

Recommended Medical Workforce Standards for Local and Special Care Neonatal Units in the UK

A DRAFT BAPM Framework for Practice

May 2025

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#### Acknowledgements

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#### Language

The British Association of Perinatal Medicine is committed to continuously fostering a diverse environment. We acknowledge the effect language can have on individuals and populations. For simplicity of language, the framework uses the terms woman and mother throughout, but this should be taken to also include people who do not identify as women but who are pregnant, in labour and in the postnatal period. The term breastfeeding is also used but should be taken to include those who term this method of feeding as chest or body feeding. Please always take time to make sure you are using the preferred pronouns and terminology of the patient and their support network.

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### **Executive summary**

This document is an update to the 2018 framework. This updated guidance offers a strategic framework for optimising medical workforce arrangements, ensuring LNU and SCU are adequately equipped to deliver safe, high-quality, and family-integrated care in an increasingly demanding healthcare environment.

- Unlike nursing staffing, there is no published evidence that links medical workforce models and patient outcomes in neonatal care. Recommendations in this document are driven by consensus and informed by more contemporaneous neonatal activity and LNU/SCU medical workforce data (*Appendix 1*)
- The framework sets minimum staffing standards across all tiers, tailored to "STANDARD" and "HIGH" activity units, with specific guidance across shifts considering activity in Neonatal unit and other demands outside neonatal unit (Table 1).
- Workforce requirements are linked to airway capabilities in line with BAPM Neonatal Airway Safety Framework.
- Family integrated care and transitional care requires robust medical oversight at senior level, and this is emphasised in the document.
- The framework provides an **'inappropriate tasks list'** to help safeguard training time and enhance resident doctor experience.
- Support for families during inter-unit transitions must be a priority. Ensuring appropriate levels and skill mix of medical staffing can enhance family experience by facilitating clear communication, maintaining continuity of care, and providing compassionate engagement. This approach is essential to alleviating parental anxiety and building trust.
- Organisational, Network and Commissioner level responsibilities and accountability underpins sustainable implementation of these recommendations.

BAPM expects neonatal care settings to ensure full compliance to these standards. It is acknowledged that that there may be exceptional circumstances where full compliance with these standards is not immediately achievable. In such instances, a comprehensive risk assessment is conducted by the relevant provider with ODN oversight. Appropriate mitigations should be identified and formally recorded. Furthermore, this risk must be logged in both the provider and ODN risk registers with a clear timeline for achieving compliance.

# **Definitions and abbreviations**

#### Definitions used in this framework

**LNU** and **SCU** are defined in the Department of Health (DH) Toolkit for Neonatal Services<sup>1</sup>, equivalent to a Level two and Level one neonatal unit respectively in accordance with the international classification.

**Medical workforce** - Roles undertaken by Medical Practitioners, Advanced Neonatal Nurse Practitioners (ANNPs) and Enhanced Nurse Practitioners (ENP). Physicians Associates (PAs) are increasingly being employed across various specialities to take on roles traditionally performed by medical staff. This model may potentially be integrated into neonatal care in the future. However, a recent consultation from RCPCH advises that PAs should not replace Paediatricians on any acute medical rotas<sup>2</sup>.

**Respiratory care days (RCDs)** - 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 via low-flow nasal cannulae or headbox or directly into an incubator.

Live births - Number of babies born alive above gestational age of 22 weeks in a maternity service with a neonatal care facility (LNU or SCU) over a year

**Total Care Days (TCDs)** - All neonatal care days at Health Care Resource Grouping (HRG) levels XA01Z – XA05Z in LNU/SCU setting over a year

**Child attendances to Emergency department** co-located with a neonatal facility has been taken as a proxy to define a busy paediatric service.

Tier 1 practitioners: ST1-3, GPST, FY, Clinical Fellow, ANNP Tier 2 practitioners: ST 3-8, Clinical Fellow, ANNP, Resident Consultant Tier 3 practitioners: Consultant or equivalent

DAY shift: Typically, 0830 – 1630.
EVENING shift 1630 – 2100.
NIGHT shift 2030 – 0900.
Local variations will be the norm. Neonatal services should consider ensuring adequate overlap between shift timings (a minimum of 30 minutes and can be extended as per local needs) to allow safe handover of patients.

**DEDICATED** – The practitioner is physically based in the neonatal unit and always available to perform routine and emergency duties with no commitments to Paediatric services except emergency support.

**IMMEDIATELY AVAILABLE** – The practitioner may not be physically stationed in the neonatal unit however available within few minutes when called. Any competing Paediatric workload should not deter/delay this arrangement.

# Abbreviations

AHP	Allied Health Professional
ANNP	Advanced Neonatal Nurse Practitioner
BAPM	British Association of Perinatal Medicine
CF	Clinical Fellow
CDC	Consultant Delivered Care
СРАР	Continuous Positive Airway Pressure
CRG	Clinical Reference Group
EWTD	European Working Times Directive
FY	Foundation Year
GIRFT	Getting It Right First Time
GPST	General Practice Specialist Trainee
HD	High Dependency
HRG	Healthcare Resource Group
ICB	Integrated Care Board
ICD	Intensive Care Day
LMNS	Local Maternity and Neonatal System
LNU	Local Neonatal Unit
NCCTR	Neonatal Critical Care Transformation Review
NHSE	National Health Service England
NICU	Neonatal Intensive Care Unit
NIPE	Newborn and Infant Physical Examination
NNAP	National Neonatal Audit Programme
ODN	Operational Delivery Network
OPTI-PREM	Optimising Neonatal Service Provision for Preterm Babies born 27 - 31 weeks in England
RCPCH	Royal College of Paediatrics and Child Health
РА	Physician Associate
RCD	Respiratory Care Days
SBR	Serum Bilirubin
SC	Special Care
SCU	Special Care Unit
SHO	Senior House Officer
ST	Specialist Trainee
тс	Transitional Care
TCD TG	Total Care Days (HRG 1-5) Trust Grade

### Introduction

#### Aim

This framework provides recommendations on the optimal medical workforce arrangements for Local Neonatal Units (LNU) and Special Care Units (SCU) in the UK using current activity patterns and medical workforce models.

