National Neonatal Audit Programme 2017 Annual Report on 2016 data

Published September 2017

Commissioned by the Healthcare Quality Improvement Partnership

Royal College of Paediatrics and Child Health,
National Neonatal Audit Programme

Neonatal Data Analysis Unit (NDAU),
Imperial College, London

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National Neonatal Audit Programme 2017 Annual Report on 2016 data

Royal College of Paediatrics and Child Health

On behalf of the NNAP Project Board

Commissioned by the Healthcare Quality Improvement Partnership (HQIP) as part of the National Clinical Audit and Patient Outcomes Programme (NCAPOP)

The programme is funded by NHS England, the Welsh Government and, with some individual audits, also funded by the Health Department of the Scottish Government, DHSSPS Northern Ireland and the Channel Islands

NNAP Project Board members

Professor Anne Greenough, Professor of Neonatology and Clinical Respiratory Physiology & Vice President (Science and Research), RCPCH – Chair of the NNAP Project Board

Dr Roshan Adappa, Consultant Neonatologist, NNAP Representative for Wales

Ms Vanessa Attrell, Manager, South East Coast Neonatal Operational Delivery Network (from November 2016)

Dr Lisa Barker, Trainee Representative

Dr Julie-Clare Becher, Consultant Neonatologist, British Association of Perinatal Medicine Representative (from September 2016)

Zoe Chivers, Head of Services, Bliss

Daniel Gray, NNAP Data Analyst, Neonatal Data Analysis Unit (NDAU) (to February 2017)

Ellen Hallsworth, Parent Representative

Wendy Hodgson, Neonatal Nurse Representative

Dr Chris Kissack, Consultant Neonatologist, NNAP Representative for Scotland

Nicholas Longford, NNAP Statistician, NDAU

Dr Helen Mactier, Consultant Neonatologist, British Association of Perinatal Medicine Representative (from September 2016)

Dr Gopi Menon, Consultant Neonatologist, British Association of Perinatal Medicine Representative (to August 2016)

David McKinlay, Programme Manager, HQIP (to December 2016)

Professor Neena Modi, Professor of Neonatal Medicine, Neonatal Data Analysis Unit (NDAU) & President, RCPCH

Jenny Mooney, Director of Operations, HQIP (to March 2016)

Dr Sam Oddie, Consultant Neonatologist, NNAP Clinical Lead

Kayleigh Ougham, Data Analyst, Neonatal Data Analysis Unit (NDAU) (from March 2017)

Gina Outram, Neonatal Nurse Representative

Dr Colin Peters, Consultant Neonatologist, NNAP Representative for Scotland

Sarah Rattigan, Director, East of England Neonatal Operational Delivery Network (to October 2016)

Mirek Skrypak, Associate Director of Quality and Development, HQIP (from April 2016)

Patrick Tully, Parent Representative

Sarah Walker, Project Manager, HQIP (from January 2017)

Professor Andrew Wilkinson, Professor of Perinatal Medicine, The Neonatal Society

Calvin Down, Project Manager, RCPCH

Melanie David-Feveck, Project Administrator RCPCH

Alison Firth, Clinical Standards Editor, RCPCH

Mark Hannigan, Clinical Standards Programme Manager, RCPCH

Dr Marcia Philbin, Assistant Director Research & Policy, RCPCH

Acknowledgements

The NNAP Project Board would like to thank the many doctors, nurses, administrators, data clerks and others who have contributed their time and effort to collect information and review its accuracy; particular thanks are due to the NNAP clinical leads in each unit.

Thanks also to the team at Clevermed Ltd for their ongoing support for NNAP data entry and data checking on the Badger system.

We also acknowledge the contribution made towards the development of this report by the members of the NNAP Clinical Reference Advisory Group (CRAG) and colleagues within the clinical standards, invited review, policy and workforce teams at the RCPCH.

Contents

Forewords

Professor Anne Greenough, Vice President (Science and Research) Royal College of Paediatrics and Child Health,

Chair of the NNAP Project Board

As chair of the National Neonatal Audit Programme (NNAP) Project Board I am delighted that data completeness for the majority of NNAP audit measures is now at an extremely high level ensuring a rich source of reliable information from which quality improvement opportunities can be identified. Neonatal practitioners should be congratulated on their input into the NNAP, often providing these data with no additional resource.

The report demonstrates areas of improvement, but there is still variation between networks and units. The NNAP has updated its online reporting tool, NNAP Online, alongside this report. NNAP Online allows users to view the results of the analysis in an interactive way and we hope that it will continue to enable practitioners to compare results and share best practice.

Sadly, little progress has been made with regard to recorded consultation with parents. One in ten parents did not have a recorded consultation with a senior member of the neonatal team in the first 24 hours after admission, a time when professional support can be most needed. Hence, we emphasise in our key findings that next year we must do better and use the NNAP detailed findings to learn from those with best practice.

I would like to thank the Project Board, who bring expertise, enthusiasm and a deep commitment to facilitate delivery of the highest quality of care. We continue to be grateful for the input of colleagues at the Neonatal Data Analysis Unit (NDAU) who provide the data analysis and statistical support for the audit. I am grateful to the NNAP Project Team for producing this comprehensive report and their work throughout the year. I would particularly like to thank Calvin Down, who after four years steps down as the NNAP Project Manager. Thankfully his immense expertise and dedication is not lost to the RCPCH, as he will take up the role of Project Manager to Epilepsy12.

Ellen Hallsworth and Patrick Tully, Parent Representatives

NNAP Project Board

On many of the NNAP's measures, from ensuring that mothers get antenatal steroids and magnesium sulphate, to mother's milk at discharge and two year follow up, making progress depends on parents and clinical staff working together.

As the parents of identical twins born prematurely at 31 weeks (Patrick), and a daughter born at 28weeks (Ellen), we joined the NNAP project board because we believe that parents' understanding of, and involvement in, the care that the audit measures is a vital part of improving all babies' outcomes.

It's clear that integrating families into neonatal units delivers long-term benefits. The 2016 results still recorded that one in ten parents did not have a consultation with senior neonatal staff within the first 24 hours of admission, and we believe that this needs to be improved. We are delighted that for 2017 this will be taken a step further in measuring the attendance of parents and carers at ward rounds, as part of building a longer-term partnership in care.

Alongside an updated version of 'Your baby's care', this year sees the launch of unit-specific NNAP posters, making good performance visible and helping units to communicate quality improvement measures to parents and carers. We received positive feedback about how the posters increased staff and family engagement with the NNAP from a pilot this year, and we're excited about the potential impact of them being rolled out nationally.

The 2016 data shows minor improvements on the core NNAP measures but there is still wide variation locally, regionally and nationally. It is encouraging to see how the NNAP has responded to encompass reporting on adherence to the new NICE clinical standard on the administration of magnesium sulphate. However, it is clear that further improvement in this is required by a majority of units. Despite evidence of the benefits of breastmilk for premature babies, the rates of babies receiving any mothers' milk at discharge remains stubbornly below 60% - we know from experience that getting the right breastfeeding support from units can make a huge difference.

We have seen at the collaborators meetings that there are great quality improvement initiatives taking place across the country. We hope that clinical staff will use the data provided in this report and on NNAP Online to target these activities where they are most needed and to work with similar units to spread innovation and improvement.

If, as a parent, carer or family member of a baby admitted to neonatal care, you have suggestions for how the NNAP can better reflect your experiences and concerns, please let us know by contacting the NNAP project team at: nnap@rcpch.ac.uk.

Dr Gopi Menon, President, British Association of Perinatal Medicine

The NNAP has developed in its utility from simply allowing individual units to assess themselves against a standard to the point of having data of sufficient quality to allow real comparisons between similar units and the ability to highlight statistical outlier status. For the first time we have national data of good enough quality to expose variation in care and address it through quality improvement. I commend the NNAP Project Board for showing examples of good practice to aid professionals wanting to improve the performance of their unit.

It is quite clear that the proportion of babies achieving the audit target for many of the measures has been steadily increasing. This presumably reflects the fact that neonatal professionals are paying increasing attention to NNAP reports and using these as a spur to quality improvement. Scotland has recently joined a more mature NNAP and has an active government funded structure for quality improvement (the Scottish Patient Safety Programme), and it will be interesting to see whether this will enable Scottish units to reap the benefits of this benchmarking more quickly.

Neonatal professionals need to use their collective influence to simplify the path from data to improvement. We need to do more to unify quality measures, minimise the duplication of data requirements, improve the timeliness of data reporting, and find ways of hastening the spread of high quality neonatal care. We must set as our ambition the systematic interrogation and reduction of variation in patient outcomes related to quality of care, and the NNAP is helping to take us closer to that goal.

Executive summary

Welcome to this 10th annual report of the National Neonatal Audit Programme (NNAP), produced by the Royal College of Paediatrics and Child Health (RCPCH).

The NNAP within the current context of neonatal care

Approximately 750,000 babies are born each year in England, Scotland and Wales and of these nearly 1 in 8, or around 95,000, will be admitted to a neonatal unit (NNU) which specialises in looking after babies who are born too early, with a low birth weight or who have a medical condition requiring specialist treatment.

Monitoring the standard of care provided by specialist neonatal units is essential to inform efforts to give all babies the best possible chance of surviving and reaching their full potential. The monitoring is achieved through the NNAP, which encourages individual neonatal units and regional networks to deliver the very highest levels of care to babies and families by reporting their outcomes against standards described by professional organisations.

The NNAP is commissioned by the Healthcare Quality Improvement Partnership (HQIP), funded by NHS England, the Scottish Government and the Welsh Government, and is delivered by the RCPCH.

Through its annual comparison of the results from all levels of neonatal units in England, Scotland and Wales against professionally agreed standards (detailed in full in **Section 4** of this report), the NNAP is well-positioned to highlight where standards of care are being met, and to identify areas in need of improvement. It is hoped that neonatal units, networks and commissioners will use this report to create change and lead quality improvement, based on their results.

Bliss, the UK charity working to provide the best possible care and support for all premature and sick babies and their families, published reports on neonatal services in England, Wales and Scotland respectively in 2015, 2016 and 2017. These reports highlighted that services for premature and sick babies in all three countries are under severe pressure, facing a critical shortage of nurses, doctors and the full range of professionals needed to deliver safe care of the quality that these vulnerable babies need and deserve.

Bliss also highlighted the fact that these staffing shortages have resulted in a large number of transfers of babies taking place due to a lack of staffed cots rather than medical need, putting babies at unnecessary risk and adding to their families' stress and worry.

The NNAP also acknowledges the recommendations within "The Best Start: A Five Year Forward Plan for Maternity and Neonatal Care in Scotland" published in January 2017 following the Review of Maternity and Neonatal Services in Scotland. This wide-ranging review of maternity and neonatal care in Scotland recommended a restructuring of care provision with fewer level 3 neonatal intensive care units, and it recognised the contribution made by the NNAP towards Scotland's efforts to improve clinical standards and outcomes.

