



**Optimal arrangements for Local Neonatal Units and Special Care Units in the  
UK:**

**A Framework for Practice**

**DRAFT – FOR CONSULTATION**

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**Main Authors: Tyler W, Fenton AC, Jones S**

**Additional Working Group Members: Al-Muzaffer I, Anderson J, Holman J, Kirk  
S, Narayanan S, Nicholl R, Rao S, Wilson D, & MacKenzie MJ**

## 1. Introduction

### 1.1 Aim

To provide guidance on the optimal activity of Local Neonatal Units (LNUs) and Special Care Units (SCUs), akin to the BAPM Framework for Practice for Neonatal Intensive Care Units [1].

### 1.2 Definitions

LNU and SCU are defined in the Department of Health (DH) Toolkit for Neonatal Services [2,3-7], equivalent to a Level two and Level one neonatal unit respectively in accordance with the international classification.

Medical staffing comprises roles traditionally undertaken by Medical Practitioners now also undertaken by appropriately trained and experienced Advanced Neonatal Nurse Practitioners (ANNPs) and augmented by Extended Nurse Practitioners (ENP).

Respiratory care days (RCDs) are defined as days during which the patient receives either invasive ventilator support via an endotracheal tube or tracheostomy, or non-invasive respiratory support with continuous positive airway pressure or high-flow nasal cannulae. It excludes days in which Oxygen is administered into an incubator or via low-flow nasal cannulae. Intensive care is defined using BAPM 2011 definitions using HRG definitions 2016 [8].

### 1.3 Target users

This document is aimed at individuals, organisations and government bodies involved in the provision, planning and commissioning of neonatal care.

### 1.4 Purpose

To provide guidance on optimal activity levels and additional guidance on medical staffing for LNUs and SCUs in the UK.

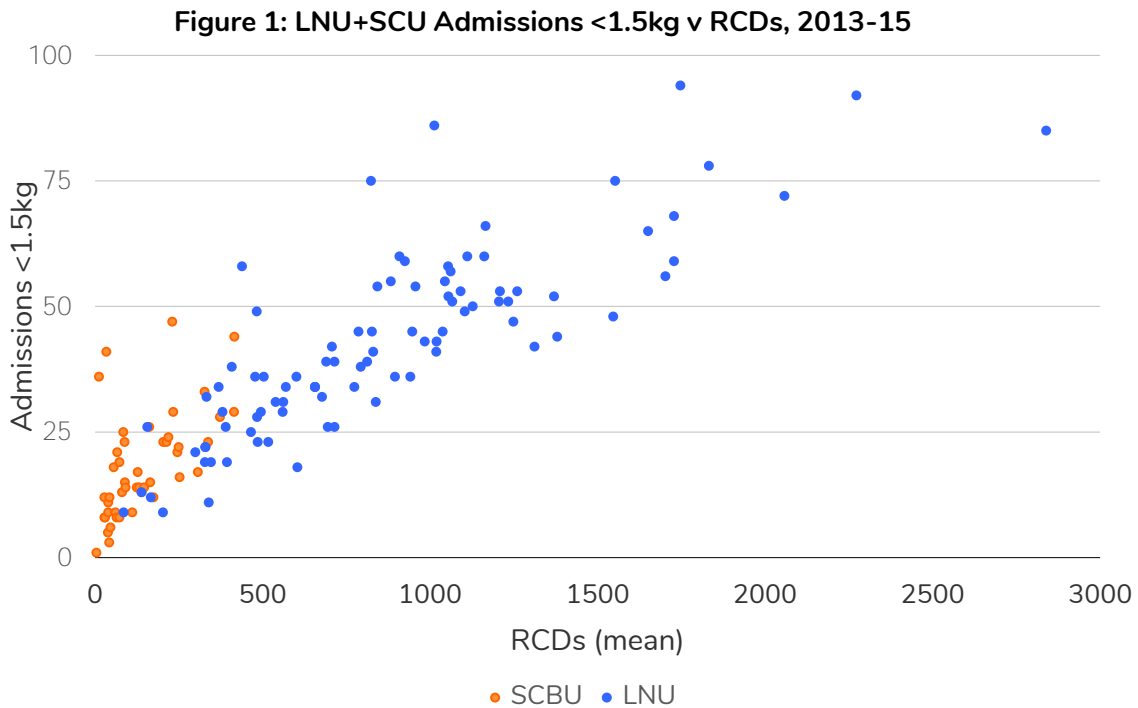
### 1.5 Background

**1.5.1** Neonatal intensive care in the UK developed as a service provided in many local units in each region which is not the case in many other developed countries.