#### **Target users**

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

#### Background

Neonatal care in the United Kingdom (UK) is delivered in a networked model of care with three categories of Neonatal units. Local and Special Care Neonatal units provide short term intensive care, high dependency, special and transitional care to babies born to women who live in the local catchment area. Infants who are extremely premature, < 800 grams or require longer term intensive care or complex treatments are transferred either in or ex utero, to Neonatal Intensive Care Units.

Since the first edition of this guidance was published in 2018<sup>3</sup>, there have been significant changes in Maternity and Neonatal activity in the UK. There has been a 10% decrease in birth rate in the last 5 years<sup>4</sup> and consequent 18% reduction in total neonatal critical care activity<sup>5</sup>. Perinatal optimisation, right place of birth, evidence based early respiratory care, and a family integrated care approach have been led through national and regional level initiatives, resulting in appropriate less invasive models of care. With the growing emphasis on survival-focused care for preterm infants at the limits of viability and increasing use of non-invasive ventilation strategies, total respiratory care days have significantly increased. This underscores the need for workforce strategies that are responsive to these changing demands.

Babies in LNU and SCU often require specialised treatments and close monitoring, which can place significant demands on the staff in these units. The increasing role of technology in neonatal units means that ongoing education and training are more important than ever to ensure that all staff members are competent and confident in using these tools.

In addition to the challenges posed by complex patient needs and advanced technology, the neonatal workforce is facing difficulties navigating this changing landscape. Many units are now staffed by less experienced resident doctors and nurses. This paradigm shift, influenced by changes in training pathways and workforce shortages, raises concerns about the capacity of these units to deliver safe and effective care, especially in scenarios that demand advanced, less frequently practiced skills and complex clinical decision-making. The recommendations from the National Maternity reviews<sup>6-8</sup> have highlighted the importance of ensuring that all staff, particularly those who are less experienced, receive proper supervision and support.

The RCPCH Progress plus training programme 2023<sup>9</sup> does not mandate neonatal placements at ST3-5 level of training ; this significantly hinders the ability to maintain adequately trained middle-grade staff across all units, with an even greater impact on LNU and SCU. RCPCH acknowledges that greater support will be needed from the neonatal consultants and ANNPs to deliver high quality, safe care in neonatal units <sup>9</sup>.

Resource allocation also remains a critical issue. Many neonatal units are operating with limited resources, including staffing, funding, equipment and infrastructure. These limitations may affect the

quality of care provided and contribute to high levels of stress and burnout among healthcare professionals. The Neonatal Critical Care Transformation Review<sup>10</sup> has underscored the need for better workforce planning and resource distribution to address these issues.

This updated guidance builds on recommendations from the earlier publications such as Neonatal Toolkit<sup>1</sup>, Neonatal Critical Care Transformation review<sup>10</sup>, GIRFT<sup>11</sup>, lessons learnt from maternity investigations<sup>6-8</sup> and Maternity Incentive Scheme (MIS)<sup>12</sup>.

### Methodology

The Framework group was chaired by a senior clinician and BAPM Executive Committee member and included representatives from clinical, leadership, administrative, and data science backgrounds, primarily from LNU/SCU settings. Members were selected through a competitive selection process administered by BAPM office.

A series of virtual meetings were conducted with an initial scoping session to agree on a standardised approach. Group drafted a literature search protocol with NHS Library and Knowledge Services support (Appendix 2). Despite multiple searches, no credible relevant evidence was found beyond the 2018 framework<sup>3</sup> and high-level recommendations from national workforce reviews and GIRFT/BAPM surveys<sup>11</sup>.

Neonatal data managers group retrieved contemporaneous activity data for 2022-23 across English LNUs and SCUs from Badgernet, covering live births, admissions, respiratory care days, and neonatal care days. Co-located paediatric service demand was estimated using emergency department Paediatric attendance data (managed by NHS Strategy Unit).

An online survey assessed current LNU/SCU medical staffing. Given the lack of published evidence on optimal workforce models, the group pursued a consultation and consensus-driven approach. Analysis of activity metrics and workforce survey available in Appendix 1.

Meetings with HEE, RCPCH Trainee Committee, clinical leads, and trainees provided insights into workforce challenges. Views from BAPM Executive Committee members and NHSE Workforce & Training Directorate were also incorporated.

Consultant-delivered care (CDC) has been recommended since 2010<sup>13</sup> as a model improving team function, care quality, and continuity while ensuring work-life balance. It may help address rota gaps, reduce locum reliance, and comply with the European Working Time Directive. Recent research shows CDC reduces unnecessary attendances, enhances GP partnerships, and improves patient flow. Industrial actions have highlighted its benefits, with consultant-led services leading to quicker discharges, better decision-making, and fewer readmissions<sup>14 15</sup>.

In neonatal care, a dedicated consultant presence could enhance clinical oversight and outcomes. NNAP 2022 data was analysed to compare key outcomes in LNUs with and without dedicated Tier 3 consultant cover, offering insights into CDC's impact.

A comparison of 2013-15 and 2022-23 data shows a 34% and 64% reduction in <1.5 kg infants in LNUs and SCUs, respectively, but a rise in respiratory care days (24% in LNUs, 78% in SCUs). Correlation analysis indicates a shift, with 1000, 1500, and 2000 RCDs aligning with approximately 300, 400, and 500 IC days, reflecting a 25% reduction in IC days.

The analysis revealed that units with dedicated Tier 3 cover demonstrated statistically significant improvements in breastfeeding rates at discharge and a lower incidence of BPD. (Appendix 1) However, no such differences were observed for the other outcomes analysed. This analysis has several limitations – one year data, small sample size and risk of confounding from other factors that could have contributed to difference in outcome metrics. Nevertheless, it is an important observation and needs to be recognised and form a stimulus for future well designed studies/research.

The framework group strongly advocated for a more comprehensive approach to workforce

planning in LNU/SCU settings, emphasizing that relying solely on Intensive Care (IC) days and Respiratory Care Days (RCDs) is insufficient. It is important to incorporate additional metrics that better reflect the full spectrum of neonatal workload in LNU/SCU setting than just to rely on higher end activity. These included total live births, all neonatal admissions (not just those of infants <1.5 kg), and neonatal activity across all levels of care, as categorized by Healthcare Resource Groups (HRG 1-5). Furthermore, it is vital to consider the demands placed on LNUs and SCUs by co-located paediatric services, particularly activity levels in children's emergency departments and assessment units as these activities rely on a shared medical workforce. LNUs and SCUs were classified in 'STANDARD' and 'HIGH' activity units based on four or more activity criteria below or above median value, respectively. (Table 1).