In September 2016 the NNAP launched "NNAP Online" alongside its annual report. NNAP Online allows people to view the results of the NNAP analysis in an interactive manner and can be accessed from the NNAP web pages at www.rcpch.ac.uk/nnap. The system provides options to view and compare results for chosen units and networks for the NNAP audit measures and across audit years. NNAP Online has been updated with the results of the analysis of 2016 data and the NNAP project board hopes that this tool will further enhance the ability of the audit to encourage the sharing of best practice and to stimulate quality improvement activities for the benefit of babies and their parents.

Summary of key findings and recommendations

The 2016 data report shows that multidisciplinary working can produce important changes in clinical performance across groups of hospitals, as well as within single units.

There are improvements in some of the NNAP audit measures. Examples include:

- There has been a 3% improvement (4,537/7,864 (58%) in 2015 to 4,868/7,758 (61%) in 2016) in the rate of babies born at less than 32 weeks gestation who have a temperature recorded within an hour of admission within the recommended range of 36.5 to 37.5°C.

- There has been an improvement in the proportion of parents who were documented as seen by a senior member of the neonatal team within 24 hours of their baby's admission. Further improvement is still required, but a rise of 2% (from 51,300/58,077 (88%) in 2015 to 54,442/60,148 (90%) in 2016) is heading in the right direction.

- A 1% rise (from 15,910/18,687 (85%) in 2015 to 16,317/18,947 (86%) in 2016) has been seen in the proportion of preterm babies exposed to antenatal steroids before birth in 2016.

- Screening of babies for retinopathy of prematurity within a week either side of the recommended timeframe has increased by 1% (from 8,226/8,821 (93%) in 2015 to 8,597/9,131 (94%) in 2016).

- Network level improvements have been seen in some measures. For example, the Wales neonatal network improved markedly in two audit measures. The rates of babies born at less than 32 weeks gestation with a temperate recorded within an hour of admission within the recommended range of 36.5°C to 37.5°C rose in Wales from 166/294 (56%) in 2015 to 214/318 (67%) in 2016. Additionally, the reporting of some clinical two year follow up information in Wales for babies born at less than 30 weeks gestation improved from 46/147 (31%) in 2015 to 100/168 (60%) in 2016. A further notable improvement was seen in the Shropshire, Staffordshire and Black Country neonatal network where the rates of "On time" screening for retinopathy of prematurity improved from 279/319 (87%) in 2015 to 320/325 (98%) in 2016.

Some networks clearly need to undertake focused quality improvement initiatives in order to achieve the higher rates of adherence to standards that have been demonstrated by other networks. Examples include:

- The need for further improvements in performance against the audit measures of antenatal steroids, magnesium sulphate and parental consultation in the Midlands South West network.

- Improvements in the timely screening for retinopathy of prematurity in Wales.

- Four out of every ten surviving babies born more than ten weeks early had no two year follow up clinical information of any type reported to the NNAP. Everyone needs to do far better in this area as all children should be receiving this crucial follow-up service in order for clinical teams to identify any developmental delays and arrange appropriate treatment.

- The national average of the NNAP audit measure of the use of antenatal magnesium to prevent cerebral palsy illustrates the spread of a relatively newly recommended treatment and the potential of national audits to help embed national recommendations, such as those issued by NICE. In this first year of measurement, networks vary in their coverage from 27% to 70%, showing how many more babies might benefit from this therapy if all networks did as well as those with the highest rates.

For the first time, having declared their certainty of the completeness of their data, twenty five NNAP units may be able to make some preliminary meaningful comparisons of their infection rates. This comparison is confined to units who know that every positive blood culture has been reported to the NNAP.

The NNAP strongly recommends the sharing of best practice between units and networks and hopes that neonatal units and networks will increasingly use the interactive unit and network level caterpillar plots within the NNAP Online reporting tool to identify opportunities to collaborate and learn from each other. NNAP Online can be accessed at: www.nnap.rcpch.ac.uk.

Impact and engagement

The NNAP has progressed over the years from an audit focusing only on neonatal units in England to the inclusion of units in Wales in 2012 and Scottish neonatal units in 2015. The RCPCH was delighted to have been commissioned by the Healthcare Quality Improvement Partnership (HQIP) to deliver the NNAP for a further four years from April 2017.

Data completeness

Data completeness for the majority of the NNAP audit measures is now at an extremely high level which means that the report outputs produced by the audit are able to provide a trusted source of information upon which to identify quality improvement opportunities.

The NNAP "Your baby's care" booklet

At a project board level, since September 2015 the experience of the parents of babies admitted to neonatal care has been reflected by the parent representatives, who play a key role in challenging the clinical members of the board to ensure that the work of the audit remains focused on babies and their families.

The production of the "Your Baby's Care" information booklet in 2015, with updates in 2016 and 2017, is a testament to the positive influence on the audit of the parent representatives. They have helped to raise awareness of the importance of the audit and ensure that it is relevant to the needs of babies and families.

Unit-specific NNAP Results posters

The neonatal nursing, parent and Bliss representatives on the NNAP project board have played a key role during the past year in helping to develop the NNAP poster initiative. Under this initiative an additional function has been added to NNAP Online which allows neonatal units to produce unit-specific posters which display their own 2016 NNAP results in comparison to the national average.

The function also allows units to produce a second poster onto which they can add details of the actions that they have taken, or plan to take, in order to address their NNAP results. Further details on the NNAP poster initiative can be viewed in **Section 3** of this report.

NNAP methodology and dataset development

Since its establishment in late 2014 the NNAP Clinical Reference Advisory Group (CRAG) has provided valuable input and guidance from clinicians who represent a broad range of unit levels and geographical representation. In July 2017 the CRAG was replaced by the NNAP Methodology and Dataset Group which includes representatives of the multidisciplinary professions that work in neonatal units and networks as well as parents, data analysts, statisticians and members of the RCPCH-based project team.

Consultation with key stakeholders

The NNAP continues to consult and engage with its key stakeholders in order that it remains both clinically relevant and responsive to the needs of the whole neonatal community. Over the past year members of the NNAP Project Board have attended neonatal network data manager and manager forum meetings and delivered presentations on the audit at the Scottish Neonatal Consultants Group/Scottish Neonatal Nurses Group study day and the annual meeting of the Scottish Neonatal Nurses Group.

The 2017 NNAP/NDAU Collaborators' meeting took place in Birmingham in April 2017 and was attended by over 100 delegates across a range of professions. Details of the Collaborators' meeting, including films of presentations delivered on the day, were made available on the NNAP web pages (www.rcpch.ac.uk/nnap) so that they could continue to be of use by the whole neonatal community after the event.

The NNAP continues to provide detailed quarterly reports to participating neonatal units and networks and is collaborating closely with colleagues at Clevermed Ltd to explore how the Badger system can support the work of the audit. This report includes the results of the analysis of the data from the two new audit measures that were introduced in 2016, namely the provision of antenatal magnesium to expectant mothers and the additional measure of central line associated bloodstream infections (CLABSI).

Encouraging the sharing of best practice

As in the 2015 and 2016 publications, this year's annual report contains case studies which have been kindly submitted by participating neonatal units and networks on the quality improvement activities that they have undertaken in response to their NNAP results. The NNAP Project Board members are pleased that units and networks are increasingly prepared to share details of their achievements with their peers in the interests of quality improvement for all neonatal services.

Future development and improvement

Following detailed consultation with stakeholders in 2016 and the successful recommissioning of the audit for a further four years, a number of new NNAP audit measures were introduced in time for data entry in 2017. These new measures address:

- Late and moderate preterm birth – avoiding inappropriate separation of mother and baby.
- Preterm infants delivered at <27 weeks gestation – delivery in appropriately designated unit
- Necrotising enterocolitis (NEC) – using a surveillance definition to facilitate NEC focused quality improvement activity in NNU.
- Reducing term neonatal admissions – minimising unnecessary mother and baby separation.
- Whether at least one of the parents of babies with admissions of greater than 24 hours attended any consultant ward round, at any time, during the baby's stay on the neonatal unit. (This audit measure is likely to be developed further from 2018 to encompass whether parents are present on all ward rounds).
- The NNAP has started to collect data from January 2017 on deaths before discharge of babies admitted to neonatal care using a methodology that has been developed so that it complements existing projects that report on neonatal mortality.

The NNAP is also linking across the healthcare system and will be supplying aggregated data outputs certain metrics to the My NHS Clinical Outcomes Publication (COP) and the National Clinical Audit Benchmarking project (NCAB).

RCPCH support and quality improvement services

At a wider level the RCPCH provides a range of support services and quality improvement tools via its Research and Policy Division. These can be viewed at the end of this report in **Appendix B.**

1. Introduction

The NNAP was set up by the Department of Health to support healthcare professionals, families and commissioners to improve the provision of neonatal care. The audit commenced in 2006 with the first NNAP report, published in 2007, covering the admission of babies to 107/226 (47%) Neonatal Units (NNUs) in the UK at the time. The first five annual reports covered neonatal units in England only, with Wales coming on board in 2012 and Scottish units joining in 2015. Participation in the NNAP has grown significantly since then, with 181/184 (98%) neonatal units across England, Scotland and Wales having contributed data to this 2017 report on 2016 data. A full list of the NNUs which provided 2016 data can be viewed in **Appendix A**.

The NNAP is commissioned by the Healthcare Quality Improvement Partnership (HQIP), funded by NHS England, the Scottish Government and the Welsh Government and delivered by the Royal College of Paediatrics and Child Health (RCPCH).

1.1 Aims of the NNAP

The key aims of the audit are:

- To assess whether babies admitted to NNUs in England, Scotland and Wales receive consistent high-quality care in relation to the NNAP audit measures that are aligned to a set of professionally agreed guidelines and standards.

- To identify areas for quality improvement in NNUs in relation to the delivery and outcomes of care.

1.2 Case ascertainment

Data for the NNAP analyses are extracted from the National Neonatal Research Database (NNRD) held at the Neonatal Data Analysis Unit (NDAU). The NNRD contains a predefined set of variables (the National Neonatal Dataset) obtained from the electronic neonatal patient records of each participating NHS Trust. Data are downloaded from the Badger3 and BadgerNet patient record systems used in NNUs and transferred to NDAU with health board and trust Caldicott Guardian approval.

Every baby admitted to the NNU would be expected to be entered on this system, and would also be eligible for inclusion in NNAP; the audit therefore achieves 100% case ascertainment in participating organisations. Babies receiving special care in transitional care or postnatal wards can also be entered.

For this report, the cohort comprises all babies with a final discharge from neonatal care from 1 January to 31 December 2016.

2. Key findings and recommendations

The following key findings and recommendations are based on the analysis of the data provided by 181 neonatal units on the care provided to 99,849 babies admitted to eligible neonatal units and discharged from neonatal care in England, Scotland and Wales during the calendar year of 1 January to 31 December 2016.