A hub and spoke model of neonatal care coordinated by Operational Delivery Networks (ODNs) was adopted following a National Review in 2003 (9) to provide better services for babies and families, improve outcomes and optimise resource utilisation. Recent evidence demonstrates improved outcomes for extremely preterm babies delivered in larger units in the UK [13] strengthening the published data supporting the Review and evidence available from the USA and the Vermont Oxford Network showing that larger regional neonatal units with high levels of activity are associated with improved outcomes for extreme preterm infants [10-12, 14-30].

### 1.5.2: Activity versus Staffing Data LNUs & SCUs

A BAPM survey of LNUs & SCUs in the UK has shown that the numbers of babies with an admission weight of <1.5kg correlates with Respiratory Care Days (RCDs) activity (Figure 1)

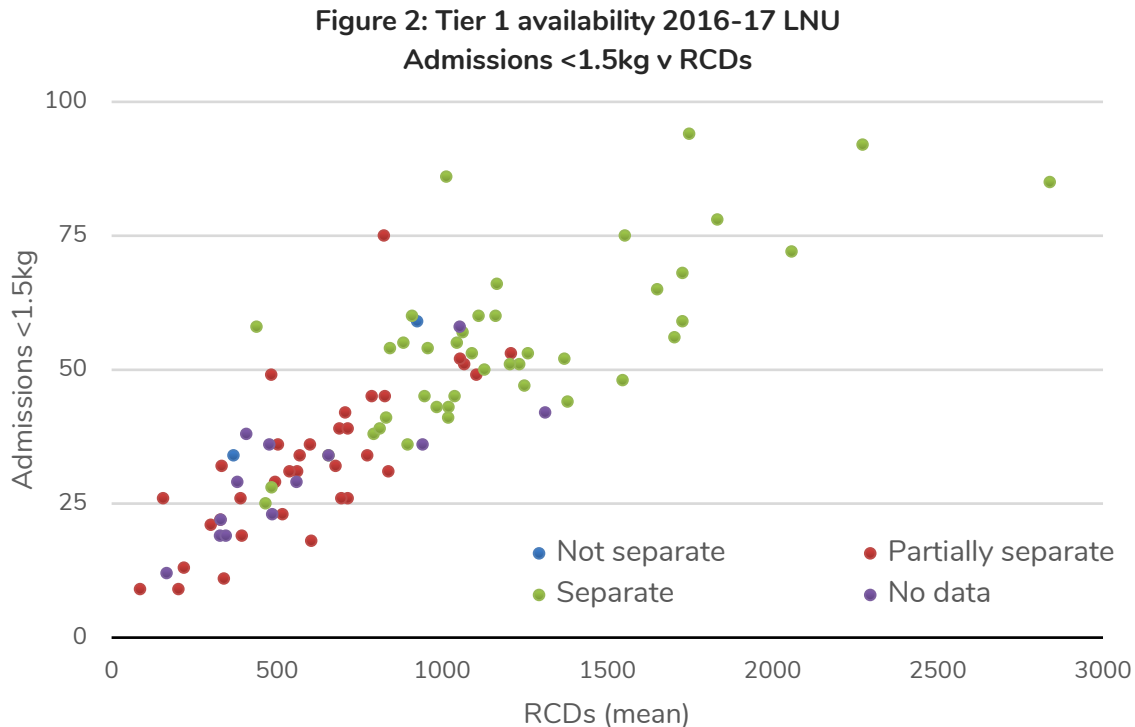


Whilst the units activity appears to lie on a continuum in Figure 1 the colour-coding for unit designation, median and interquartile ranges (IQR) for the activity data within LNUs & SCUs describe two different types of unit for the majority (Table 1).

**Table 1: Interquartile ranges & median values for activity (BAPM survey)**

	LNUs	SCUs
<1.5kg admissions	29-55 (median 42)	10-23 (median 16.5)
RCDs mean 2013-15	484-1120 (median 827)	45-226 (median 90)

Figure 2 demonstrates the variation in provision of a dedicated 24/7 Tier 1 practitioner in 2016-17 (medical or ANNP) to the neonatal unit in those designated as LNUs in the BAPM UK survey. Those units with a fully separate Tier 1 rota dedicated to the neonatal unit 24/7 are shown in green.



