Bristol, North Somerset & South Gloucestershire Joint Health Scrutiny Committee briefing on the review of Neonatal Intensive Care

NHS England and NHS Improvement

NHS North Bristol NHS Trust

NHS University Hospitals Bristol NHS Foundation Trust

Bristol, North Somerset and South Gloucestershire Joint Health Scrutiny Committee briefing on proposed reconfiguration of Specialised Neonatal Intensive Care

1. Introduction: What happens now?

Every year over 11,000 women have a baby in Bristol and the majority can choose where to deliver their baby.

Women with low-risk pregnancies can have their babies at home or in hospital under the care of a midwife. Women with pregnancy-related health concerns will be cared for by a consultant and will have their babies in hospital.

A small number of babies, usually around 10%, will need extra, more specialised care in hospital each year. Special care for ill or premature babies should be provided by specialised 'neonatal services' in acute hospitals in line with a national service specification. The service specification describes what is required in each of three levels of neonatal unit to ensure that people receive the same level and quality of service regardless of where they have their baby delivered in England.

Each level of neonatal care requires increasing speciality (described below):

Level One – Special Care Unit (SCU)

SCU is for babies who need short-term care such as continuous monitoring of their breathing and heart rate, treatment for jaundice and for those who are convalescing from other care. Generally premature babies who are over 32 weeks gestation will be cared for in a SCU.

Level Two – Local Neonatal Unit (LNU)

LNU is for babies who have a higher dependency and need short-term intensive care. Generally premature babies who are over 27 weeks gestation will be cared for in a Local Neonatal Unit.

Level Three – Neonatal Intensive Care Unit (NICU)

NICU provides very specialist intensive treatment for the very smallest and sickest babies. Generally, neonatal intensive care is for babies needing respiratory support weighing less than 1,000g, born at less than 28 weeks gestation and needing significant continuous positive airway pressure. Babies with severe respiratory disease who also require surgery may need this level of care too.

All 3 levels of care are currently provided in neonatal units at Southmead (North Bristol Trust - NBT) and St Michael's (University Hospital Bristol Trust - UHB) hospitals in Bristol.

The neonatal unit at Southmead cares for around 770 babies each year and the neonatal unit at St Michael's cares for around 750 babies each year. Both units function independently and provide care to babies within the Bristol, North Somerset and South Gloucestershire (BNSSG) region as well as to babies from the wider South West Operational Delivery network (SWODN) as and when needed.

2. Proposal to integrate neonatal services in Bristol

Neonatal services at both sites provide excellent care to the large number of babies they care for and have some of the lowest mortality figures in the UK (MBRRACE 2015). Nevertheless, in line with recommendations made following national and local clinical reviews, local clinical experts at both hospitals agree that changes need to be made now to ensure they can continue to deliver a safe, resilient and sustainable service for years to come.

This is because neither service is currently able to meet the staffing requirements set out in the national service specification, which makes both services less resilient and less able to be flexible when responding to staffing pressures or sudden increases in demand. Moreover, in attempting to meet the national service specification's staffing requirements for two separate NICUs that are located four miles apart, both Trusts are competing to recruit an already limited, highly specialised workforce. Consequently, attempts to achieve staffing targets at both sites have been repeatedly unsuccessful.

In addition, there is strong clinical agreement locally, nationally and internationally that babies needing neonatal intensive care (level 3) receive better quality care and have better clinical outcomes when they are treated by specialists who deal with a higher number of patients (please see Research section). Indeed, British Association of Perinatal Medicine (BAPM) research recently found that extremely preterm babies (below 27 weeks gestation) who are cared for in neonatal units that treat greater numbers of patients have approximately twice the survival rates as babies cared for in units that treat fewer patients. However, spreading activity across two sites that work independently makes it more difficult for either Bristol NICU to receive and treat the number of babies needed to maintain the highly specialist skills that are associated with these higher survival rates.