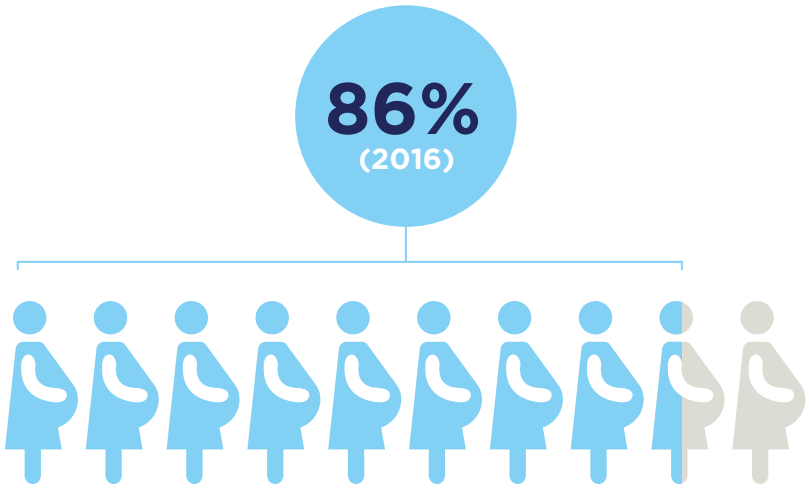
The NNAP focused on the following areas of neonatal care in 2016:

- Antenatal steroids
- Magnesium sulphate
- Temperature on admission
- Consultation with parents
- Encephalopathy
- Bronchopulmonary dysplasia (BPD)
- Measuring rates of infection on neonatal units
- Retinopathy of prematurity (ROP) screening
- Mother's milk at discharge
- Clinical follow-up at 2 years of age

Full details of the NNAP 2016 audit measures are available on page 44 of this report.

2.1 Antenatal steroids

Antenatal steroids are the most powerful health intervention in neonatal care. They are given to mothers by obstetricians and midwives prior to preterm birth in order to reduce the chance that their baby is affected by breathing difficulties (respiratory distress syndrome), as well as to reduce the risk of several other serious complications of prematurity.



Key findings

- Eighty-six percent (86%) of mothers of preterm babies were given antenatal steroids in 2016 (Table 1.1, Page 50). This figure has risen by 1% since 2015.

- Two units achieved major changes in rates of recorded steroid administration in a short period of time (Harrogate SCU, where the rate increased from 65% in 2015 to 100% in 2016, and the Royal Surrey County Hospital SCU, where the rate increased from 79% in 2015 to 98% in 2016). This shows that units of any level can improve the assurance they offer to their service users and commissioners that best practice is being followed. (see NNAP Online)

- One network (Midlands South West Newborn Neonatal ODN) had rates of reported antenatal steroid administration below the NNAP standard of 85%. This network had the lowest rates of reported antenatal steroid administration in both 2015 and 2016 and furthermore the rate also decreased from 81% in 2015 to 76% in 2016. (Figure 1.2, Page 51 and NNAP Online)

- Data were missing for 212 of the 18,581 babies who were eligible for inclusion in this audit measure. Over a quarter of this missing data is attributed to just two units (Birmingham Heartlands (31/212) and Good Hope Hospital (27/212)). (see NNAP Online)

- Scotland, with 93%, had the highest rates of antenatal steroid administration across networks for 2016. (Table 1.2, Page 50 and NNAP Online)

Key recommendations

- **Neonatal units**, together with the lead obstetrician responsible for the implementation of the NICE guidance on preterm labour (NICE NG25, 2015), should formally review records of babies born at <35 weeks admitted for neonatal care where antenatal steroids were not given to the mother, in order to identify potential missed opportunities and themes as to why these were not given, and develop appropriate action plans.*
- **Neonatal networks** should keep administration rates of antenatal steroids in their units under regular review, identify any quality improvement opportunities and support units to achieve the best possible neonatal outcomes.*
- **The NNAP and the National Maternity and Perinatal Audit** (**NMPA**) should collaborate to report antenatal steroid administration rates as part of the national Maternity Indicators.*
- **The NNAP** should seek to understand the clinical and audit processes in the Scottish units participating in the NNAP in order to understand and share, through case studies, newsletters and events such as the annual Collaborators' meeting, which practices other networks may be able to emulate.

*Recommendations marked with an asterix are repeated from the 2016 annual report on 2015 data

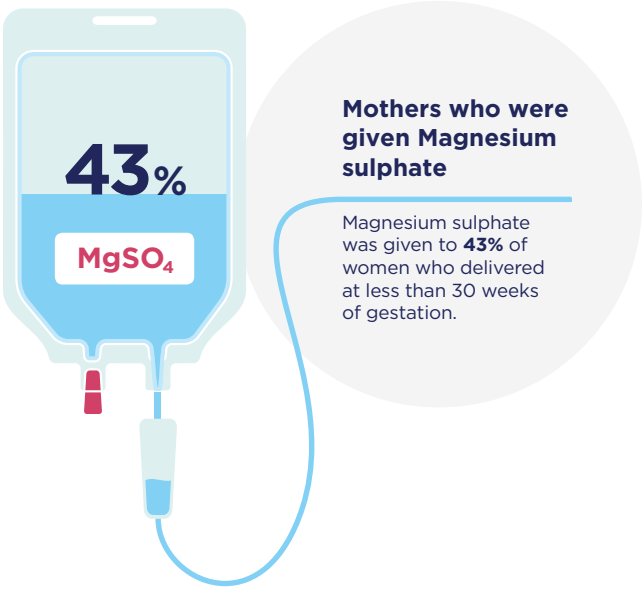
Full 2016 results and tables for antenatal steroids are found on pages 49 to 52.

2.2 Magnesium sulphate

Administering intravenous magnesium to women who are at risk of delivering a preterm baby reduces the chance that the baby will later develop cerebral palsy by around 30%. NICE guidance recommends that all women who may deliver at less than 30 weeks should be offered treatment.

Key findings

- Forty-three percent (43%) of women who delivered at <30 weeks of gestation were given magnesium sulphate. (Table 2.1, Page 53)
- Magnesium sulphate was administered more commonly to mothers of babies born in maternity units associated with a NICU (48%) vs LNUs (36%) and SCUs (23%). (Table 2.1, Page 53)
- Neonatal networks vary in how often magnesium sulphate was given, suggesting that implementation of NICE guidance is inconsistent. (Table 2.2, Page 54)
- Data were missing on whether magnesium sulphate was given in just 1 in 5 cases in 2016, the first year in which this new NNAP audit measure was introduced. (Table 2.1, Page 53)



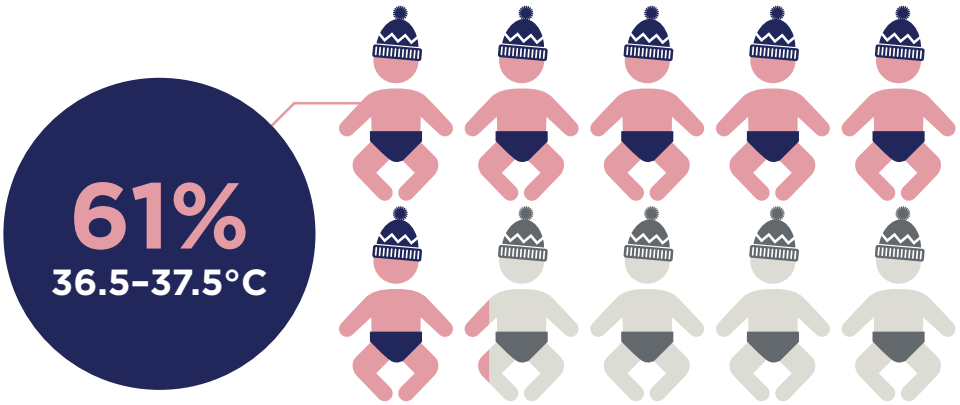
Key recommendations

- **Neonatal units**, together with the lead obstetrician responsible for the implementation of the NICE guidance on preterm labour, should formally review records of babies born at <30 weeks admitted for neonatal care where magnesium sulphate was not given to the mother, in order to identify potential missed opportunities and themes as to why these were not given, and develop appropriate action plans.
- **Neonatal networks** should keep administration rates of magnesium sulphate in their units under regular review, identify any quality improvement opportunities and support units to achieve the best possible neonatal outcomes, for example by sharing best practice.
- **The NNAP** should investigate if an indication for antenatal magnesium sulphate administration could be added to the BadgerNet NNAP data quality checklist.

Full 2016 results and tables for magnesium sulphate are found on pages 53 to 55.

2.3 Temperature on admission

Neonatal staff should pay careful attention to a baby's temperature on admission to the neonatal unit because low admission temperature has been associated with an increased risk of illness and death in preterm infants. Hypothermia is an easily preventable condition, even in vulnerable newborns, and neonatal unit staff need to know if a baby is too cold so that they can take action to get the temperature back to normal. NNAP have measured how successful neonatal units are in achieving normothermia (admission temperature of 36.5 to 37.5°c inclusive) in very preterm infants.



Key findings

- In 2016, more babies born at <32 weeks gestation were admitted with a temperature within the recommended range of 36.5-37.5°C than in 2015 (58% in 2015; 61% in 2016). This improvement in normothermia is seen in most units, suggesting changes in clinical practices. (Table 3.5, Page 61)
- There has been a rise in the proportion of infants who have temperature measured within an hour of birth (93% in 2015; 96% in 2016). (Table 3.5, Page 61)
- SCU, LNU and NICU neonatal services were all equally effective in promoting normothermia in 2016. (Table 3.3, Page 59)
- Most networks (13 out of 16) saw rises in the proportion of babies admitted within the recommended range of 36.5-37.5°C. Three in particular had clear improvements in rates of admission normothermia (Wales 56% in 2015, 67% in 2016; Trent ODN 57% in 2015, 65% in 2016; Northern ODN 51% in 2015, 61% in 2016). (Figure 3.2, Page 59, Table 3.4, Page 60 and NNAP Online)

Key recommendations

- **Neonatal units** with an existing focus on promoting admission normothermia should maintain these initiatives, using an accepted quality improvement methodology to monitor changes in practice.
- **Neonatal units** should ensure that they have a care bundle in place, developed with multidisciplinary input, which mandates the use of evidence-based strategies to encourage admission normothermia of very preterm infants.*
- **Neonatal units** that have above average rates of admission hypothermia recorded for their babies should firstly consider whether they have such an evidence-based care bundle. If they do, they should then audit whether they are applying it effectively, and seek local quality improvement and learning opportunities by comparing their practices to units with better performance using NNAP Online.*
- **Neonatal units** should report all infants admitted with marked hypothermia (admission temperature <36.0°C) through local governance structures to identify opportunities to improve practices.*
- **Neonatal units** should, if existing focus on promoting admission normothermia does not result in sustained improvements, consider using real time temperature measurement between birth and admission to guide interventions during this period.
- **The NNAP** should review its audit standard for the proportion of infants who should be admitted normothermic, and repeat this review every five years.
- **The NNAP** should consider whether to confine comparisons of rates of admission normothermia (in networks, or by unit level) to babies who were born in maternity units.