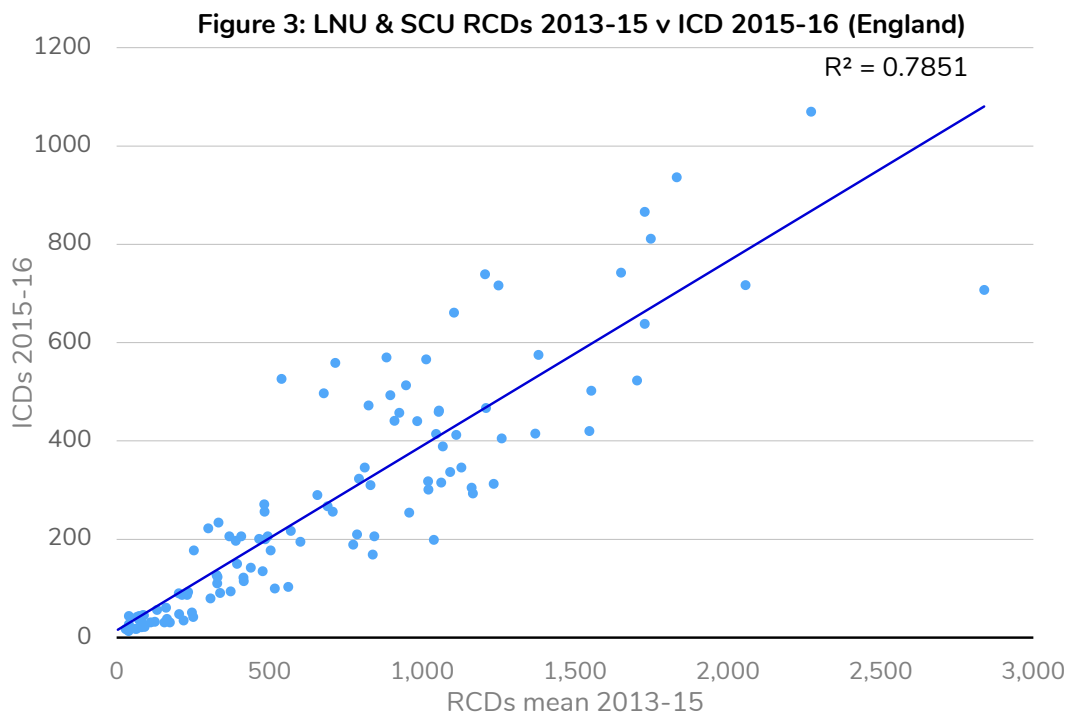
The DH Toolkit for Neonatal Services [2] recommendations are not currently being met in all units. Units intending to provide short-term intensive care (LNUs) should have Tier 1 24-hour cover for provision of direct care with sole responsibility for the neonatal service (ST1-3 or ANNP). The higher activity LNUs (as defined by mean RCDs) do have dedicated Tier 1 staffing to the neonatal unit but those providing 500 - 1000 RCDs have mostly partially separate Tier 1 rotas with two LNUs having a fully shared rota at Tier 1 level with paediatric services. A number of units were unable to provide data because they closed or merged before the 2016-17 staffing survey. Most units in Wales and a significant proportion in Northern Ireland did not provide data.

The BAPM LNU SCU UK staffing survey determined the availability of dedicated neonatal unit staffing at all 3 Tiers in 2016-17 (Table 2). Whilst a number of solutions have been developed which are pertinent to local geography and paediatric service, there remains unexplained variation across the UK.

**Table 2: Dedicated 24/7 neonatal unit staffing (BAPM survey)**

Unit type (respondents/total)	Tier 1	Tier 2	Tier 3
<b>LNUs (n=78/90)</b>	42 (53.8% of respondents)	17 (21.8% of respondents)	24 (30.8% of respondents)
<b>SCUs (n=38/40)</b>	4 (10.5% of respondents)	1 (2.6% of respondents)	1 (2.6% of respondents)

RCDs as an indicator of activity has been compared to data on Intensive Care Unit days (ICD) 2015-16 data [31] (Figure 3). There is a wide range of ICU days in units providing similar levels of activity as defined by RCDs. The intersections for 1000, 1500 & 2000 RCDs lie close to 400, 600 & 750 ICU days. Activity defined both by ICU days and RCDs have been used to provide consensus recommendations for medical staffing in this document.