We also know that babies born at less than 32 weeks will often need other paediatric specialist treatment such as cardiac surgery. However, since paediatric services were centralised at the Bristol Royal Hospital for Children some years ago, Southmead has had no paediatric surgery, cardiology, radiology and neonatal trained pharmacy on site, and has

limited input from paediatric physiotherapy, speech and language therapy and dietetics. As a result, 35-40% of NICU babies born at Southmead have to be transferred to St Michael's at some point after they have been born in a specially equipped and staffed neonatal ambulance to receive care from paediatric specialists that are unavailable at Southmead. Moving from one hospital to another ex-utero at such a vulnerable time in a small baby's life can be challenging both for the baby and their family and poses substantial clinical risks.

3. Reconfiguration option development and appraisal

To address these concerns specialised commissioners and a project team from the two NICU units in Bristol have listened to a range of clinical experts, patient representatives and their families to develop and appraise options for how neonatal services could be arranged differently to ensure all babies born in Bristol are delivered in the right place at the right time with the right level of staffing within the following parameters.

- The neonatal service must operate as a single managed service, with a clear line of day to day clinical and operational accountability;
- There is a strong preference for the entire service to be based on a single site where this is deliverable within logistical and operational constraints;
- If the service is based across more than one site, the level 3 (NICU) element of the service must be delivered entirely on one site, with a level 1 or level 2 service delivered on the second site.
- The level 3 (NICU) element of the service must have direct and seamless access to the full range of paediatric co-dependencies and specialist clinical support.

Moreover, both Trusts and Specialised Commissioners are keen to ensure that any proposed change to current provision meets the following objectives.

- Minimise transfers of small high-risk babies
- Improve access for all neonatal babies to paediatric specialities
- Improve access for all neonatal babies to paediatric support services i.e. paediatric radiology, paediatric pharmacy, speech and language therapy, physiotherapy, dietetics
- Support provision of a safe and sustainable neonatal workforce
- Have minimal impact on the existing maternity provision at each hospital

Having consulted a wide group of paediatric and obstetrics clinicians, CCG maternity commissioners, patient advocacy groups both locally and nationally, and the South West Neonatal Operational Delivery network a long list of options were developed (please see Table 1).

After assessing each of the above options against the previously mentioned criteria options 2 and 5 were rejected for the reasons given in Table 1. Hence, the three options that were selected to be taken forward for further targeted engagement were:

1. **Do nothing option**

   St Michael's and Southmead to both remain level 3 (Neonatal Intensive Care) Units.

3. **LNU option**

   St Michael's to remain a level 3 (Neonatal Intensive Care) Unit, with Southmead to be re-designated as a level 2 (Local Neonatal) Unit

4. **SCU option**

   St Michael's to remain a level 3 (Neonatal Intensive Care) Unit, with Southmead to be re-designated as a level 1 (Special Care) Unit

Table 1. Long list to short list of clinical model options

Long of options	Shortlisting Criteria	Result
1. Do Nothing	• Delivers Project Objectives • Feasibility & deliverability	Standard to include in short list
2. Minimum change/enhance existing service at Southmead (NBT)		Not shortlisted as does not achieve project objective to minimise transfers of small high risks babies
3. Neonatal Intensive Care (level 3) at St Michael's (UH Bristol) and Local Neonatal Unit (Level 2) at NBT		Shortlisted
4. Neonatal Intensive Care (level 3) at UH Bristol and Special Care Unit with short term non-invasive ventilation at NBT		Shortlisted
5. All neonatal services centralised on one site		Not shortlisted as currently not feasible or deliverable
6. Option 4 with maternity workload redistribution		Not shortlisted as significant impact on maternity services

Public and Patient Feedback

To ensure the options appraisal was informed by the views and ideas of local people in ways that are proportionate to the proposed change and targeted at the people most likely to be impacted by it, support groups that were already involved and engaged in either maternity or neonatal services were asked to attend a public meeting and/or complete a questionnaire.

This included local Maternity Voices members, South West Neonatal Operational Delivery Network parent representatives, and Bliss volunteers (Neonatal Charity for families with sick and premature babies).

This was undertaken through existing groups led by the clinical teams at both hospitals, with input and oversight from Specialised Commissioners to obtain a wider group of people's views on the shortlist.

In addition, a public engagement meeting held on 6th November, 2018 was attended by 11 people and a further three people provided feedback on the proposals online. The invitation to this event was widely circulated to the parent representative organisations listed above. It was also placed on Facebook. The numbers who attended the public meeting reflects the very small user population for this service and what we have found to be wide support for our efforts to protect the sustainability and resilience of neonatal provision in Bristol for years to come.