A more holistic dataset would provide a clearer picture of resource utilization, ensuring workforce planning accurately aligns with service demands and supports high-quality neonatal care.

## **Recommendations on medical staffing**

These recommendations are intended to be an essential part of a comprehensive strategy to support high quality neonatal care and facilitate workforce wellbeing in LNU/SCU settings. This would enable hospitals and Trust Executive Boards to maximise safe working practices in Neonatal care environments, promote staff wellbeing and improve effectiveness and safety of clinical care.

- The recommendations are **MINIMUM** requirements to provide safe neonatal care. Individual services, ODNs and Commissioners should appraise these recommendations in their local context and invest in medical staffing as appropriate.
- For the purposes of facilitating local decision making, LNU and SCU are grouped into **'STANDARD'** and **'HIGH'** activity units, with recommendations per activity group (Table 1)
- Specific recommendations are listed for all tiers categorised into **'DAY'** shift, **'EVENING'** shift and **'NIGHT'** shift which reflect common shift patterns in UK neonatal units.
- Staffing arrangements have been further strengthened by aligning airway management capabilities outlined in the recently published BAPM airway safety standards<sup>16</sup>.
- Organisations, supported by their networks, should prioritise adherence to these standards, as deviations may lead to avoidable harm. It is essential to allocate the necessary training resources to meet the airway competencies at induction and, where needed, provide ongoing training for skill enhancement. In addition, out-of-hours rostering should be carefully planned, considering local geography activity patterns and BAPM airway safety standard compliance matched to unit level.
- Paediatric services should not rely on Neonatal Tier 1 & 2 staff for routine patient care and volume/surge management as this is likely to compromise quality of neonatal care. Locally agreed escalation plans should be followed where Tier 3 and senior nurses on call are consulted for appropriate deployment of resources to support the clinical area requiring assistance. e.g. a neonatal Tier 3 staff should not be routinely coming in to act down to permit a shared Tier 2 to manage a surge in paediatric activity unless the Tier 3 in Paediatrics is also on-site.
- Transitional care is an essential part of neonatal care and daily direct input from Tier 2 practitioners similar to neonatal special care service e.g., ward rounds, new patient reviews and parent communication is recommended.
- Tier 3 practitioners should be actively involved in transitional care provision. Depending on local demands and complexity this could vary from daily board rounds to direct clinical reviews.
- Inappropriate tasks list: the following duties/tasks should not be entirely dependent on medical and/or ANNP workforce.
  - Newborn and Infant Physical Examination these examinations are part of routine newborn care; Medical and ANNP practitioners require training and experience in this examination, but the service should not be dependent on medical practitioners and ANNPs
  - **Routine blood tests:** Screening blood spot, routine serum bilirubin, point of care blood glucose, follow on C-Reactive Protein (CRP)
  - o Others: Vitamin K, Glucose gel and Antibiotic administration

(This is not an exhaustive list - local units should review above tasks and others that may be relevant to local eco-system and adapt as appropriate.)

• Nursing staffing

Neonatal nurse staffing is not within the scope of this document. Standards for neonatal nurse staffing are outlined by BAPM in the Service and Quality Standards for Provision of Neonatal Care in the UK<sup>17</sup> and NHS England Neonatal Critical Care Transformation Review.

Table 1: Medical Staffing Recommendations for LNU and SCU

UNIT CATEGORY – "STANDARD" OR "HIGH" ACTIVITY			
	STANDARD ACTIVITY	HIGH ACTIVITY	
	(Meets any 4 or more criteria listed below) Events per year	(Meets any 4 or more criteria listed below) Events per year	
	Live births* < 3700	Live births* $\geq$ 3700	
	Total Neonatal Admissions <sup>^</sup> < 375	Total Neonatal Admissions^ ≥ 375	
	< 1.5 kg Admissions <sup>\$</sup> < 25	< 1.5 kg Admissions <sup>\$</sup> ≥ 25	
LNU	Total Care Days (HRG 1-5) < 4200	Total Care Days (HRG 1-5) ≥ 4200	
	Respiratory Care Days <sup>+</sup> < 1000	Respiratory Care Days <sup>+</sup> ≥ 1000	
	Paediatric Attendances to co-located ED < 24000	Paediatric Attendances to co-located ED $\ge$ 24000	
	Live births* < 2000	Live births* ≥ 2000	
	Total Neonatal Admissions <sup>^</sup> < 200	Total Neonatal Admissions^ ≥ 200	
	< 1.5 kg Admissions <sup>\$</sup> < 5	< 1.5 kg Admissions <sup>\$</sup> ≥ 5	
SCU	Total Care Days (HRG 1-5) < 1800	Total Care Days (HRG 1-5) ≥ 1800	
	Respiratory Care Days⁺ < 150	Respiratory Care Days <sup>+</sup> ≥ 150	
	Paediatric Attendances to co-located ED < 17000	Paediatric Attendances to co-located ED ≥ 17000	
Data in this table bas	sed on activity statistics (median and interquartile range) for all LNU	J and SCU in England (FY 2022 – 23)	
*Includes home births, ^Excludes transitional care admissions, <sup>\$</sup> First episode only-does not include repatriations, <sup>+</sup> Excludes nasal cannula oxygen			

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LNU STAFFING RECOMMENDATIONS – TIERS 1, 2, & 3				
ACTIVITY CATEGORY	TIER*	DAY SHIFT^	EVENING SHIFT^	NIGHT SHIFT^
	<b>1</b> Minimum 8 WTE on rota	At least <b>ONE DEDICATED</b> practitioner with <b>STANDA</b>	<b>RD</b> airway capability	
STANDARD	<b>2</b> Minimum 8 WTE on rota	The set one dedicated practitioner with At least ONE dedicated practitioner with STANDARD airway capability and CANDARD airway capability ONE IMMEDIATELY AVAILABLE practitioner with INTERMEDIATE airway capability		
	<b>3</b> Minimum 1:7 on call rota	Mon-Fri: 0830 – 1700, Sat/Sun: 0830 – 1300 (onsite hours) At least ONE DEDICATED practitioner with ADVANCED airway capability operating on a Consultant of the Week model	Practitioner with <b>ADVANCED</b> airway capability on c	all from home available within 30 minutes
*Tier 1: ST1-3, GPST,	*Tier 1: ST1-3, GPST, FY1-2, Clinical Fellow, Trust Grade, ANNP, Tier 2: ST3-8, Clinical Fellow, Trust Grade, ANNP, Resident Consultant, Tier 3: Consultant or Equivalent			
30-minute overlap fo	r handover, I	Night shift: Typically, 2030 - 0900 (local variation may	apply) with 30-minute overlap for handover	