## 2. Recommendations - activity

### 2.1 Optimal activity levels in LNUs and SCUs

#### 2.1a Local Neonatal Units

- Units designated as LNUs should admit  $\geq 25$  infants  $< 1500\text{g}$  admission weight and perform  $\geq 365$  RCDs annually
- ODNs should consider re-designating LNUs with less activity as SCUs, with the more preterm babies being transferred to other LNUs or NICUs as appropriate within the network

#### 2.1b Special Care Units

- SCUs should anticipate admitting up to 25 infants  $< 1500\text{g}$  or undertake up to 365 RCDs annually
- ODNs should ensure that where SCUs regularly exceed these levels of activity that they are staffed safely to provide that activity and consider whether re-designation as an LNU with consequent change in care pathways is warranted

The group recognized that local geography is an important consideration in decisions, particularly for isolated more rural areas of the country. However, it is important that the more preterm infants  $< 32$  weeks and those requiring respiratory support are cared for in a unit that has adequate numbers of trained staff available and can demonstrate consistent good outcomes for such infants.

It is essential to provide appropriate pathways of care for all infants within a network, particularly for the sickest and the most preterm. The use of timely antenatal transfer within networks should be maximised, in addition to on-going development of neonatal transfer services to optimise volume of activity for different levels of units.

### 3. Recommendations – staffing

#### 3.1 Nursing staffing

Standards for defining neonatal nurse to patient ratio determined by illness severity were defined by BAPM giving one-to-one nursing for intensive care, one-to-two nursing for patients in high dependency care and one-to-four nursing for neonates in special or transitional care. The Toolkit also defined a standard for the proportion of the nursing establishment qualified in specialty. We believe these remain key standards across all levels of units.

#### 3.2 Medical staffing of LNUs and SCUs

##### 3.2.1 Tier One

###### 3.2.1a Local Neonatal Units

- Units designated as LNUs should have immediately available at least one resident Tier 1 practitioner dedicated to providing emergency care for the neonatal service 24/7; the provision of newborn infant physical examination should not be the sole responsibility of this individual and midwives should be trained to deliver this aspect of care [32]
- In large LNUs (>7000 births) there should be two dedicated Tier 1 practitioners 24/7 to support emergency care, in keeping with the NICU framework [1]

###### 3.2.1b Special Care Units

- SCUs should provide a resident Tier 1 practitioner dedicated to the neonatal service in day-time hours on weekdays and a continuously immediately available resident Tier 1 practitioner to the unit 24/7. This person could be shared with a co-located Paediatric Unit out of hours if this does not reduce quality of care delivery and safety to the neonatal unit
- SCUs delivering higher than recommended activity levels should provide a dedicated Tier 1 practitioner as required for LNUs; see 2.1b
- In stand-alone SCUs without co-located paediatric services this resident Tier 1 practitioner would be dedicated to the neonatal service alone

##### 3.2.2 Tier Two

###### 3.2.2a Local Neonatal Units

- LNUs should provide an immediately available resident Tier 2 practitioner dedicated solely to the neonatal service at least during the periods which are usually the busiest in a co-located Paediatric Unit e.g. between 09.00-22.00, seven days a week
- LNUs undertaking either >1500 RCDs or >600 IC days annually should have immediately available a dedicated resident Tier 2 practitioner separate from paediatrics 24/7
- LNUs undertaking either >1000 RCDs or >400 IC days annually should strongly consider providing a 24/7 resident Tier 2 dedicated to the neonatal unit and entirely separate from paediatrics; a risk analysis should be performed to demonstrate the safety, timeliness and quality of care delivery to both paediatrics, delivery suite, maternity unit and neonatal services if the Tier 2 is shared at any point 24/7 in these units. Considerations should include the level of activity of

any Paediatric Unit including peak activity times and the geography of the site including the location of A&E and the Paediatric wards.

- Where the LNU is on a different site from Paediatrics requiring road transport between sites, then a separate dedicated resident Tier 2 should always be provided for the LNU 24/7 regardless of activity

### **3.2.2b Special Care Units**

- SCUs should provide a resident Tier 2 to support the Tier 1 in SCUs admitting babies requiring respiratory support or of very low-admission weight <1.5kg. This Tier 2 would be expected to provide cover for co-located paediatric services but be immediately available to the neonatal unit
- SCUs delivering higher than recommended activity levels should provide a Tier 2 practitioner as required for similar activity levels in LNUs; see 2.1b