Patient representatives and local clinical experts who shared their views on the above options identified Option 3 (that level 3 activity should be consolidated at St Michael's and that the Southmead facility should be re-designated as a level 2 unit) as the preferred option because it balances clinical improvements against the need to maintain access and choice of birthing location for all but the most premature births and enables level 3 babies to be repatriated to Southmead for step down care as soon as they are well enough.

A summary of the things that were said in response to the public and patient engagement and how these have influenced commissioners' plans and actions (in italics) is summarised (in no particular order) below.

1. Initially, a few people were opposed to any change, especially changing the level of the Southmead unit, but once they learned about the reasons for changes and the benefits for mothers and babies, they understood why the change was being considered and were supportive.

2. **Parking, facilities for parents, access to food** were all raised as important factors for families that need to be taken into consideration when thinking about concentrating NICU services at St Michael's.

   The project team have modelled the parental accommodation that would be needed for the preferred option, details of which are included in an outline business case that has been approved by both Trusts and NHS England/Improvement (available on request).

3. **Communication:** The need for clear and consistent communication throughout the maternity and neonatal pathway was emphasised both as an everyday part of quality delivery as well as something that would need to be carefully considered when

informing people about any service change. Mothers would want to know what was happening and why so that they and their families could prepare properly.

Communications and engagement colleagues from both hospitals and NHS England/Improvement are currently working on this with a view to producing an information leaflet to help people navigate the system and know what to expect.

4. **Bereavement and Palliative care**: People suggested that bereavement and palliative care at St. Michaels would need to be enhanced and expanded to cope with the greater numbers of very sick babies.

   Bereavement and palliative care services are available at both sites. As we change the way that the teams at each hospital work together we will review the distribution of bereavement and palliative care services that currently exist and respond as needed.

5. **Perinatal mental health** was raised as a general current concern and discussed at length as people stressed the importance of ensuring mothers' physical and mental health needs are provided for as well as babies.

   Although perinatal mental health services were beyond the scope of this NICU review, NHS England and NHS Improvement's South West Specialised Commissioning team have listened to these concerns and are working to secure an additional seven perinatal beds in the South West by April 2021.

6. **Capacity:** Concerns were raised about St. Michaels' ability to cope with any additional workload when babies and mothers are already being sent out of Bristol due to occasional lack of capacity at St Michael's.

   The St. Michaels unit will be expanded to accommodate the additional workload, with improved cot occupancy to increase capacity. If Option 3 is endorsed by scrutiny colleagues then we are committed to increase capacity at St Michaels to be a 41 cot unit (from a 31 cot unit). Southmead would retain 26 cots which would achieve an average daily occupancy of 90% (cot modelling available on request). However, we cannot rule out the possibility that there may be (albeit fewer) times when mothers and babies are sent out of area as happens currently even if the number of cots is increased.

7. **Continuity of care:** Some people stressed the need for continuity of care for women and babies who need to be transferred between different services.

   Having the same clinical guidelines, governance structures and policies implemented across both units will support continuity of care for babies by enabling both teams to collectively plan and provide care as one team. Further work is being carried out with the local maternity system for Bristol, North Somerset and South Gloucestershire to look at how continuity of care for mothers can also be enhanced.

8. **Choice:** People asked whether women would feel that they still had choice in terms of place to birth, and whether they would feel supported in their choice if possible.

   The recommended changes do not impact on the choice of most mothers as it is only the sickest babies that would need to go to St Michael's, where many babies are already being transferred shortly after birth. As such these cases are treated as an

emergency where choice is not applicable. Nevertheless, choice was one of the criteria the appraisal team considered when scoring options and the option that was given the highest score (Option 3) enables 98% of mothers to still be able to deliver in their booking hospital of choice as Southmead will continue to provide maternity services and Level 1 and 2 neonatal unit care as currently.

9. **Transitional Care:** Concerns were raised about the provision of transitional care and "rooming in" and at times the poor experience of mothers coming from neonatal units into transitional care. It was hoped that the proposed changes for neonatal service may be an opportunity to iron out some of the existing issues with transitional care.