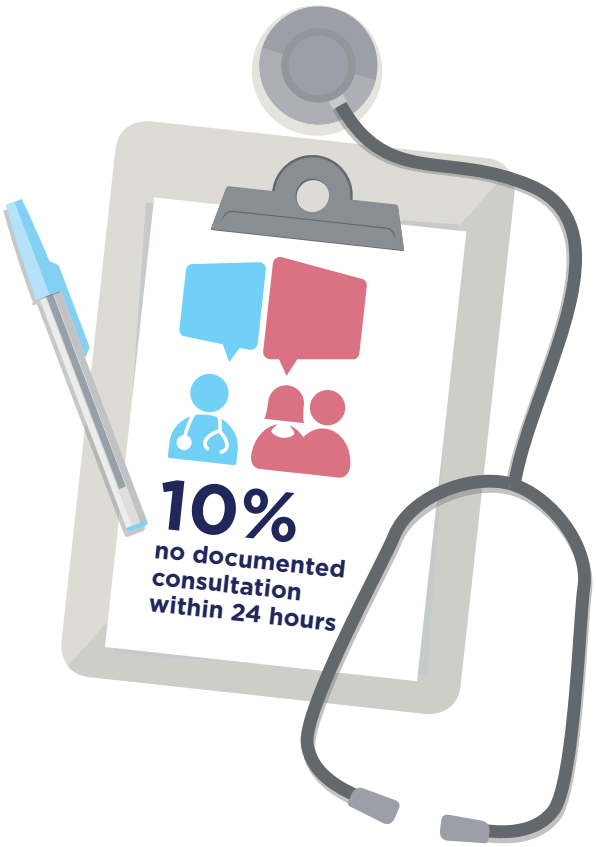
*Recommendations marked with an asterix are repeated from the 2016 annual report on 2015 data

Full 2016 results and tables for temperature on admission are found on pages 56 to 61.

2.4 Consultation with parents

The parents of babies admitted for care in neonatal units find themselves in a difficult and stressful situation. Involving parents in their baby's care helps to achieve the best long-term outcomes; engaging them in the first 24 hours is an essential part of doing this. It is therefore vital that senior neonatal unit staff meet the parents of newly admitted babies, listen to their concerns, explain how their baby is being cared for, and respond to any questions that they may have.

Key findings



- There has been further improvement in the proportion of families who were documented as seen by a senior member of the neonatal team within 24 hours of their baby's admission (88% in 2015; 90% in 2016). (Table 4.3, Page 65)
- One in ten admissions overall have no documented consultation with parents within 24 hours after the baby's admission. In one in 17 of documented cases (5.9%) this was because the unit had indicated that this consultation did not occur. (Table 4.1, Page 63 and NNAP Online)
- Thirty-three (33) units met this standard for 100% of eligible babies admitted while seven units met the standard for fewer than 80% of their eligible babies. (see NNAP Online)
- Two networks (Thames Valley & Wessex ODN (Thames Valley) and Thames Valley & Wessex ODN (Wessex)) had the highest rates of adherence to this audit measure in both 2015 and 2016. (Figure 4.1, Page 63 and NNAP Online)
- Midlands South West ODN performed least well in this audit measure in both 2015 and 2016, however it did improve its adherence to the standard by 8% across those years. (Table 4.2, Page 64 and NNAP Online)

Key recommendations

- **Neonatal units** should review the reasons why timely parental consultations did not occur in their units, asking whether documentation and recording processes describe, on a daily basis, whether or not parents have seen a senior member of staff. They should seek to identify themes among the underlying reasons and put processes in place in order to strengthen their support of parental partnership in care.*
- **Neonatal units** should ensure they have a same day process for the electronic capture of information about parental consultation.
- **Neonatal units** should make use of guidance on parent involvement in their baby's care which is readily available in the Bliss Baby Charter Standards.*
- **Neonatal units** whose adherence to the standard is less than 100% should consider referring to NNAP Online to identify suitable units for comparison to inform local quality improvement for this audit measure.*
- **Neonatal units** should promote the aims and importance of the NNAP with parents by discussing the NNAP booklet "Your Baby's Care" with them and by openly displaying their latest NNAP results for parents in the unit using the poster generation function within NNAP Online.
- **Neonatal units** should ensure that they enter data for the new audit measure on the involvement of parents in ward rounds which was introduced by the NNAP for 2017.
- **Neonatal units** with poor data completeness should be aware that it is likely their underlying adherence to this communication standard is also poor and should therefore develop action plans to improve communication with parents, and how they keep a record of this communication.
- **Neonatal networks** should review the parental consultation rates of units within their network, and offer encouragement and support to lower performing units to enhance parental partnership in care by sharing best practice.*
- **Neonatal networks** should encourage units to identify suitable comparator units with better performance using NNAP Online in order to identify quality improvement opportunities.*
- **The NNAP** should continue to measure adherence to this communication standard (using 12-hour admission duration cut off) in future reports.
- **Parents** who feel they haven't had an early consultation should ask their baby's nurse to arrange one and use such meetings to discuss how they can work in partnership with the neonatal unit staff in their baby's care.

*Recommendations marked with an asterix are repeated from the 2016 annual report on 2015 data

Full 2016 results and tables for consultation with parents are found on pages 62 to 65.

2.5 Encephalopathy

"Encephalopathy" refers to a brain illness causing problems with all the functions of the brain. There are a wide variety of causes of such illness. In babies born at or near term the most common situation is where a baby seems to have got into difficulty during the labour or delivery. Many such babies do well, but hospitals are interested in measuring rates of encephalopathy in order to look for cases in which management of the labour or delivery might have been handled differently.

Key findings

- For the first time the NNAP has published rates of encephalopathy for health boards and trusts in England and Wales* which may be of use in supporting local trust investigation of cases of encephalopathy. (see NNAP Online)

* The Information Services Division of NHS National Services Scotland has offered to provide the required denominator data for Scottish units subject to the NNAP submitting the required confidential release application. Results for Scottish units for this audit measure should therefore be available in the 2017 annual report.

Key recommendations

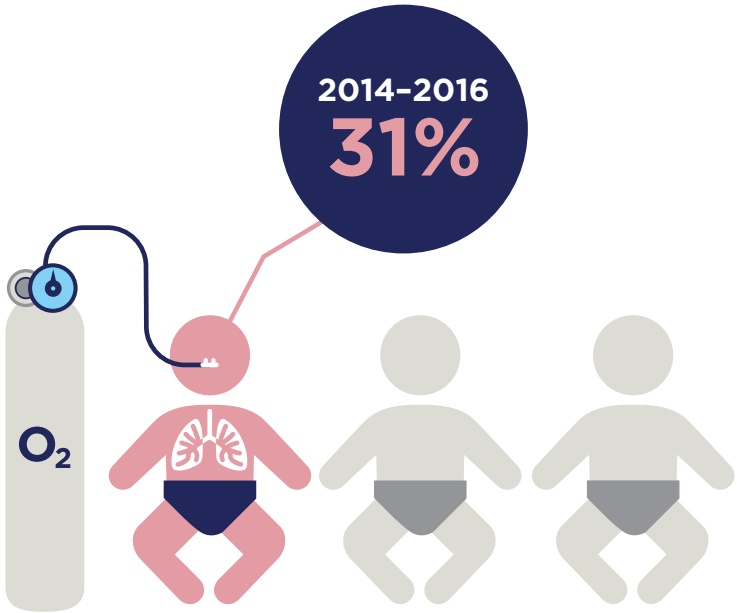
- **Neonatal units** should use a multidisciplinary group including representatives from obstetrics and midwifery to review all cases of encephalopathy identified by NNAP criteria for modifiable factors in accordance with the approach taken in the Royal College of Obstetricians and Gynaecologists' "Each Baby Counts" programme. Local action plans should be developed to address identified modifiable factors.
- **The NNAP** should further develop the denominator data flow for this measure so as to minimise uncertainty in reported rates of encephalopathy.
- **Neonatal units, hospital managers, commissioners, healthcare review bodies and the public** should not use the data from the first three years of this measure to make direct inferences about the quality of obstetric or maternity care delivered in organisations until collaboration with others in the field has developed appropriate case mix adjustment which may explain some of the variation observed in the data.

Full 2016 results and tables for encephalopathy are found on pages 66 to 67.

2.6 Bronchopulmonary dysplasia (BPD)

Bronchopulmonary dysplasia (BPD) is an important complication of preterm birth. First described in 1967, this disease now occurs in babies who survive thanks to modern intensive care. BPD typically results in longer hospital stays, sometimes results in infants needing home oxygen, and may even cause longer term problems with development. While some babies are born with risk factors for developing the disease – such as very low gestation – it is likely that care practices also influence the risk of babies developing BPD. BPD is often studied using operational definitions based on the levels of support clinicians provide to infants at particular ages.

Several such "surveillance definitions" exist for BPD. The NNAP has chosen to report two levels of a well-recognised surveillance definition. Currently collected data do not allow the NNAP to distinguish between "moderate BPD" and "severe BPD" as described by the National Institute for Child Health and Human Development (NICHD), and for this reason, we report "significant BPD", which we define as the occurrence of either of these disease severities.



Key findings

- Thirty-one percent (31%) of all babies born at <32 weeks gestation who were admitted to NNAP units developed significant BPD. (Table 6.1, Page 69)
- Significant BPD occurs more commonly in some neonatal networks than others, with a range of 26% to 39% across all networks. (Table 6.2, Page 70)
- Unit level rates of significant BPD vary greatly, including between units which might expect to have comparable case mixes. However, at present the NNAP is not reporting case mix adjusted BPD rates. (see NNAP Online)

Key recommendations

- **Neonatal units** should consider reviewing their reported rates of significant BPD and use the NNAP online data reporting tool to identify similar units with which to compare themselves and identify potential quality improvement opportunities.*
- **The NNAP** should, when reporting this measure of significant BPD in future, adjust for potential confounding variables such as casemix and mortality, in addition to reporting unadjusted rates in order to promote review of underlying care processes and outcomes at network and unit level.*

*Recommendations marked with an asterix are repeated from the 2016 annual report on 2015 data

Full 2016 results and tables for BPD are found on pages 68 to 71.

2.7 Measuring rates of infection on neonatal units

Infection is a common complication for babies in neonatal units, but can be reduced by careful attention from staff, parents and others to a wide variety of measures. Infections can take a variety of forms – the NNAP concentrates on reporting measures of bloodstream infection because it believes that it can be reliably measured. Infections in babies are important because they can be hazardous, lengthen stay, and may worsen the longer term developmental outlook for affected babies.

