multiple births as a percentage of total admissions by network of booking**

**(1 October 2007 - 30 September 2008 and 1 October 2008 to 30 June 2009)** Figure 11d

**Post-menstrual age at discharge by neonatal unit and network**

**(1 October 2007 - 30 September 2008 and 1 October 2008 - 30 June 2009)**

|                   |            |
|-------------------|------------|
| Level One Units   | Figure 12a |
| Level Two Units   | Figure 12b |
| Level Three Units | Figure 12c |

|  |                   |
|--|-------------------|
| <b>Admissions by maternal ethnicity, neonatal unit and network</b><br><b>(1 October 2007 - 30 September 2008 and 1 October 2008 - 30 June 2009)</b>  |                   |
| Level One Units  | Figure 13a        |
| Level Two Units  | Figure 13b        |
| Level Three Units  | Figure 13c        |
| <b>Maternal ethnicity by network of booking</b><br><b>(1 October 2007 - 30 September 2008 and 1 October 2008 - 30 June 2009)</b>   | <b>Figure 13d</b> |
| <br>   |                   |
| <b>Major morbidities by neonatal unit and network</b><br><b>(1 October 2007 - 30 September 2008 and 1 October 2008 - 30 June 2009)</b>   |                   |
| Level One Units  | Figure 14a        |
| Level Two Units  | Figure 14b        |
| Level Three Units  | Figure 14c        |
| <b>Major morbidities by network of booking</b><br><b>(1 October 2007 - 30 September 2008 and 1 October 2008 - 30 June 2009)</b>  | Figure 14d        |
| <br>   |                   |
| <b>Babies born out of network by network of booking</b><br><b>(1 October 2007 - 30 September 2008 and 1 October 2008 - 30 June 2009)</b>   | Figure 15         |
| <br>   |                   |
| <b>Babies receiving some care outside booked network</b><br><b>(1 October 2007 - 30 September 2008 and 1 October 2008 - 30 June 2010)</b>  | Figure 16         |
| <br>   |                   |
| <b>Babies <math>\geq 36</math> weeks gestation with convulsions by network of admission</b><br><b>(1 October 2007 - 30 September 2008 and 1 October 2008 - 30 June 2009)</b>   | Figure 17         |
| <br>   |                   |
| <b>Annual Mortality by Network</b><br><b>Standardised mortality ratio, unadjusted, for babies born <math>\leq 32^{+6}</math> weeks gestational age by Network of Booking</b><br><b>(1 January 2008 to 31 December 2008)</b>  | Figure 18a        |
| <br>   |                   |
| <b>Standardised mortality ratio, adjusted for gestational age at birth, birth weight, gender, antenatal steroids, and multiple birth, for babies born <math>\leq 32^{+6}</math> weeks gestational age by Network of Booking</b><br><b>(1 January 2008 to 31 December 2008)</b> | Figure 18b        |
| <br>   |                   |
| <b>Outcome by gestational age, all admissions to neonatal specialist care</b><br><b>(1 October 2007 to 30 June 2009)</b>   | Table 1           |