   In line with the recommendations of the national review of neonatal services (soon to be published) specialised commissioners will be looking at transitional care models across all providers to identify best practice so that learning can be shared across all neonatal units.

10. **Parent Accommodation**: people were concerned that this would need to be increased if the proposal to deliver all NICU babies at St Michael's was actioned.

    Provisional plans for expansion at St. Michaels include the recommended increased provision of parental accommodation, including rooms for parents to stay in on the unit, for each of the options (available on request) to ensure there is sufficient accommodation to cope with the increase in activity at St Michaels.

11. **Neonatal /parents timeline**: Parent representatives that attended the event agreed the planned development of a roadmap for parents may be a useful resource in the future to address some of the confusion parents can feel and wanted to know when this would be available.

    Communications and engagement colleagues from both hospitals and NHS England are currently working on this with a view to producing an information leaflet to help people navigate the system and know what to expect as soon as all of the work to ensure the carefully managed centralisation of NICU at St Michael's is completed.

12. **Clinical reputations:** Some were concerned that mortality numbers may increase at St Michael's relative to current figures if the NICU starts receiving greater numbers of the very sickest babies that have a low chance of survival even with the best intervention. Hence, people stressed the need for steps to protect the unit's reputation.

    We asked the options appraisal team to specifically consider each of the options in terms of their ability to protect and enhance the reputation of both services. Of all the options that were considered the recommended model (Option 3) scored highest for clinical reputation (please see Table 2 below).

    Table 2

Framework for decision making	No.	Criteria	Option 1 "Do Nothing"	Option 3 NIC/LNU	Option 4 NIC/SCU
4. Reputational	4a	The option protects and offers opportunity to enhance the reputation of neonatal services delivered by both organisations.	569	942	796
		Total	**569**	**942**	**796**

13. **"De-skilling" of staff, governance issues:** Some asked whether the change in service provision at Southmead would result in de-skilling of staff and whether, if there was integration and staff rotation to prevent this deskilling, if there would be any governance issues with staff working across two hospitals.

    The recommended changes would give clinical staff access to a wider range of cases by working on a shared rota and to a single set of governance and clinical protocols. This will provide increased opportunities to share learning and expertise across both teams and help staff develop and maintain their skills at the highest level.

Staff Feedback

Throughout the lifetime of the project there have also been a number of staff engagement sessions held in both hospitals both before and after the public and patient engagement described above. These staff engagement sessions, run by the clinical lead for the project and/or the NICU Project Manager, have included neonatal nurses, neonatal staff, midwifery staff, neonatal consultants and obstetric consultants.

After providing staff with updates on progress with the project to date, staff have been asked to raise:

1. Any concerns they have
2. Any positive outcomes/opportunities that making a change might bring

Key issues raised by staff were consistent with the feedback and concerns that people shared during the public and patient engagement already described above. Additional benefits of reconfiguring neonatal services in Bristol that local clinical experts identified were:

- Improved clinical quality of care by reducing transfers of very sick small high-risk babies across the city.
- Excellence and good clinical outcomes at both Southmead and St. Michaels so bringing both units closer together will offer opportunities to share best practice across both sites.
- Highly trained and skilled staff on both sites, presents opportunities to share learning, to increase exposure of staff to both medical and surgical neonatology to improve the service overall.
- Larger pool of both medical and nursing staff to pull from.
- Improved recruitment and retention of both medical and nursing staff across both units.
- Common sense to have intensive care at St Michael's who manage almost all the paediatric services.
- Could improve continuity of care for families if the same clinical guidelines and policies are implemented across both units. This could be further improved if both units had the same patient administration system.
- Improved educational and research opportunities across both units.
- Larger service could improve support for staff and benefit the babies.

- Positive for babies in Bristol as may mean fewer transfers out of area if there is increased capacity/occupancy across the units.
- Co-ordinated cross-city working, improved cohesiveness between both units.
- Focusing on what's best for the baby, placing the baby at the center of designing the potential future neonatal service- aiming for a service that is both safe and sustainable has to be good.

A detailed engagement report that describes the patient, public and clinical stakeholder engagement that was conducted is available to download at https://www.england.nhs.uk/south/team/direct-commissioning/specialised-commissioning/

Scoring Process

All of the stakeholder feedback was included in the options appraisal supporting information pack that was given to the scoring team to ensure any recommended option that emerged was influenced by local people's views.