Key findings

- The numbers of blood cultures reported to the NNAP has increased (64,798 cultures from 95,325 babies in 2015; 71,627 from 99,849 babies in 2016). (Table 7.3, Page 77)
- There is only a small increase (from 84% in 2015 to 85% in 2016) in the proportion of blood cultures with a result of any description entered into the clinical information system which feeds the NNAP. (Table 7.3, Page 77)
- The completeness of data pertaining to symptoms present at the time a blood culture was taken remains poor, at 55%. (Table 7.3, Page 77)
- Twenty-five (25) neonatal units have provided assurance that 100% of positive blood cultures in their units have been entered into the audit, meaning that these units can meaningfully compare some measures of infection with those of other units with 100% complete data entry. (see NNAP Online)

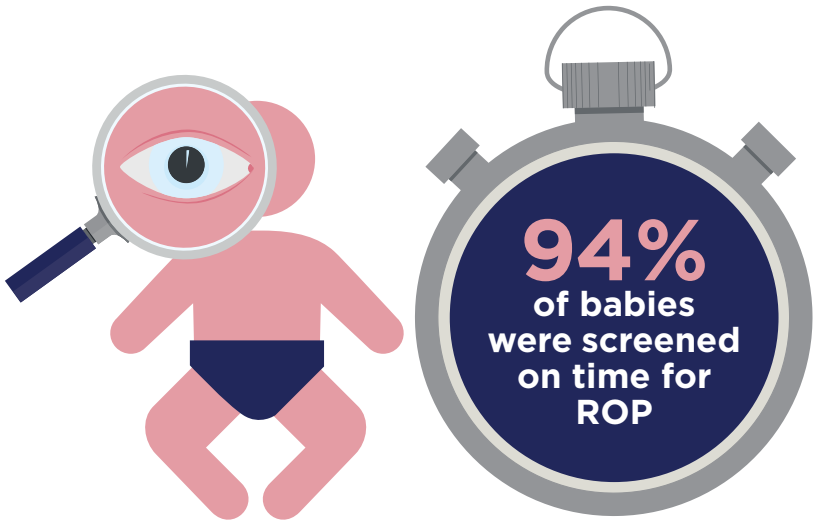
Key recommendations

- **Neonatal units** that have entered all the positive blood cultures for babies in their units should compare their rates of bloodstream infection with "known pathogens" and rates of bloodstream infection with central line use as measured by the clinical reference group (CRG) / NNAP quality improvement surveillance definition of central line associated bloodstream infection (QISDCLABSI) to inform local quality improvement activities.
- **Neonatal units** that have not provided assurance of entry of all positive blood cultures should develop means to do so, based on review of microbiology records and the Badger system.
- **The NNAP** should review the existing definition of bloodstream infection (and CLABSI) with organisms not defined as "known pathogens" in order to make them simpler and more practicable.
- **The NNAP** should seek to achieve linkage between Public Health England Second Generation Surveillance System and the National Neonatal Research Database (NNRD) in order to report meaningful data about bloodstream infection and thus facilitate quality improvement.
- **The NNAP** should consider deferring reporting on measures dependent on data about symptoms and signs contemporaneous with blood cultures until such time as the data are of adequate completeness.

Full 2016 results and tables for prevalence of CLABSI and QISDCLABSI are found on pages 73 to 75.
Full 2016 results and tables for recording of bloodstream and cerebrospinal fluid (CSF) infection are found on pages 76 to 78.

2.8 Retinopathy of prematurity (ROP) screening

Retinopathy, a condition that affects the blood vessels in the back of the eyes, is a complication of prematurity with the potential to result in visual loss or blindness. It has no symptoms, but its complications are largely preventable if babies are screened and treated on time in line with national guidelines.



Key findings

- In 2016, 98.4% of babies had documented screening for retinopathy of prematurity at any time, an increase from 97.5% in 2015. (Table 8.3, Page 83 and NNAP Online).
- ROP screening was conducted on time in 94% of babies, an important improvement on 93% in 2015. In the last 4 years, "on time" screening rates have increased from 87% (2013) which is likely to reflect increased clinical attention being paid to this process. (Table 8.3, Page 83)
- As was the case in 2015, in 2016 one in eight babies had their first ROP screen performed on time, but after discharge. While this contravenes existing RCOphth and RCPCH guidelines, it is clear post discharge first screens can be delivered in the appropriate time frame. (Table 8.1, Page 80)
- Networks vary in the proportion of their babies that receive on time screening for retinopathy of prematurity (88-98%). Wales was the only network in 2016 where less than 90% of babies had on time screening for ROP recorded, despite only moderate levels of incomplete data. However, on time screening in Wales has improved from 86% in 2015 to 88% in 2016. (Figure 8.2, Page 81, Table 8.2, Page 82 and NNAP Online)
- In contrast, the network recording highest levels of screening (Shropshire, Staffordshire and Black Country; 2016: 98%) had much lower recorded screening in the 2015 data (87%), which shows that improvements in recording and/or clinical practice can be made. (Figure 8.2, Page 79, Table 8.2, Page 82 and NNAP Online)
- There is evidence of some units improving ROP screening rates, or documentation of screenings, by significant margins within a single year and evidence of some units having less well documented on time screening in 2016 than in 2015. (see NNAP Online).
- There was no improvement between 2015 and 2016 in the number of units that achieved 100% on time ROP screening (38/156 (24%) in 2015; 39/181 (22%) in 2016). (see NNAP Online).

Key recommendations

- **Neonatal units** should strive to achieve the standard of 100% "on time" screening for ROP for all eligible babies. Where this does not occur due to late or absent screening, units should, as part of a formal local risk incident investigation, formally review their clinical, organisational and administrative pathways in discussion with their ophthalmology colleagues and put in place local targeted action plans for improvement.*
- **Neonatal units** identified as low outliers should review their clinical, organisational and administrative pathways with the aim of documenting comprehensive ROP screening in collaboration with their ophthalmology colleagues.*
- **Neonatal units** with multiple missed ROP screening cases should use the NNAP Online data reporting tool to find units with which to compare themselves in order to identify quality improvement opportunities.*
- **Neonatal units** should clearly describe to parents the need for ROP screening using an individualised written resource which sets out for the parents the anticipated date of first screening for their baby. This communication should take place prior to the opening of the screening window, but after the first week of life.*
- **Neonatal units** should note the higher proportion of missed ROP screens among infants born after 32 weeks, and weighing less than 1501g at birth, and ensure their clinical and administrative processes provide for effective screening of this group.
- **Neonatal networks** should regularly review their units' adherence to ROP screening guidance, and consider supporting units in conducting quality improvement and education activities, especially where poor performance is repeated.*
- **Commissioners and neonatal networks** should work together to ensure that sufficient trained personnel are available to perform ROP screening in neonatal units.*
- **Commissioners** should consider using contractual mechanisms and key performance indicators (KPIs) to encourage trusts to ensure comprehensive screening for ROP is conducted and sustained.*
- **The NNAP** should maintain continued surveillance of delivery of ROP screening in 2018 and beyond.
- **Parents** should talk to neonatal unit staff and find out whether ROP screening might be needed for their baby. If it is, they should also find out when their baby's screening might be due. If their baby is due to be screened after being discharged from the unit, parents should make every effort to attend the appointment.
- **Guideline developers** should take the successful deployment of on time post discharge screening into account when describing appropriate clinical practice for ROP screening.

*Recommendations marked with an asterix are repeated from the 2016 annual report on 2015 data

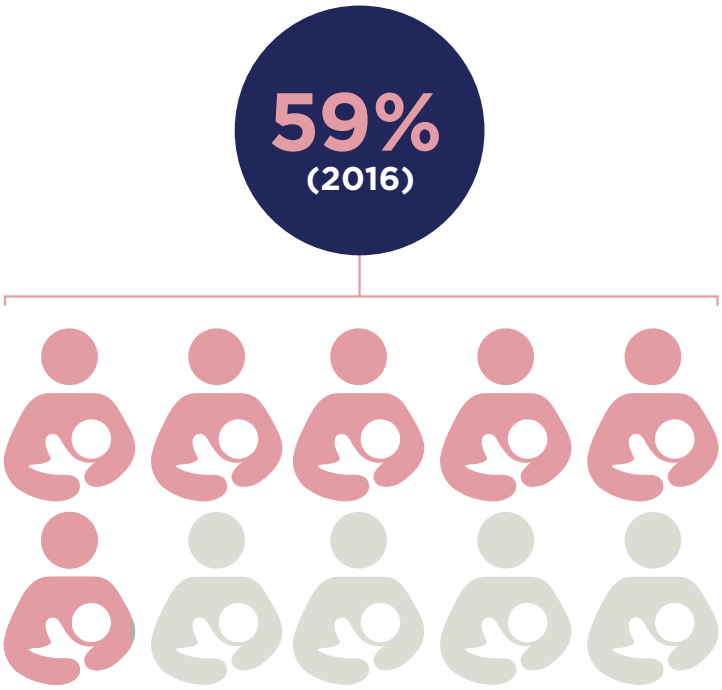
Full 2016 results and tables for ROP screening are found on pages 79 to 83.

2.9 Mother's milk at discharge

Premature babies are especially vulnerable to infection, and their own mother's milk provides an important line of defence through the protective antibodies that it provides. These significant health benefits include a reduction in infection and bowel problems, as well as improved longer-term health and neurodevelopmental outcomes.

Key findings

- There has been no improvement in the overall rates of breastmilk feeding for babies born at <33 weeks gestation and the rate has remained broadly stable over time (from 58-60% between 2012 and 2015 to 59% in 2016). (Table 9.3, Page 87)
- Considerable geographical variation persists between different parts of the country. (Table 9.2, Page 86 and NNAP Online)



Key recommendations

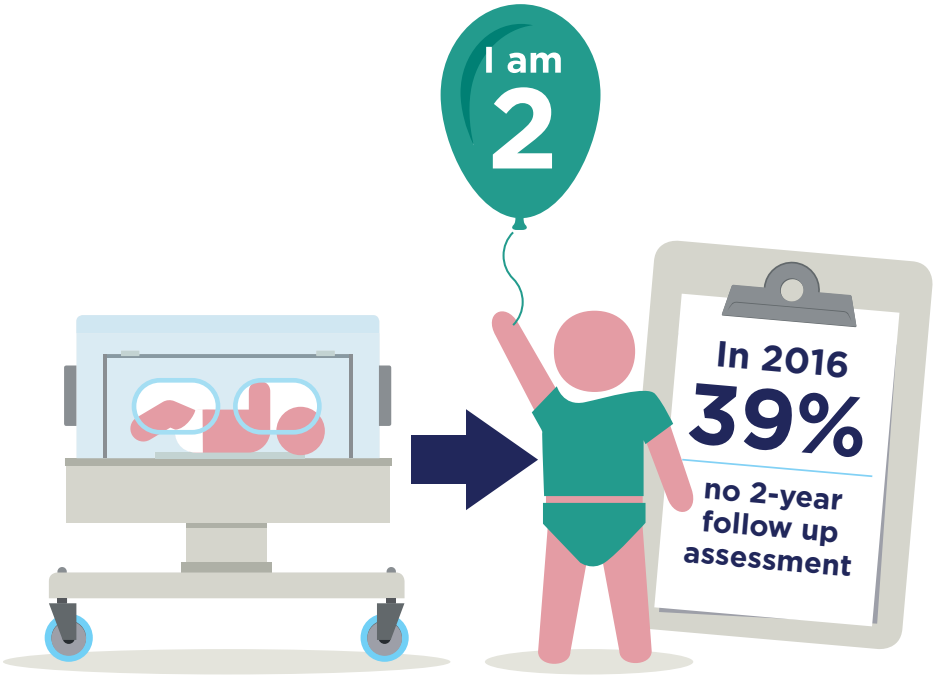
- **Neonatal and midwifery staff** should, as part of active use of a multidisciplinary policy, inform parents before delivery of a preterm baby of the major health benefits of breastmilk feeding for preterm babies and advocate breastmilk feeding. Staff should provide information and support about the practical aspects of breastmilk expression prior to, and after, delivery of the baby in order to help mothers of preterm infants to breastfeed.
- **Neonatal units** should use breastmilk feeding data, alongside available data concerning breastfeeding practices in full term babies in their local area, to inform local quality improvement activity.
- **Neonatal units** should aim to deliver sustainable sequential improvements in breastmilk feeding at discharge by adopting best practice and regularly reviewing its implementation.
- **Neonatal networks and units** should use the NNAP online data reporting tool to compare their performance and its trajectory over time to that of suitable comparable networks.*
- **Neonatal networks** should consider whether standardising aspects of support for breastmilk feeding across units would improve parental experience, particularly where babies are transferred.
- **Neonatal units, hospitals, neonatal networks and outside bodies** should interpret the breast milk feeding at discharge rates of individual units alongside data describing breastfeeding in the population local to that unit.
- **The National Maternity and Perinatal Audit** (**NMPA**) **and the NNAP** should align any future work concerning breastmilk feeding.
- **The NNAP** should consider longitudinal outlier analysis to identify networks or units whose trajectory is different to that of other networks or units.
- **The NNAP** should consider including the transferred baby in this measure.*

*Recommendations marked with an asterix are repeated from the 2016 annual report on 2015 data

Full 2016 results and tables for mother's milk at discharge are found on pages 84 to 87.