### **3.2.3 Tier Three**

#### **3.2.3a Local Neonatal Units**

- Units designated as LNUs providing either >2000 RCDs or >750 IC days annually should provide a separate Tier 3 Consultant rota for the neonatal unit
- LNUs providing >1500 RCDs or >600 IC days annually should strongly consider providing a dedicated Tier 3 rota to the neonatal unit entirely separate from the paediatric department; a risk analysis should be performed to demonstrate the safety & quality of care if the Tier 3 is shared with paediatrics at any point in the 24 hours in these LNUs.
- All LNUs should ensure that all Consultants on-call for the unit also have regular weekday commitments to the neonatal service. This is best delivered by a 'consultant of the week' system and no consultant should undertake <4 'consultant of the week' service weeks annually.
- No on-call rota should be more onerous than one in six and all new appointments to units with separate rotas should either have a SCCT in neonatal medicine or be a general paediatrician with a special interest in neonatology or have equivalent neonatal experience and training

#### **3.2.3b Special Care Units**

- In SCUs there should be a Lead Consultant for the neonatal service and all consultants should undertake a minimum of continuing professional development (equivalent to a minimum of eight hours CPD in neonatology) [33]



## References

1. Optimal Arrangements for Neonatal Intensive Care Units in the UK including guidance on their medical staffing (2014)  
<https://www.bapm.org/resources/optimal-arrangements-neonatal-intensive-care-units-uk-including-guidance-their-medical>
2. Toolkit for High-Quality Neonatal Services. NHS & Department for Health (2009)
3. Neonatal Service Specification from Neonatal Clinical Reference Group of the National Commissioning Board, DH England 2013
4. All Wales Neonatal Standards (2013) 2<sup>nd</sup>  
<http://www.wales.nhs.uk/documents/All%20Wales%20Neonatal%20Standards%202nd%20Edition%20v2%2005.08.13.pdf>
5. Neonatal Care in Scotland: A Quality Framework (2013)  
<http://www.gov.scot/Resource/0041/00415230.pdf>
6. The Best Start: A Five-Year Forward Plan for Maternity and Neonatal Care in Scotland  
<http://www.gov.scot/isbn/9781786527127>
7. Position Paper on specialist services in Northern Ireland (2006) Northern Irish government
8. NCCMDS Expert Working Group. The new NCCMDS, Neonatal HRGs 2016 and Reference Costs, A guide for Clinicians December 2016. <https://www.bapm.org/resources/new-nccmds-neonatal-hrgs-2016-and-reference-costs-guide-clinicians-2016>
9. Neonatal Intensive Care Review: Strategy for Improvement, Department of Health (2003)
10. Field D, Hodges S, Mason E, Burton P. Survival and place of treatment after premature delivery. Archives of Disease in Childhood 1991; 66: 408-411
11. Field D, Draper ES. Survival and place of delivery following preterm birth: 1994 -96. Arch Dis Child Fetal Neonatal Ed 1999 80: F111-F114
12. International Neonatal Network, Scottish Neonatal Consultants, Nurses Collaborative Study Group. Risk adjusted and population based studies of the outcome for high risk infants in Scotland and Australia. Arch Dis Child Fetal Neonatal Ed 2000;82: F118-F123
13. Marlow N, Bennett C, Draper ES, Hennessey EM, Morgan AS, Kosteloe KL. Perinatal outcomes for extremely preterm babies in relation to place of birth in England: the EPICure 2 study 2014 May; 99(3): F181-F188
14. Costeloe K, Hennessey EM, Stacey F, Draper ES. Survival of Extremely Preterm Infants by Hospital Designation. Presented at ESPR Meeting 2009 Hamburg, Germany (Abstract 943).
15. Poets CF, Bartels DB, Wallwiener D. Patient Volume and Facilities Measurements as Quality Indicators of Peri and Neonatal Care: A review of data from the last 4 years. Zeitschrift fur Geburtshilfe und Neonatologie. 2004; 208(6):220
16. Kolle´e LA, Verloove-Vanhorick PP, Verwey RA, Brand R, Ruys JH. Maternal and neonatal transport: results of a national collaborative survey of preterm and very low birth weight infants in the Netherlands. Obstet Gynecol. 1988; 72:729-732
17. Verloove-Vanhorick SP, Verwey RA, Ebeling MCA, Brand R, Ruys JH. Mortality in Very Preterm and Very Low Birth Weight Infants According to Place of Birth and Level of Care: Results of a National Collaborative Survey of Preterm and Very Low Birth Weight Infants in the Netherlands PEDIATRICS Vol. 81 No. 3 March 1988, pp. 404-411
18. Paneth N, Kiely JL, Wallenstein S, Marcus M, Pakter J, Susser M. Newborn intensive care and neonatal mortality in low birthweight infants: a population study. N Engl J Med.1982; 307:149-155