Across all evaluation criteria, Option 3, that level 3 specialised support should be concentrated at St Michael's and that the Southmead facility should be re-designated to provide care as a level 2 unit (see Table 3), emerged as the preferred option. This balances clinical improvements against the need to maintain access and choice of birthing location for all but the most premature births and enables level 3 babies to be transferred back to Southmead for step down care as soon as they are well enough.

Table 3 Option Appraisal Results

Framework for decision making	Option 1 "Do Nothing"	Option 3 NIC/LNU	Option 4 NIC/SCU
1. Strategic Alignment	2067	2899	2310
2. Operational	6754	10,458	9,732
3. Clinical and quality	3321	4531	3795
4. Reputational	569	942	796
Total	**12711**	**18830**	**16633**

4. Impact Assessment

Doctors and midwives agree that the safest way to transport a baby that is likely to need higher levels of care is in the mother's womb whilst she is still pregnant. Whilst the vast

majority of women (98%) due to give birth would see no change at all, there would be a small number of women who would move to St Michael's to give birth.

In the new model of care, with a Level 3 service at St. Michael's and a LNU at Southmead, we would expect based on historical data (2016/17: 23, 2017/18: 28, 2018/19: 22) that less than 30 women a year would deliver at St. Michael's instead of Southmead, excluding women who transfer into the area from outside of Bristol, North Somerset and South Gloucestershire.

The distance between Southmead (NBT) and St Michael's (UHB) is approximately four miles, making it closer to the homes of some of these women and slightly further for others. NHS England/Improvement and local clinical experts believe the clinical benefits to babies and mothers far outweigh any potential negative impact of any additional mileage. Moreover, a free hospital shuttle bus operates between hospitals in Bristol and free accommodation for families at both St Michael's and Southmead that is being increased to ensure there is sufficient capacity to meet the anticipated increase in demand for family accommodation. Therefore, we do not believe the proposed change will disadvantage people on low incomes or contribute to health inequalities.

Families will still be able to access level 1 and level 2 neonatal services at Southmead to enable babies to receive as much of their care as possible in the hospital that mothers originally chose as their place of delivery. NHS England/Improvement and local clinical experts believe these considerations collectively mitigate and minimise the potential negative impact on families who would have otherwise chosen to give birth at Southmead.

Under current arrangements, 40% of babies born at Southmead before 32 weeks are subsequently transferred to St Michaels for surgical interventions and so a significant proportion of the women who would be affected by the proposed change will have earlier transfer to the most appropriate care setting for their babies, thereby removing the clinical risk to both mother and child that is incurred when having to move them.

There will be more paediatric clinicians with the right specialist skills (including cardiology and surgical specialties) available to treat NICU babies through this integrated service, with multidisciplinary teams working across both hospitals jointly caring for sufficient numbers of babies to maintain their skills at the levels needed to deliver the safest, highest quality neonatal services 24/7 (in accordance with the recommendations of the British Association of Perinatal Medicine and South West Neonatal Operational Delivery Network). This should also support research and development activities at each hospital, again increasing the skills and knowledge of both teams.

Funding additional cots will also reduce the number of mothers who need to be sent out of the area to deliver their baby. Any reduction in transfers would improve the patient and family experience, staff morale as well of the financial benefits to the local health economy of retaining activity in Bristol.

Local clinical consensus is that the integration of the Southmead and St Michaels specialised neonatal services in this way will create a centre of excellence for neonatal care in Bristol that is more resilient and sustainable.

5. The benefits of the proposed reconfiguration

To summarise, we anticipate the proposed model of care will have the following benefits.