2.10 Clinical follow up at 2 years of age

It is important that the development of very preterm babies who were admitted to a neonatal unit is monitored by a paediatrician or neonatologist after discharge from the neonatal unit. Babies born prematurely do not always reach key developmental milestones so these checks at age two provide a valuable opportunity to identify any potential issues at an early stage.



Key findings

- For 39% of babies, no two year follow up health data were reported to the NNAP at all. This figure has improved by only 0.8% since 2015, despite both a relevant active CQUIN in England, and the emphasis given by NHS England to this measure in 2016. (Table 10.1, Page 90 and NNAP Online).
- Only nine units reported two year follow up health data of 100% of babies discharged home from their unit. The fact that complete follow up occurs in so few units demonstrates the challenges facing clinicians, neonatal networks, commissioners and families in order to better understand the consequences of preterm birth. (see NNAP Online).
- Some networks have greatly improved their performance (Wales: 31% in 2015; 59.5% in 2016), but others have shown a decline in performance (Thames Valley Wessex: 85% in 2015; 76% in 2016). (Figure 10.3, Page 92 and NNAP Online)

Key recommendations

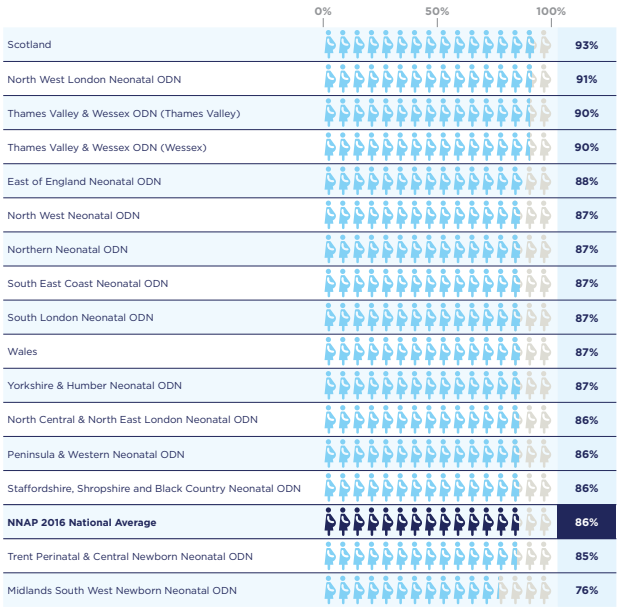
- **Neonatal units** with incomplete data capture should develop specific plans to improve documented follow up of babies born at <30 weeks gestation.*
- **Neonatal medical staff** should discuss the indications and arrangements for two year follow up with families in the period leading up to the discharge home of their baby, and support this communication with written information which details the expected timeframe for the two year follow up consultation.*
- **Neonatal networks** should use the NNAP Online reporting tool to identify networks or units that have, as suggested by their higher results, better procedures or practices, and support their units to deliver and record follow up with higher levels of completeness in line with learning applied from best practice examples.*
- **NHS England commissioners, and their equivalents in Scotland and Wales**, should use contractual means such as key performance indicators (KPIs) to encourage networks and units to deliver this key aspect of follow up care more effectively.*
- **The NNAP** should consider whether forthcoming NICE guidance about developmental follow up of preterm babies can be subject to audit by the NNAP.*
- **Parents** should ensure that they support the follow up of their preterm infants by attending appointments or engaging in alternative arrangements in the event that follow up becomes impractical, for example in situations where families move house at some distance from the discharging unit.

*Recommendations marked with an asterix are repeated from the 2016 annual report on 2015 data

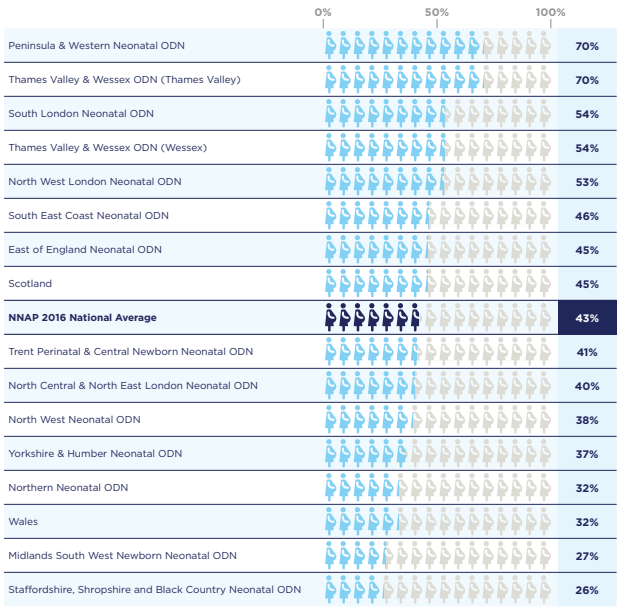
Full 2016 results and tables for clinical follow up at 2 years of age are found on pages 88 to 97.

2.11 Neonatal network key findings

Antenatal steroids: Percentage of mothers who delivered their babies between 24 and 34 weeks gestation and received any dose of antenatal steroids.

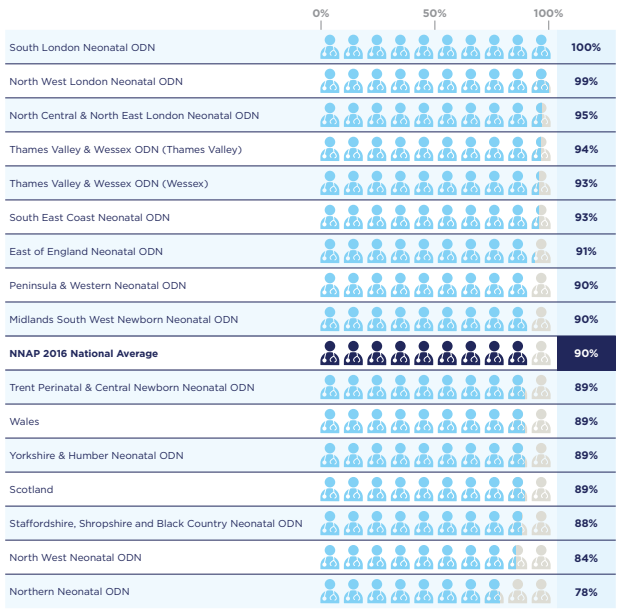


Magnesium sulphate: Percentage of mothers who delivered their babies at less than 30 weeks gestation and received Magnesium sulphate 24 hours prior to delivery.



Temperature within range: Percentage of babies born at less than 32 weeks gestation admitted with a recorded temperature within the recommended range of 36.5°C –37.5°C.

Consultation with parents: Percentage of parents that had a documented consultation with a senior member of the neonatal team within 24 hours of their babies' admission.



Bronchopulmonary dysplasia (BPD): Rates of significant bronchopulmonary dysplasia in babies born at less than 32 weeks gestation and discharged between 1 January 2014 and 31 December 2016.

Retinopathy of prematurity (ROP) screening: Rates of on time screening for ROP for babies with a birthweight of less than 1,501g or a gestation at birth of less than 32 weeks.

Mother's milk at discharge: Percentage of babies born at less than 33 weeks gestation receiving any of their own mother's milk at the point of discharge home from the neonatal unit.

Two year follow-up: Percentage of babies born at less than 30 weeks gestation between July 2013 and June 2014 for whom clinical follow up data was recorded at 2 years of age.

3. Case studies

Two case studies are presented which highlight examples of how neonatal units have used their NNAP results as a basis for identifying and undertaking local quality improvement activities. The third case study relates to a new function within NNAP Online which will allow neonatal units to generate posters displaying their NNAP results.

3.1 Case study one

Using quality improvement methodology to reduce central line associated blood stream infections

Presented by: Dr Colin Peters, Consultant Neonatologist, Royal Hospital for Children, Glasgow

Background: The neonatal unit of the Royal Hospital for Children in Glasgow was formed in 2015 by the merger of the Royal Hospital for Sick Children (Yorkhill) and the Southern General Hospital (SGH) neonatal units on the site of the latter. It consists of 50 beds and provides tertiary level care including surgery, neurosurgery and all neonatal cardiac and ECMO services for Scotland. The unit is part of the West of Scotland Managed Clinical Network and has been contributing to NNAP data since 2015.

Processes that were in place before 2016

Since 2013 the unit has participated in the Scottish Patient Safety programme. The Maternal & Children's Quality Improvement Collaborative (MCQIC) arm of the programme has supported units in using quality improvement methodology to reduce harm. This has included education in QI methods, sharing of practices between Scottish neonatal units, advice from improvement advisors as well as provision of a spreadsheet toolkit for data collection and analysis. We worked with the programme to reduce harm from central line associated blood stream infection (CLABSI) amongst several other strands of work.

When data was first collected in April 2014 on the SGH site, there was an average of 101 line days per month. The median CLABSI rate per month was 9.46 per 1000 line days over the first 12 months during which testing improvements were ongoing. This is based on the NNAP measure of proportion of babies with positive blood culture after 72 hours of age when central line present, standardised to a rate per 1000 catheter days. After merging units the number of line days increased to 409 per month.

What we did

Standardising process

Central line insertion and maintenance bundles were used to standardise processes. Key elements of insertion included:

Figure 1: Elements of a central line insertion training package highlighting hand washing, use of hat, mask, gown & surgical gloves.

- ✓ Two person technique
- ✓ Use of hat, mask, gown & gloves
- ✓ Use of appropriate cleaning solution
- ✓ Securing with a standard technique and documentation of line tip position
- ✓ An auditable checklist was developed for the assistant and a sticker developed for documentation. These were used for both umbilical and percutaneous (PICC) catheters Lines inserted in theatre did not use an insertion checklist

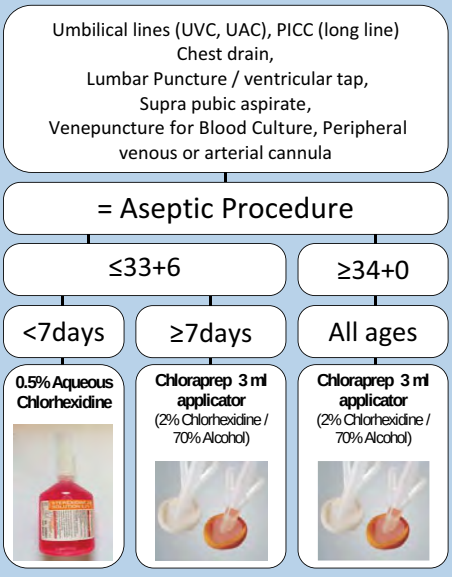


Figure 2: Skin Antisepsis Version 7

Early testing indicated the need for clarity around cleaning solution. Agreement was reached between clinicians and the local Infection Prevention Team to use 0.5% Chlorhexidine for babies born <34 weeks in the first 7 days of life.