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LNU STAFFING RECOMMENDATIONS – TIERS 1 <sup>\$</sup> , 2, & 3				
ACTIVITY CATEGORY	TIER*	DAY SHIFT^	EVENING SHIFT^	NIGHT SHIFT^
	<b>1</b> Minimum 8 WTE on rota	At least <b>ONE DEDICATED</b> practitioner with <b>STANDARD</b> airway capability A <b>SECOND DEDICATED</b> practitioner with <b>STANDARD</b> airway capability for attendance at high-risk deliveries, review/screening of babies on Transitional Care and Postnatal wards		At least <b>ONE DEDICATED</b> practitioner with <b>STANDARD</b> airway capability
HOIH	<b>2</b> Minimum 8 WTE on rota	At least ONE DEDICATED practitioner with INTERMEDIATE airway capability A SECOND DEDICATED practitioner with STANDARD (preferably INTERMEDIATE) airway capability to enable transitional care ward rounds, support to Tier 1	At least <b>ONE DEDICATED</b> practitioner with <b>INTERMEDIATE</b> airway capability This practitioner should not be redeployed to manage patient volume within co-located Paediatric services and Emergency Departments. Paediatric on call Tier 3 support should be sought Practitioner with <b>ADVANCED</b> airway capability on call from home available within 30 minutes	
	<b>3</b> Minimum 1:7 on call rota	Mon-Fri: 0830–1700 Sat/Sun: 0830–1500 (onsite hours) At least ONE DEDICATED practitioner with ADVANCED airway capability operating on a Consultant of the Week model		
*Tier 1: ST1-3, GPST,	FY1-2, Clinica	al Fellow, Trust Grade, ANNP, <b>Tier 2:</b> ST3-8, Clinical Fel	low, Trust Grade, ANNP, Resident Consultant, <b>T</b>	Fier 3: Consultant or Equivalent
30-minute overlap for handover. <b>Night shift:</b> Typically, 2030 - 0900 (local variation may apply) with 30-minute overlap for handover.				
<sup>5</sup> Need for a second dedicated tier 1 is important, ideally 24/7, but given finance and recruitment constraints, workgroup has somewhat diluted its recommendations to 12 hours a day. This is				
quality enhancing, however, would need 1:9 rota to be EWTD and New Resident Doctor Contract compliant				

SCU STAFFING RECOMMENDATIONS – TIERS 1, 2, & 3				
ACTIVITY CATEGORY	TIER*	DAY SHIFT^	EVENING SHIFT^	NIGHT SHIFT^
	<b>1</b> Minimum 8 WTE on rota	At least <b>ONE DEDICATED</b> practitioner with <b>STANDARD</b> airway capability	At least <b>ONE IMMEDIATELY AVAILABLE</b> practition The sharing of this practitioner should not reduce neonatal unit	er with <b>STANDARD</b> airway capability quality-of-care delivery and safety to the
STANDARD	<b>2</b> Minimum 8 WTE on rota	<ul> <li>0830 – 1300</li> <li>At least ONE DEDICATED practitioner with STANDARD airway capability</li> <li>1300 - 1700</li> <li>At least ONE IMMEDIATELY AVAILABLE practitioner with STANDARD airway capability. The sharing of this practitioner should not reduce quality-of-care delivery and safety to the neonatal unit</li> </ul>	At least <b>ONE IMMEDIATELY AVAILABLE</b> practition The sharing of this practitioner should not reduce neonatal unit	er with <b>STANDARD</b> airway capability quality-of-care delivery and safety to the
	<b>3</b> Minimum 1:7 on call rota	0830 – 1700 (Mon -Fri), 0830 – 1300 (Sat/Sun) (onsite hours) At least <b>ONE IMMEDIATELY AVAILABLE</b> practitioner with <b>INTERMEDIATE</b> airway capability	Practitioner with <b>INTERMEDIATE</b> airway capability minutes	on call from home available within 30
*Tier 1: ST1-3, GPST, ^Day shift: Typically, 30-minute overlap fo	FY1-2, Clinic 0830 – 1630 r handover,	al Fellow, Trust Grade, ANNP, <b>Tier 2:</b> ST3-8, Clinical Fellow (local variation may apply) with 30-minute overlap for ha <b>Night shift:</b> Typically, 2030 - 0900 (local variation may app	ν, Trust Grade, ANNP, Resident Consultant, <b>Tier 3:</b> Co ndover, <b>Evening shift:</b> Typically, 1630 - 2100 (local v oly) with 30-minute overlap for handover	onsultant or Equivalent variation may apply) with

SCU STAFFING RECOMMENDATIONS – TIERS 1, 2, & 3				
DAY SHIFT^ EVENING SHIFT^ NIGHT SHIFT^				
rway capability				
At least <b>ONE IMMEDIATELY AVAILABLE</b> practition The sharing of this practitioner should not reduce neonatal unit	er with <b>STANDARD</b> airway capability quality-of-care delivery and safety to the			
Practitioner with <b>INTERMEDIATE</b> airway capability minutes	on call from home available within 30			
Trust Grade, ANNP, Resident Consultant, <b>Tier 3</b> : Condover, <b>Evening shift:</b> Typically, 1630 - 2100 (local v) with 30-minute overlap for bandover	onsultant or Equivalent variation may apply) with			
	NDATIONS – TIERS 1, 2, & 3 EVENING SHIFT^ way capability At least ONE IMMEDIATELY AVAILABLE practition The sharing of this practitioner should not reduce neonatal unit Practitioner with INTERMEDIATE airway capability minutes Trust Grade, ANNP, Resident Consultant, Tier 3: Cr dover, Evening shift: Typically, 1630 - 2100 (local of y) with 30-minute overlap for handover			