Improved clinical quality outcomes and patient safety

- It places the most at risk small vulnerable babies at St Michael's with the paediatric specialists co-located, ensuring that they are in the right place at the right time with the right staff to care for them
- It minimises ex-utero transfers of these small high-risk babies
- A centralized NICU is endorsed by the research evidence that has shown improved mortality and morbidity in NICU's that care for higher numbers of babies
- A key component of any partnership agreement between the Trusts would be a firm commitment from St Michael's to ensure systems are in place to improve referral pathways from Southmead to St Michael's to paediatric specialists and improve access for babies to paediatric support services
- It improves patient safety by integrating the units and agreeing clinical guidelines, rotation of staff and maintenance of neonatal skills across sites, professional advice and shared learning

Improved long term sustainability of the service

Integrating both units would significantly improve the long-term sustainability of the service:

- Southmead NICU would no longer be a standalone unit, instead it would be bolstered and supported via integration with St Michael's, with better access to paediatric specialists and paediatric support services, and together provide excellent, high quality tertiary neonatal care across the region
- Integration of medical staffing would enable greater flexibility of medical workforce to cover rotas across both sites due to a larger medical staff pool
- Improved recruitment and retention for nursing and medical staff**;** Integration of the units provides more scope for teaching and training, better exposure to a wider range of neonatal problems. This breadth of exposure would be attractive to potential incoming staff

- Will allow the establishment of an integrated neonatal service with increased research capabilities which in turn will help to attract staff for training and fellowships

Additional benefits include:

- Improved patient and family experience; It is recognised that the transfer of new-borns at such an early vulnerable stage of their life often causes both the new-born and their family stress and concern. Reducing these transfers will help improve families' experience as well as the clinical outcomes of neonatal care in Bristol
- Minimal impact on current maternity services as 98% of women will still deliver in their maternity unit of choice
- It meets the Specialised Commissioner intentions for all intensive care to be provided on one site and it steps towards the intentions for a single managed neonatal service in Bristol

In other words, there will be one neonatal service jointly delivered across two sites that is more flexible and resilient to pressures related to demand and staffing gaps. No resources will be lost as concentrating NICU for the very sickest level babies at St Michael's will also enable specialised commissioning to increase the number of NICU beds that is able to deliver a 24/7 service that meets the requirements of the national service specification and gives these very sick babies the very best chance of survival based on current evidence.

6. The risks if we do not implement the proposed reconfiguration

There is universal support for the proposed changes because both services are unable to meet the standards set out in the national service specification and are vulnerable to increasing demand and staffing challenges, which undermines their sustainability and resilience.

7. Next steps

Before the recommended changes can proceed the proposal to centralise NICU at St Michael's must be supported by the organisations that need to commit the resources needed to implement the reconfiguration (University Hospitals Bristol, North Bristol Trust and NHSE England). Consequently, an outline business case has been developed with stakeholders and approved by the relevant organisations.

Detailed work is now needed to develop a full business case, including the shared management model, which can then go for final approval to Trust and NHSE/I boards to commit the necessary resources in Spring 2020. Endorsement by members of the Bristol, North Somerset and South Gloucestershire Joint Overview and Scrutiny Committee (at the

end of October 2019) is sought for the progression of this work, with ongoing engagement as the full business case is developed.

In line with recommendations from the national review of neonatal services to concentrate NICU activity in a single centre in Bristol by 2022 we anticipate commencing implementation by mid to late 2021 once the additional clinical facilities, family accommodation, management model and staffing arrangements are in place.

8. Recommendations

Given the sound evidence-based reasons for the proposed development; that the national service specification is mandatory and has itself already been subjected to impact assessment and public and clinical engagement and; the balancing of choice against clinically optimal service considerations, members of Bristol, North Somerset and South Gloucestershire Joint Health Overview and Scrutiny Committee are respectfully asked to:

- Note the improvements in patient outcomes and family experience the proposed model is expected to deliver;
- Note the support and involvement of local people, experts and clinical leaders in the option development and appraisal processes that identified the recommended model of care;
- Note the intention to increase NICU capacity and family accommodation in Bristol;
- Note the commitment to ensure sustainability of services through reconfiguration, relevant to the clinical workforce and estate of both organisations;
- Endorse the proposal to centralise level 3 NICU at St Michael's, with families still able to access level 2 neonatal services at Southmead.