In all other circumstances 2% Chlorhexidine in 70% alcohol would be used. Using multiple Plan, Do, Study, Act (PDSA) cycles an A4 poster was developed (Figure 2) and placed around the unit.

Key elements of the maintenance bundle included daily review of the need to keep the line in situ, the use of needle free adaptors on all ports which were changed every 3 days, dressing change unless clean and secure and appropriate hygiene before accessing the port. The latter currently consists of hand washing and the use of sterile gloves.

Tests of change

Whilst compliance with insertion and maintenance bundles appeared to be relatively good there was no improvement in CLABSI rates. In response to this, the combined checklist and audit forms were considered in detail in May 2016. This revealed that the checkbox relating to the "appropriate cleaning solution" was often given a positive response by the assistant but in effect the lower strength cleaning solution was being used in cases where 2% chlorhexidine and alcohol was expected. This afforded an opportunity for further tests of change. An updated education package was developed

for new registrars with some success but it is well recognised that education of the current workforce, especially when many only work in the neonatal unit for six months, will not necessarily lead to long term sustained improvement. A physical change was required and as such all cleaning solutions of 0.5% Chlorhexidine were labelled with details of babies in whom it's use is appropriate and the word "WEAK" in bold (Figure 3). This design was settled upon after testing different options. We then saw our compliance with the process measure of appropriate skin cleansing increase to 88% from 44%. Overall compliance shown in the run chart below represents the percentage of babies in who all elements of the bundle were complied with.

Alongside work on insertion, the nursing team focused on the regular changing of smart sites, promoting asepsis when accessing lines and ward round review of the need for central access, aiming to remove lines when babies reach 120ml/kg/day of enteral feeds where there are no complicating factors e.g. surgery.

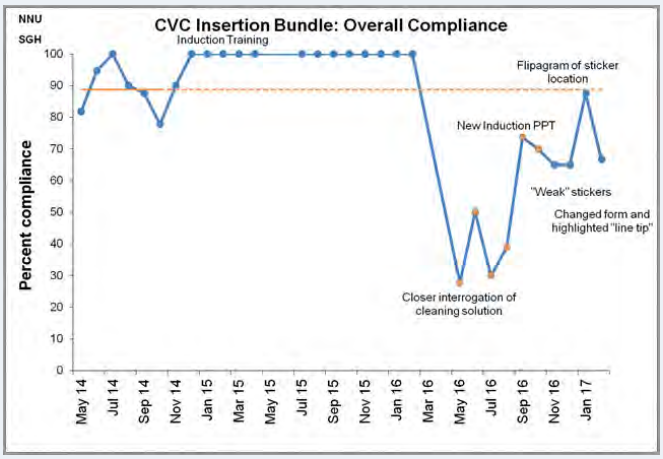
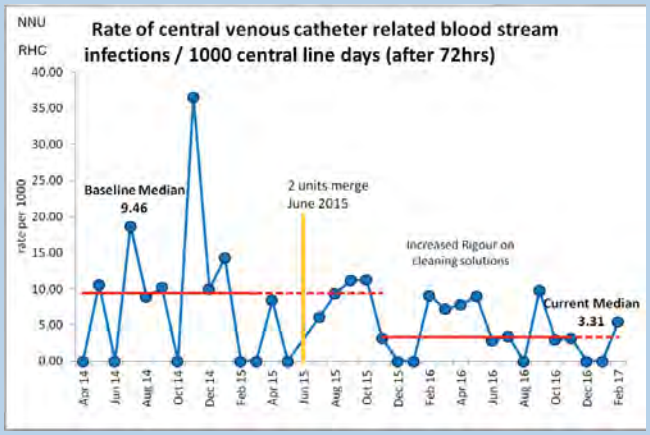


Figure 3: 0.5% Chlorhexidine labelled with agreed patient characteristics

What we achieved

Sustained improvement

From November 2015 there has been sustained improvement, with 13 consecutive months on or below the baseline median of 9.46. Compliance fell because we (the QI team) measured raw data to obtain a correct measure of compliance rather than the observers interpretation of the compliance question.



The new baseline of 3.31 CLABSI per 1000 line days per month represents a 65% reduction in the median. Work is ongoing to further reduce this rate with the introduction of a new SPSP central line bundle in May 2017.

Acknowledgements
Dr Dhulipala Anand was instrumental in introducing the original central line bundle in RHSC (Yorkhill), Dr Sumaiya Cassim diligently analysed audit forms and SN Natalie Houston has led the improvements in central line maintenance. Their time and efforts are much appreciated.

3.2 Case study two

Improvements to 2 year follow up assessments for at risk neonates in a district general hospital setting: meeting metrics vs improving quality of assessments

Presented by: Dr Sankara Narayanan (Consultant Neonatologist & NNAP lead)
Dr Nazakat Merchant (Consultant Neonatologist & Lead for High Risk Neonatal Follow-up Programme), Sarah Beasley (Paediatric Physiotherapist), Bhavani Sivakumar (Badgernet data analyst) Pauline Southernwood (Clinic coordinator)

Background: Woodland Neonatal Unit at Watford General Hospital, West Hertfordshire NHS Trust caters for up to 1200 admissions per year. It is one of the busiest level 2 units within the East of England Neonatal Network. The unit has contributed data to the NNAP since its inception in 2007. Completion of two year outcome assessment forms for babies born less than 30 weeks gestation was less than satisfactory (≤80%) in 2013/2014. Moreover, none of this cohort of babies had a formal neurodevelopmental assessment. In this case study, we demonstrate how we have used NNAP 2 year follow up data benchmarks to guide our quality improvement project. We show how we improved data completion rates while at the same time increasing the proportion of babies who had a formal developmental assessment.

What we did

We arranged for brainstorming sessions between all relevant stakeholders to identify key areas for improvement and discussed potential solutions (Figure 2). The team considered providing home visits as a regular service but due to staff working patterns and constraints we were only able to provide that for two patients (at parent's request). A specialist clinic was set up to improve compliance. The team included a neonatologist, physiotherapist and a clinic coordinator. Eligible infants born at <30 weeks were prioritised. Appointments were given on discharge and reminders & alerts were set up for 18-30 months range. Bayley Scales of Infant & Toddler Development III (BSID) were used for the assessments. A BadgerNet data analyst was appointed to facilitate real time data monitoring which allowed zero latency feedback to the lead consultant.

Figure 1: Testing neuromotor skills at two year BSID assessment

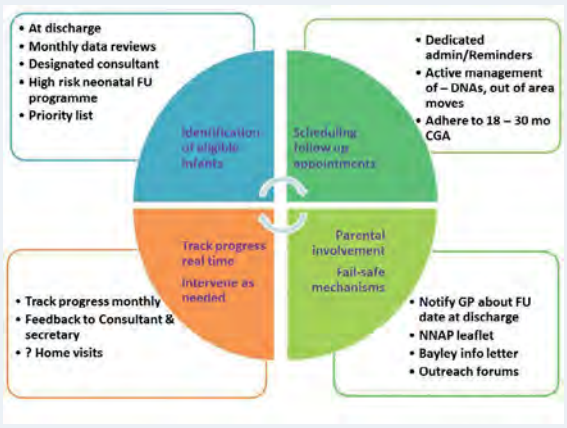


Figure 2: Key issues/solutions that emerged during brainstorming sessions

What we achieved

Table 1 shows steady improvement from 2013 to 2017 in the results for the NNAP audit measure of 2-year health status follow-up completion. There was a small decline in 2016 as 2 babies were seen outside the 18-30 months' target. Table 2 shows that BSID assessments increased from 0 in 2013 to 75% in 2017. DNA rates increased initially in 2015 on introduction of the Bayley Assessment Clinic but using iterative PDSA cycles this was brought down to 6% in 2017.

Table 1: 2 year neurodevelopmental follow up assessment over the years 2013-17

	Level 2 – Neonatal Unit		
	Eligible babies	**2-year assessment form completed***	**2-year health data completed**
2013	16	11 (69%)	11/11 (69%)
2014	25	20 (80%)	17/25 (68%)
2015	29	29 (100%)	29/29 (100%)
2016	19	17 (89%)	9/19 (47%)
2017 (to May 2017)	20	20 (100%)	15/20 (75%)

*The results in this column include babies for whom any data was entered, not only health data i.e. "Not assessed for other reason" and "Lost to follow up".

Table 2: Bayley assessment clinic attendance and DNA rates: 2013-17

	Eligible babies	**Bayley assessment**	**DNA (Bayley clinic)**	**Died**	**Moved out of area**
2013	16	0/16 (0%)	N/A	0	0
2014	25	0/25 (0%)	N/A	0	3
2015	29	9/29 (31%)	17/29 (58%)	0	3
2016	19	8/19 (42%)	3/19 (15%)	1	7
2017 (to May 2017)	20	15/20 (75%)	1/20 (5%)	0	4

Parental feedback was obtained through an anonymous questionnaire at the end of each clinic appointment which asked about pre-clinic communication, in clinic experience, parent understanding of process and communication of BSID outcomes; parents rated the service as 'very good' (5.5/6 on Likert scale).

Suggestions for adaptation for other units:

- ✓ Engage all key stakeholders when discussing NNAP report findings
- ✓ Dedicate resources towards clinic administration/data entry and feedback
- ✓ Multidisciplinary set up ideal for Bayley clinics
- ✓ Active clinic management to reduce DNA rates
- ✓ Set up avenues for user (parent) feedback

Feedback to NNAP:

Patients who move out of area pose a unique challenge for completion of two year outcome assessments and influence outcome data. We would suggest that NNAP/BadgerNet develop mechanisms to allow reassignment of patients to units closer to their home.

Acknowledgements

Mr and Mrs Martin, for sharing a picture of Issac's Bayley assessment.

N.B The RCPCH has secured permissions for the use of imagery within this case study.