### Supporting babies and families through transfers between units

Neonatal care is an anxious time for families, often compounded by unfamiliar environments, complex procedures, and varying staffing levels. Transfers between units, though clinically beneficial, can increase emotional strain and disrupt bonding. Having the right medical workforce skill mix is crucial to ensuring safe, consistent care and effective communication. A well-balanced team with the right expertise enhances family support, minimizes disruptions, and improves outcomes by providing seamless, high-quality care across different neonatal settings. **Figure 1:** Perspectives from parents with lived experience of neonatal care across units

I have since been diagnosed with PTSD and a large proportion of that stems from the transfer to the new unit. Feeling the same fear as when she was born, not understanding the new system, feeling lost and alone. If someone had prepared us and let us know what to expect then maybe this would have been different. When our son was transferred to a smaller unit we had a complete mix of feelings. We were both pleased with his progress but also uncertain. Where we were had become our new normal, strangely it felt like our first home as a family. To have this change was unsettling but we focused on his progress and trusted that the move was best for him.

When our baby's condition started to improve, we were moved from a large, well-staffed neonatal unit to a much smaller one. At first, I thought this was a positive step, but once we arrived, I felt unsettled. There were fewer doctors around, hardly any ward rounds, and we didn't get regular updates on our baby's progress. I missed that sense of constant care and reassurance I'd come to rely on in the bigger unit. Even though I knew this smaller unit was meant to be a sign that our baby was getting better, it was hard to feel confident when the team felt so stretched.

A recent study provided insight on parental experiences of neonatal care through place-of-care disruptions<sup>8</sup>. A skilled and adequately staffed team can provide timely information and deliver a seamless, family-centered care experience, fostering trust and confidence during this challenging time for parents.

### **Governance Framework for Implementation**

This updated framework is built on two fundamental principles: prioritising the needs of the baby and their family and safeguarding the health and wellbeing of healthcare professionals delivering neonatal care. These recommendations aim to redefine standards, foster collaboration, and ensure sustainability in neonatal services across the UK.

Every newborn deserves to receive care in the right setting, as close to home as possible, in line with the Service and Quality Standards for Provision of Neonatal Care in the UK (BAPM 2022)<sup>18</sup>. Perinatal organisations must assess their neonatal unit's category and ensure appropriate staffing. If staffing falls short, a formal governance process must be in place to conduct a risk analysis, determine mitigation strategies, and escalate concerns through the network and provider risk registers. Governance structures must ensure accountability at provider, network, and regional levels, with clear lines of responsibility for implementing workforce recommendations.

Given NHS rota gaps<sup>19</sup>, balancing service delivery, education, and staff wellbeing is crucial to retaining skilled neonatal professionals. To support perinatal organisations, RCPCH and BAPM have developed guidance on education, training, workforce sustainability and rostering<sup>20 21</sup>. These recommendations ensure equitable access to professional development for all neonatal and paediatric staff, including non-training medical professionals. Advanced Neonatal Nurse Practitioners (ANNPs) play a key role, and their continued development is vital, as outlined in the BAPM ANNP Capabilities Framework<sup>22</sup>.

The successful implementation of LNU/SCU medical workforce recommendations requires robust governance, including regular workforce reviews, risk assessments, and escalation processes. These recommendations apply to all perinatal organisations providing LNU and SCU care, along with their linked NICUs and networks, with clear accountability for implementation at every level.

# Responsibilities

### **Provider Trust responsibility**

It is widely recognized that provider organisations often deprioritise national recommendations due to resource constraints. The framework group would like to emphasise that implementing these recommendations is critical to enhancing neonatal outcomes, reducing length of stays, improving staff wellbeing and organisational reputation.

High volume services require dedicated reporting structures to support equitable resource allocation. Clinical lead for Neonatal services in these units should be reporting directly to divisional and corporate teams rather than through an intermediary, typically Paediatric Clinical Director. These units should be acknowledged for their significant workload, with resource planning aligned to their care models and focused on optimising patient outcomes. High-quality neonatal care often leads to shorter lengths of stay, reduced reliance on high-intensity neonatal care (HRG 1 & 2), and an increased emphasis on family-integrated care (HRG 4). This care model must be reinforced through appropriate resource investment.

#### **ODN responsibility**

Operational Delivery Networks (ODNs) should share responsibility and facilitate successful implementation of this updated framework across neonatal services in their region. This would include coordination and monitoring compliance with activity-based service specifications, workforce requirements, and quality standards across LNU and SCU. ODNs must support perinatal organisations in identifying and addressing staffing gaps, conducting risk assessments, and making necessary adjustments to service delivery while maintaining patient safety and staff wellbeing. ODNs should have active check and challenge style dialogue with provider organisations within their region who consistently fail to meet staffing standards described in this document.

## Limitations

- The working group believe that this framework document would have benefitted from indepth qualitative evidence around themes such as medical staffing, workload and challenges, involving multiple tiers of the medical and nursing workforce, and other stakeholders.
- The criteria for defining high vs standard activity LNU and SCU was based on consensus opinion. This requires future scientific evaluation to assess its validity, for example, against impact on clinical, staff, family and health service delivery outcomes.

# Areas for future study/research

- Qualitative research into prioritisation and effective utilisation of the medical workforce, exploring key themes around staffing workload, capacity, challenges and potential solutions.
- Research to examine associations between workforce structures, unit activity patient outcomes and cost effectiveness of care. This would include assessing the validity of current definitions of high vs standard activity for LNU and SCU
- Quality improvement work identifying how better to support families and staff, when babies transition from one unit to another, either as part of an uplift in care, step-down care or capacity transfer.
- Utility of Artificial Intelligence in medical workforce planning/modelling bespoke to individual regions, workload, capacity and challenges.

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# Appendix 1: LNU/SCU Activity data and Workforce Survey Findings

Current version of the LNU/SCU Medical Staffing Framework (2018) <sup>1</sup> matched the workforce requirements to neonatal activity within these settings from intelligence gathered from 2013-15 activity data. This included activity vs staffing data in LNU/SCUs (Respiratory Care Days, Number of admissions < 1.5 kg, dedicated medical practitioner staffing across Tier 1 to 3 & correlation data between Respiratory Care Days and number of admissions < 1.5 kg and Intensive Care Days). This approach focused primarily on high-complexity activity.