References

Marlow N, Bennett C, Draper ES, Hennessy EM, Morgan AS, Costeloe KL. Perinatal outcomes for extremely preterm babies in relation to place of birth in England: The EPICure 2 study. *Arch Dis Child Fetal Neonatal Ed.* 2014 99(3): F181-8 doi: 10.1136/archdischild-2013-305555

Watson S, Arulampalam W, Petrou S, Marlow N, Morgan AS, Draper ES, Santhakumaran S, Modi N; Neonatal Data Analysis Unit and the NESCOP Group. The effects of designation and volume of neonatal care on mortality and morbidity outcomes of very preterm infants in England: Retrospective population-based cohort study. BMJ Open (in press) 2014

Watson SI, Arulampalam W, Petrou S, Marlow N, Morgan AS, Draper ES, Modi N; Neonatal Data Analysis Unit (NDAU) and the Neonatal Economic, Staffing, and Clinical Outcomes Project (NESCOP) Group. The effects of a one-to-one nurse-to-patient ratio on the mortality rate in neonatal intensive care: a retrospective, longitudinal, population-based study. Arch Dis Child Fetal Neonatal Ed. 2016 Feb 9. pii: fetalneonatal-2015-309435. doi: 10.1136/archdischild-2015-309435.

Fenton AC, Ainsworth SB, Sturgiss SN. Population-based outcomes after antenatal transfer. Paediatric & Perinatal Epidemiology 2002; 16: 278-285

Mohammed, M. A., Aly, H. Transport of premature infants is associated with increased risk for intraventricular haemorrhage. Archives of Disease in Children – Fetal and Neonatal Edition 2010:95:F403-F407

Almadhoob, A., Ohlsson, A. 2015. Sound reduction management in the neonatal intensive care unit for preterm or very low birthweight infants. Cochrane Database of Systematic Reviews.

Harrison, C., McKechnie, L. 2011. How comfortable is neonatal transport? Acta Paediatrica. Feb:101(2):143-7.

BLISS. 2016. BLISS Reports and Publications. [ONLINE] Available at: https://s3.eu-west-2.amazonaws.com/files.bliss.org.uk/images/Transfers-of-premature-and-sick-babies.pdf?mtime=20180404114256. [Accessed 5 November 2018].

Mulaney, D. M., Edwards, W. H., DeGrazia, M. 2014. Family Centered Care During Acute Neonatal Transport. Advances in Neonatal Care. Vol. 14 (5S) p S16-S23

Appendix A – Glossary

Apnoeic attacks	Apnoeic attacks refer to cessation of respiratory movements for more than 10 seconds.
BLISS	A charity that supports families with babies born premature or sick.
Continuous positive airway pressure	Continuous positive airway pressure is a form of positive airway pressure ventilator, which applies mild air pressure on a continuous basis to keep the airways continuously open in people who are not able to breathe spontaneously on their own.
Dietetics	Applying the science of nutrition to regulate food intake and provide advice on healthy diets.
Jaundice	Jaundice is when your skin and the whites of your eyes turn yellow. It is common in new born babies but in some cases requires intervention with investigations and treatment.
Maternity Voices	A forum to engage with patient populations in respect of changes to maternity services in Bristol, North Somerset and South Gloucestershire.
NBT	North Bristol Trust – neonatal unit at Southmead often referred to as NBT
Operational Delivery Network	ODNs coordinate patient pathways between providers over a wide area to ensure access to specialist resources and expertise. South West Operational Delivery Network (for neonatal care) is made up of neonatal services at

	Gloucester, Swindon, Bristol, Bath, Taunton, Yeovil (Northern Sector) and Barnstaple, Torbay, Exeter, Plymouth and Truro (Southern Sector).
Phototherapy recovery	Phototherapy in the newborn is a treatment for hyperbilirubinemia and jaundice in the newborn that involves the exposure of an infant's bare skin to intense fluorescent light.
Tertiary services	The NHS is divided into primary care, secondary care, and tertiary care. Primary care is often the first point of contact for people in need of healthcare, and may be provided by professionals such as GPs, dentists and pharmacists. Secondary care, which is sometimes referred to as 'hospital and community care', can either be planned (elective) care such as a cataract operation, or urgent and emergency care such as treatment for a fracture. Tertiary care refers to highly specialised treatment such as neurosurgery, transplants and includes specialised neonatal services such as NICU. As of March 2017 there are 233 NHS providers of secondary and tertiary care.
UHB	University Hospitals Bristol NHS Trust – neonatal unit often called St. Michael's