19. Phibbs CS, Bronstein JM, Buxton E, Phibbs RH. The effect of patient volume and level of care at the hospital of birth on neonatal mortality. *JAMA* 1996; 276:1054-9.
20. Cifuentes J, Bronstein J, Phibbs CS, Phibbs RH, Schmitt SK, Carlo WA. Mortality in low birth weight infants according to level of neonatal care at hospital of birth. *Pediatrics* 2002; 109:745-51.
21. Phibbs CS, Baker LB, Caughey AB, Danielsen B, Schmitt SK, Phibbs RH. Level and Volume of Neonatal Intensive Care and Mortality in Very-Low-Birth-Weight Infants. *N Engl J Med* 2007; 356:2165-75.
22. Warner B, Musial MJ, Chenier T, Donovan E. The effect of birth hospital type on the outcome of very low birth weight infants. *Pediatrics*. 2004; 113:35-41
23. Mayfield JA, Rosenblatt RA, Baldwin LM, Chu J, Logerfo JP. The relation of obstetrical volume and nursery level to Perinatal mortality. *Am J Public Health* 1990; 80:819-23.
24. Mandell MB. The Effect of Regionalization On Infant and Early Neonatal Mortality. An Interrupted Time-Series Analysis. *Evaluation Review*, Vol. 10, No. 6, 806-829 (1986)
25. Lubchenco LO, Butterfield LJ, Delaney-Black V, Goldson E, Koops BL, Lazotte DC. Outcome of very-low-birth-weight infants: does antepartum versus neonatal referral have a better impact on mortality, morbidity, or long-term outcome? *Am J Obstet Gynecol*. 1989; 160:539-545
26. Modanlou HD, Dorchester W, Freeman R, Rommal C. Perinatal transport to a regional perinatal center in a metropolitan area: maternal versus neonatal transport. *Am J Obstet Gynecol*. 1980; 138:1157-1164
27. Mondalou HD, Dorchester WL, Thorosian A, Freeman RK. Antenatal versus neonatal transport to a regional Perinatal center: a comparison between matched pairs. *Obstet Gynecol*. 1979; 53:725-729
28. Ozminkowski RJ, Wortman PM, Roloff DW. Inborn/outborn status and neonatal survival: a meta-analysis of non randomised studies. *Stat Med*. 1988; 7:1207-1221
29. Tarnow-Mordi WO, Tucker JS, McCabe CJ, Nicolson P, Parry GJ, The UK neonatal staffing study: A prospective evaluation of neonatal intensive care in the UK. *Semin Neonat* 1997; 2; 171-179
30. Fox GF, Hannam S. Data on staffing of London level 3 neonatal units, collected for the Thames Regional Perinatal Group 2010
31. Personal communication from Professor Neil Marlow & Dr Ngozi Edi-Osagie (2017)
32. Better Births –NHS(2016): <https://www.england.nhs.uk/wp-content/uploads/2016/02/national-maternity-review-report.pdf>
33. BAPM Neonatal Service Quality Indicators: Standards relating to structures and processes supporting quality and patient safety in Neonatal Services (2017)

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## Membership of Working Group

Name	Position	Place of Work
Dr Wendy Tyler (Co-Chair and main author)	Consultant Neonatologist	Princess Royal Hospital, Telford
Dr Stephen Jones (Co-Chair & main author)	Consultant Neonatologist	Royal United Hospital, Bath
Dr Alan Fenton (main author)	Consultant Neonatologist	Royal Victoria Infirmary, Newcastle
Dr Al-Muzaffar	Consultant Neonatologist	Royal Glamorgan Hospital
Josie Anderson	Senior Policy and Public Affairs Officer	Bliss
Kate Dinwiddy	Executive Manager	BAPM
Dr Jennifer Holman	Consultant Paediatrician	Gloucestershire Royal Hospital
Sarah Kirk	ANNP	Princess Royal Hospital, Telford
Megan Jean MacKenzie	N/A	Parent based in Manchester
Dr Sankara Narayanan	Consultant Neonatologist	Watford General Hospital
Dr Richard Nichol	Consultant Neonatal Paediatrician	Northwick Park Hospital
Dr Sudhakar Rao	Consultant Paediatrician & Clinical Director for Women and Children (Pantrust)	United Lincolnshire Hospitals NHS Trust
Deb Wilson	ANNP	East Surrey Hospital