Current framework membership considered medical workforce recommendations in the context of changing neonatal care model by analyzing a broader and more representative dataset. Neonatal care has evolved over the past decade, with less invasive strategies becoming more prevalent, resulting in fewer intensive care days, increasing high-dependency care, and shorter overall stays, requiring adjustments in workforce planning.

Unlike the 2018 BAPM framework<sup>1</sup>, which primarily relied on high-complexity activity (e.g., respiratory care days, intensive care episodes), this review incorporated a wider scope of neonatal workload – live births (proxy for unaccounted activity on Badgernet, e.g., postnatal reviews, sepsis screens etc), total admissions to neonatal care, total care days, actual number of child attendances to co-located emergency departments (proxy for acuity that might rely on neonatal workforce).

Furthermore, differences in Tier 1, 2, and 3 medical staff skill mix were analysed to align workforce models with actual service demands. By integrating contemporary activity trends and broader workforce responsibilities, this framework ensures workforce planning is fit for purpose, sustainable, and reflective of modern neonatal care needs.

Activity data was collected for financial year 2022-23 through neonatal data managers group and included all LNU/SCU in England. Metrics included – live births, all neonatal admissions, total care days across HRG 1 -5, Respiratory Care Days, < 1.5 kg admissions and number of 0–16-year attendances to co-located emergency departments.

An online workforce survey was sent to all LNU/SCU clinical leads to understand current medical workforce staffing across Tier 1 - 3 in LNU/SCUs across the UK.

#### Activity data findings

(Neonatal units in England only):

All 112 (100%) LNU and SCU submitted data (74 LNU, 38 SCU). Key findings listed in Table 1 & Figures 1 & 2.

Table 1: LNU and SCU activity data (Financial Year 2022 – 23)			
Parameter/Metric	Median (IQR)		
LIVE BIRTHS			
LNU	3668 (2932-4299)		
SCU	2046 (1617-2666)		
COMBINED (LNU&SCU)	3098 (2147-3933)		
NEONATAL ADMISSIONS (excludes transitional care a	admissions)		
LNU	382 (297-427)		
SCU	217 (185-267)		
COMBINED (LNU&SCU)	323 (236-411)		
BABIES < 1.5 KG (first episode only)			
LNU	27 (21-35)		
SCU	6 (5-12)		
COMBINED (LNU&SCU)	22 (9-29)		
RESPIRATORY CARE DAYS			
LNU	1025 (697-1199)		
SCU	160 (88-264)		
COMBINED (LNU&SCU)	699 (261-1095)		
TOTAL CARE DAYS			
LNU	4251 (3386-5154)		
SCU	1838 (1450-2349)		
COMBINED (LNU&SCU)	3479 (2228-4884)		
COMBINED IC/HD DAYS			
LNU	1264 (885-1477)		
SCU	211 (99-3056)		
COMBINED (LNU&SCU)	887 (301-1370)		
CHILD ATTENDANCES TO CO-LOCATED EMERGE	NCY DEPARTMENT		
LNU	23,934 (18447-32342)		
SCU	16,721 (13515-20062)		
COMBINED (LNU&SCU)	21,192 (15547-27645)		

Figure 1: 2013-15 vs 2022-23 data comparison shows reduction in median number of babies < 1.5 kg in both LNU (34 % reduction) and SCU (64% reduction) but increase in Respiratory Care Days (24 % in LNU & 78 % in SCU)

2013 – 15 (2018 Framework)

<1.5 KG vs RCDs – Median (IQR)			
LNUs SCUs			
< 1.5 kg admissions	42 (29 -55)	16.5 (10 – 230)	
RCDs	827 (484 – 1120)	90 (45 – 226)	



 <1.5 KG vs RCDs (IQR, Median), FY 22-23</td>

 LNUs
 SCUs

 < 1.5 kg admissions</td>
 27 (22-35)
 6 (5 – 7)

 RCDs
 1025 (712 – 1243)
 160 (101 – 263)



2022 - 2023

Figure 3: Correlation between Respiratory Care Days (RCDs) and Intensive Care (IC) days 2013-15 vs 2022-23 Intersections for 1000, 1500 & 2000 correspond to 400, 600 & 750 IC days in 2013-15 vs 300, 400 & 500 IC days (25 % reduction approx.)

2013 – 15 (2018 Framework)

2022 - 2023



#### Workforce survey

Of the 131 LNU and SCU in the United Kingdom (note difference in denominator to activity data where only units in England were included due to technical reasons), 102 units (77%) provided a response to the workforce survey. Complete, analysable data was returned by 86 units (66%) of units. 62 were LNU and 24 SCU. Full data included in supplementary material on BAPM framework web page.

#### Tier 1

The reported median number of Tier 1 WTE on rota was 9 (IQR 8 – 13) for LNU and 9 (IQR 8-10) for SCU. The higher numbers reported are likely to reflect the entire paediatric Tier 1 workforce rather than a dedicated neonatal establishment. Unit leads explained that doctors rotate frequently between neonates and Paediatrics, sometimes even within the same shift, making it difficult to separate neonatal whole-time equivalents from the overall paediatric team. Tier 1 medical rotas consisted of Paediatric ST1-3 (27%), GPST/FY2/Trust doctors (63%) and ANNPs (10%) across LNU and SCU.

Compliance to Tier 1 weekday and weekend cover as per current guidance:

- LNU: 45/62 (73%) compliance on weekdays, 43/62 (71%) on weekends
- SCU: 18/24 (75%) compliance on weekdays, 23/24 (96%) on weekends

Newborn and Infant Physical Examinations (NIPE) relied on Tier 1 workforce in 62 % of LNU and 66 % of SCU.

#### Tier 2

The median number of Tier 2 whole time equivalents on rota was 9 (IQR 7-12) for LNU and 7.5 (IQR 6 - 9.5) for SCU. The higher numbers reported are likely to reflect the entire paediatric Tier 1 workforce for similar reasons listed in Tier 1 section above. Compliance to Tier 1 weekday and weekend cover as per BAPM 2018 framework:

- LNU: 44/62 (71%) compliant on weekdays, 39/62 (63%) on weekends
- SCU: 16/24 (66%) compliance on weekdays, 24/24 (100%) on weekends

#### Tier 3

60 out of 62 (97 %) LNU and 21/24 (88 %) SCU had a designated clinical lead with programmed activities in their job plan. Programmed activities varied from 0.25 to 2.0. 53 out of 62 (85 %) LNU and 9 out of 24 (38%) SCU operated on a consultant of week model of care delivery. 34 out of 62 (55 %) LNU and 21/24 (88%) SCU consultants provided regular cross cover to Paediatric service while rostered as consultant cover for Neonatal service. 15 out of 62 (25 %) LNU and 8/24 (33 %) SCU consultants provided regular cross.

The findings highlight variations in workforce structure and compliance with BAPM 2018 framework recommendations across LNU and SCU<sup>1</sup>. Reported WTE numbers for Tier 1 and Tier 2 generally exceeded neonatal-specific recommendations, suggesting shared rotas with Paediatric services. Compliance with the BAPM 2018 standards was higher in SCU than LNU, particularly on weekends. Findings in agreement with other recent national workforce surveys (GIRFT)<sup>2</sup>. Newborn physical examinations were heavily reliant on medical (Tier 1) staff. Most units had designated Consultant clinical leads, and a significant proportion of consultants provided cross-cover between neonatal and paediatric services, and some offered resident consultant cover. These patterns reflect a mixed workforce model with shared responsibilities and varying degrees of compliance across units.

#### **Dedicated Tier 3 Rotas in LNUs & NNAP metrics**

The Framework group explored the hypothesis that enhanced Tier 3 medical staffing models, specifically 24/7 dedicated Tier 3 cover for neonatal services in LNU, could improve patient outcomes. NNAP 2022 outcome data<sup>3</sup> were analysed, focusing on outcome metrics such as bronchopulmonary dysplasia (BPD), breastfeeding at discharge, retinopathy of prematurity, normothermia, two-year follow-up assessments, senior review within 24 hours, necrotising enterocolitis, and non-invasive ventilation. Data from LNU with dedicated Tier 3 rotas (n = 30) were compared against LNU that shared their Tier 3 rota with paediatrics (n = 47). The analysis revealed that units with dedicated Tier 3 cover demonstrated statistically significant improvements in breastfeeding rates at discharge and a lower incidence of BPD. However, no such differences were observed for the other outcomes analysed.

NNAP metric	Dedicated Tier 3 rota group	Shared Tier 3 rota group	P value
	Mean (SD) (n = 30)	Mean (SD) (n = 47)	
Delayed cord clamping	59.1 (17.5)	59 (16.0)	0.9795
Temperature	75.2 (8.4)	73.4 (12.4)	0.4691
Non-invasive ventilation	56.1 (11.6)	54.9 (17.3)	0.7410
Breast milk at discharge	68.5 (11.3)	59.3 (10.3)	*0.005
ROP	66.2 (15.9)	65.0 (15.5)	0.7463
Follow up at 2 years	73.6 (14.8)	70.9 (26.0)	0.6105
BPD	22.7 (5.7)	19.5 (6.2)	*0.0295
NEC	2.8 (4.0)	2.1 (3.1)	0.4003
Parent consultation	48.5 (18.9)	49.9 (13.8)	0.7229
Senior review in 24 hours	96.4 (4.5)	94.9 (5.6)	0.2161

This analysis has several limitations – one year data, small sample size and risk of confounding from other factors that could have contributed to difference in outcome metrics. Nevertheless, it is an important observation and needs to be recognised and form a stimulus for future well designed studies/research.

After analysing activity patterns, workforce survey data, and NNAP outcomes, the framework group, in consultation with stakeholders, identified key factors and metrics to inform medical workforce recommendations across all tiers. In the absence of published evidence, the group adopted a pragmatic approach, incorporating a combination of metrics: neonatal activity across all levels, live birth rates (as a proxy for postnatal ward activity not captured on BadgerNet), and service co-dependencies that place additional demands on neonatal medical staff.

This exploration facilitated the categorization of LNU and SCU into **'STANDARD'** and **'HIGH'** activity units (Table 1 in the main document), to guide recommendations. Additionally, stakeholder discussions recognised the challenges posed by declining skill and experience levels across all tiers of staffing around neonatal airway safety. For this reason, the BAPM neonatal airway safety framework capabilities<sup>4</sup> were integrated into the recommendations grid.

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## Appendix B Literature search

#### Search Strategy words

#### 1<sup>st</sup> Search Strategy

#### Ovid MEDLINE(R) ALL

#### 1 \*NEONATOLOGY/ 2348

2 "neonatal workforce".mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 7

3 "neonat\* workforce".mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 13

4 "neonatal health service\*".mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]68

<sup>5</sup> "British Association of Perinatal Medicine".mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 43

6 BAPM.mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]36

#### 7 1 or 2 or 3 or 4 or 5 or 6 2486

8 "medical workforce".mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]955

9 \*Health Workforce/ 7129

10 "human resources for health".mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]1308

11 "healthcare staffing".mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]38

12 \*Medical Staff, Hospital/ 15384

13 \*Health Personnel/ 36731

<sup>14</sup> "medical staffing".mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]271

15 8 or 9 or 10 or 11 or 12 or 13 or 14 60819

- 16 \*Health planning/ 12430
- 17 \*Planning Techniques/1818

18 "service\* planning".mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]2115

19 "planning model\*".mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]821

20 "planning framework\*".mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]391

21 "service\* framework\*".mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]913

22 \*"Delivery of Health Care"/ 69053

23 \*"Health Services Needs and Demand"/ 23415

- 24 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 107856
- 25 7 and (15 or 24) 58

#### 2<sup>nd</sup> Search Strategy

#### Ovid MEDLINE(R) ALL <1946 to August 01, 2024>

- 1 \*Mortality/ 23848
- 2 \*Hospital Mortality/ 13781
- 3 \*Infant Mortality/ 16369
- 4 Perinatal Mortality/ 2528

5 mortality.mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 1479869

6 "mortality rate\*".mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, rare disease supplementary concept word,

unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 190749

7 "rate\* of mortality".mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 12418

8 "death rate\*".mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 27897

9 "rate\* of death".mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 5410

10 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 1492870

11 \*"Length of Stay"/ 13961

12 "length of stay".mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 157296

13 los.mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 110316

14 "length in hospital".mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 14

<sup>15</sup> "inpatient stay".mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 2551

16 "time in hospital".mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 766

17 "time to discharge".mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 6898

18 11 or 12 or 13 or 14 or 15 or 16 or 17 255094

19 \*Patient Satisfaction/ 32757

20 "patient\* satisfaction".mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 123014

21 "patient\* experience\*".mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 86356

<sup>22</sup> "patient\* perception\*".mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 13549

<sup>23</sup> "patient\* attitude\*".mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 3556

24 19 or 20 or 21 or 22 or 23 215723

<sup>25</sup> "medical workforce".mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 955

26 \*Health Workforce/ 7129

<sup>27</sup> "health workforce".mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 18945

<sup>28</sup> "healthcare staffing".mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 38

29 \*Medical Staff, Hospital/ 15384

30 \*Health Personnel/ 36737

31 "medical staffing".mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 271

32 25 or 26 or 27 or 28 or 29 or 30 or 31 71054

- 33 32 and (10 or 18 or 24) 4409
- 34 limit 33 to yr="2024" 96

#### 3<sup>rd</sup> Search Strategy

#### Ovid MEDLINE(R) ALL <1946 to August 05, 2024>

1 neonatal.mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 278859

2 neonatology.mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 9114

3 1 or 2 282797

4 physician\*.mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 673508

5 consultant\*.mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 30729

6 doctor\*.mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 161379

7 4 or 5 or 6 805123

8 (staffing or staffed or "medical staff").mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 77198

9 (workforce or "medical workforce").mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 114223

10 8 or 9 181256

11 7 and 10 42005

12 mortality.mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 1480794

13 3 and 11 and 12108

# Appendix 3: Checklist for Reporting Results of Internet E-Surveys (CHERRIES) – LNU-SCU Medical Workforce Survey

Item Category	Checklist Item	Explanation
Design	Describe survey design	A cross-sectional survey was conducted to gather information on current LNU/SCU medical workforce at all tiers. Survey questionnaire was designed on survey monkey. The survey questions focussed on Tier 1, 2, 3 numbers, rota arrangements during weekdays and weekends. Questions were largely closed -ended, however open-ended questions were also included so participants could elaborate on specific concerns and factors related to the medical workforce patterns and adequacy.
Approval and	Approval	Ethical approval was not needed for this survey.
Consent Process	Informed consent & Data Protection	The survey's covering letter explained that the data collected would be used to develop guidance on the neonatal medical workforce and would subsequently be published. Participants were informed about the survey's purpose, estimated completion time, confidentiality, and voluntary participation principles before responding. The questionnaire included an optional section for clinical leads to provide their contact information to enable further interactions and discussions, if required. All data was stored anonymously and was accessible only to the BAPM working group.
Development and pretesting	Development and testing	Respondents' data was collected via survey monkey. Before formal data collection, BAPM working group were invited to answer the questionnaire for testing and the questionnaire was revised based on their feedback.
Recruitment Process	Open survey versus closed survey	Closed survey. Survey was completed by clinical leads or professionals designated to complete the survey. Survey link was distributed through ODN directors (England), framework group members (Scotland and Wales) and a clinician contact (Northern Ireland)
	Contact mode	Clinical leads for all LNUs and SCUs in England, Scotland and Wales were the main designated participants. The survey was sent either directly to the clinical leads or to the network directors to send to the clinical leads.
	Advertising the survey	Survey was promoted through the BAPM online platforms and word of mouth.

Survey	Web/email/text message	Survey monkey questionnaire was emailed to all
administration		the clinical leads through named individuals as
		described above. The responses were
		automatically downloaded using the survey
		monkey download option.
	Context	The questionnaire was specifically for the
	Context	clinical lead to complete as they would have
		overarching knowledge and information
		regarding the medical workforce.
	Mandatory/Voluntary	Voluntary
	Incentives	No incentives were offered
	Time/Date	The data was collected over 6 months. Survey
	Time, bute	nlanning started in Oct 23 survey was initially
		sent in Ian 24 and reminders were sent every
		A-6 weeks
	Randomisation of items or	No randomisation was needed as hias items
	questionnaires	were not included
	Adaptive questioning	N/A
	Number of items	28 questions in total if 2.7 questions nor page
	Number of scroops (pages)	
	Completeness check	S Completeness shack was incorporated as part
	completeness check	of the survey menkey questionnaire
	Poviou stop	Descendents were able to review and shange
	Review step	Respondents were able to review and change
		their answers through a back button or come
Decision retes		
Response rates		N/A The system connet record the number of
	view rate	The system cannot record the number of
		unique visitors so the view rate cannot be
	Denticipation vote	Calculated.
	Participation rate	No of people completing the first page/total
	Completion rate	No of poople completing/total po
Dreventing		No or people completing/ total no
Preventing	Cookies used/IP checks	No cookies were assigned. Duplicate entries
multiple entries		database was downloaded and climinated
from the same		database was downloaded and eliminated
Individual		before analysis. Entries which were most
		recently completed were kept for analysis. Ip
		Checks were not used.
	Log file analysis	Not used
	Registration	Users did not need to login first; nowever they
		nad to registrar their name and hospital name
Analysis		All sugging and a sugging
Analysis	Handling of incomplete	All questionnaires – complete and incomplete
	questionnaires	were analysed
	Questionnaires submitted	included irrespective of the time frame when
	with an atypical timestamp	completed
	Statistical correction	No statistical correction e.g weighting of items
		or propensity scores were used to adjust for
		non-representative sample.



# This document was produced by the British Association of Perinatal Medicine (BAPM).

BAPM is a membership organisation that is here to support all those involved in perinatal care to optimise their skills and knowledge, deliver and share high-quality safe and innovative practice, undertake research, and speak out for babies and their families.

We are a professional association of neonatologists, paediatricians, obstetricians, nurses, midwives, trainees, network managers and other health professionals dedicated to shaping the delivery and improving the standard of perinatal care in the UK.

Our vision is for every baby and their family to receive the highest standard of perinatal care. Join us today.

# www.bapm.org/join

British Association of Perinatal Medicine (BAPM) is registered in England & Wales under charity number 1199712 at 5-11 Theobalds Road, London, WC1X 8SH