3.3 Case study three

A new strategy for communicating the aims and outputs of the NNAP effectively to parents and families

Presented by: Dr Sam Oddie, NNAP Clinical Lead, Ellen Hallsworth and Patrick Tully, NNAP Project Board Parent Representatives, Wendy Hodgson, Service Development Lead, Neonatal Educator, University Hospitals of Morecambe Bay NHS Foundation Trust, Gina Outram, Lead Sister, Neonatal Unit, Royal Berkshire NHS Foundation Trust, Zoe Chivers - Head of Services, Bliss RCPCH NNAP Project Team

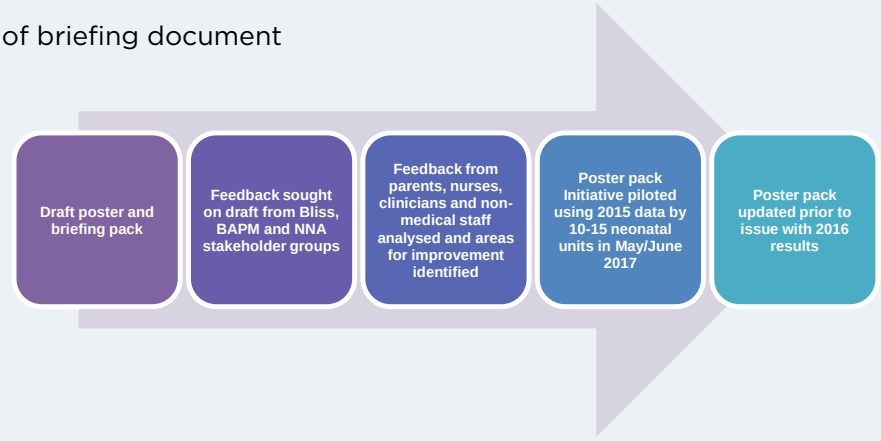
Background: The clear aim of the NNAP is to help facilitate and drive up national standards of neonatal care. In 2015, a noticeable gap was identified in regards to the communication between neonatal unit staff and parents about the aims and functions of the NNAP which was impeding the involvement of parents in driving up standards. Parent representatives, nurses and network managers were recruited to form a working group to help find a solution to plug this gap and encourage an increase in engagement.
The identified solution included the adoption of infographics and results into unit-specific posters as a means of easily highlighting NNAP results and a revision of the style and content of the NNAP parent and carers report, "Your baby's care".

Purpose of the initiative

- ✓ Better informed parents feel more involved in their baby's care
- ✓ Recognise it's not for all parents
- ✓ Provide the opportunity to demonstrate the good work units are doing in quality improvement
- ✓ Broaden the focus of NNAP from clinical improvement to encompass the patient experience
- ✓ Better informed nurses who feel more empowered to discuss NNAP with parents and gain more insight into the parent experience
- ✓ Utilise the poster to display local data against national targets and list interventions to improve local results
- ✓ Opportunity to share good practice within the neonatal community via the RCPCH website and act as drivers for quality improvement with the involvement of clinicians, nurses and parents

What we did

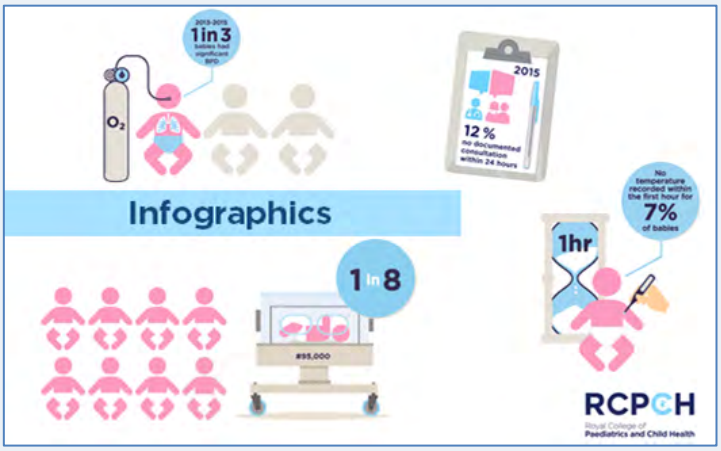
Development of briefing document



The working group developed a briefing document that set out the purpose of the initiative from a clinician, nurse and parent perspective. Key stakeholders Bliss and BAPM provided valuable support for the project. The briefing document included examples of the poster that shows individual audit results and a second poster that allows the unit to indicate how they have responded to their NNAP results and describe their successes and service improvements. The briefing document also suggested ways in which neonatal unit staff might introduce parents to the NNAP 'Your babies care' booklet.

Development of the posters

The infographics used within the national report were also used to create poster one. The graphics were used to clearly communicate the local results in comparison to the national average. Poster two was created in order for units to respond to their results as displayed in poster one. Both posters were available to download and print from the NNAP Online platform.



Consultation phase

The poster and briefing document were shared for consultation with nursing and parent stakeholder groups in order to capture feedback and identify areas requiring improvement. Members of the working group shared the initiative with delegates that attended the national NNAP/NDAU Collaborators meeting in April 2017.

Pilot phase

Feedback received from the consultation phase and collaborators meeting were used to refine the posters and briefing document. Twenty units from different levels of neonatal unit volunteered to pilot the initiative for one month during the summer. Each pilot unit received A3 size colour posters, electronic copies of the briefing document and an evaluation form to be submitted to the project team to help inform an effective national roll-out of the poster initiative to all participant neonatal units.

Pilot feedback from unit staff regarding their views on the value of the poster initiative

"Yes. It is a good means of communicating with them and families were pleased for this to be shared with them".

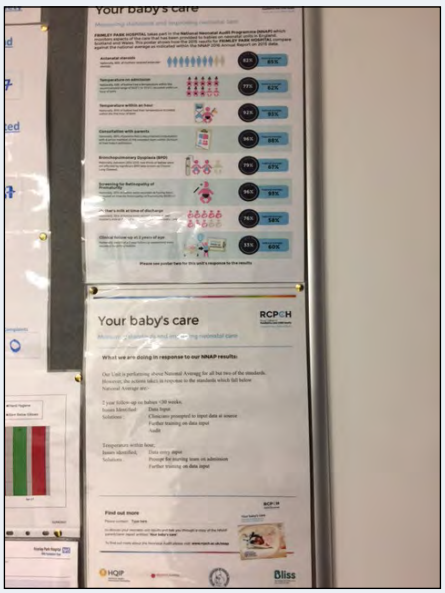
"Yes, publishing unit specific data is very useful as parents are aware of variations across the country and are very interested in how their local unit is performing".

"Yes. I believe the poster is more eye catching and instant than the leaflets. Also reinforces the leaflets for parents who wish to take an interest".

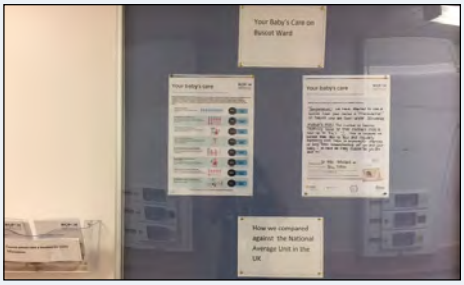
"Very much so – it's been a tremendous help. I have struggled to develop unit posters of any quality so far and realise it would be a huge challenge to do so every year. We will probably update our posters 6 monthly if possible".

A selection of images provided by some of the volunteer units that piloted the posters

Royal Hospital for Children, Scotland displaying their posters.



Frimley park Hospital unit staff displaying their posters.



Royal Berkshire Hospital displaying their posters alongside copies of 'Your baby's care'.

Poole hospital displaying their poster

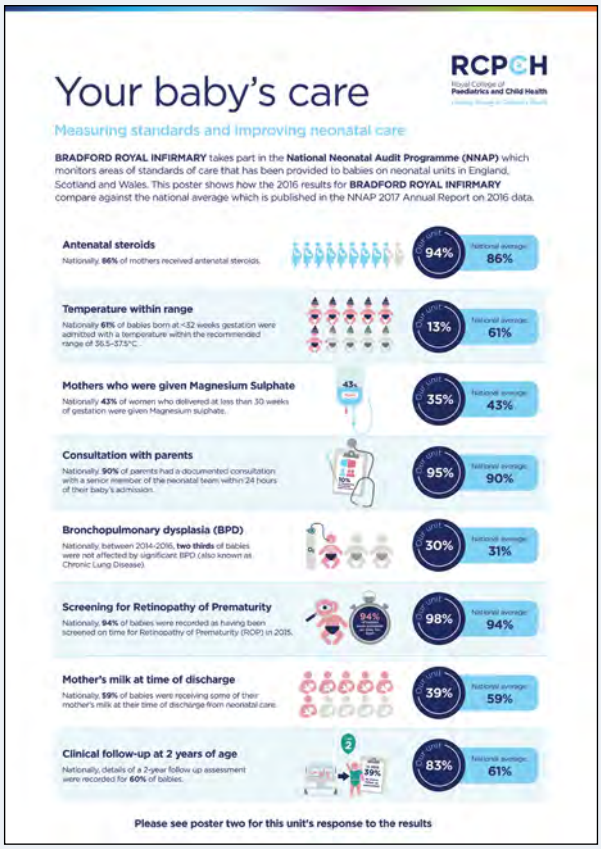
New Cross Hospital displaying their posters alongside copies of 'Your baby's care'.

What we achieved

By undertaking extensive consultation with key stakeholders the unit level poster initiative will be rolled out with 2016 results alongside copies of the NNAP parent and carer report, 'Your baby's care', to all audit participant neonatal units in NNAP Online alongside the launch of the annual report.

We would like to thank all those involved with the development and piloting of the poster quality improvement initiative and we hope that it will be successful in facilitating the sharing of best practice ideas amongst neonatal units. Based on the positive feedback received from units that took part in the pilot we would like to offer units the opportunity to share with us how they have implemented the display of their unit-specific NNAP posters and how they have used them to demonstrate and respond to their NNAP results.

Units are encouraged to submit pictures of their display area, with a focus on how they set out poster two, by sending them to the NNAP project team at: nnap@rcpch.ac.uk and indicate whether they are happy for us to share them with other units via the NNAP website and at NNAP events such as the annual Collaborators' meeting. The NNAP project team will conduct an evaluation of the use of the poster initiative at the end of 2017.



*The results displayed in this poster are shown for illustrative purposes only, they do not necessarily represent the confirmed results for this unit

4. Full 2016 unit, network, national and year on year results

4.1 NNAP audit measures

The NNAP has a clear process for identifying new audit measures and revising existing measures. The NNAP Methodology and Dataset Group (M&DG) reviews all related professionally developed guidance and standards relating to key areas of neonatal care and considers whether the audit measure is clinically relevant, the opportunities that it offers for quality improvement, how the results of analysis be reported and whether the audit measure will be subject to outlier analysis.

The NNAP M&DG has representation from the key patient and professional bodies involved in neonatal care and submits proposals for changes to the NNAP audit measures to the NNAP Project Board for review and approval. The NNAP Project Board makes a decision on any changes at its autumn meeting so that participating NNAP units and networks can be made aware of any changes by the end of October in time for the start of data entry at the beginning of the following calendar year.

The 2016 NNAP audit measures were:

- Are all mothers who deliver babies between 24 and 34 weeks gestation inclusive given any dose of antenatal steroids?
- Are mothers who deliver babies below 30 weeks gestation given magnesium sulphate in the 24 hours prior to delivery?
- Do all babies < 32 weeks gestation have their temperature taken within an hour after birth?
- Is there a documented consultation with parents by a senior member of the neonatal team within 24 hours of admission?
- How many babies born > 34 weeks gestation have an encephalopathy within the first three full calendar days after birth?
- What is the proportion of babies born <32 weeks who develop bronchopulmonary dysplasia?
- How many blood stream infections are there on a NNU per 1000 days of central line care?
- How many babies experienced bloodstream infection on a NNU per 1000 days of central line care?
- What percentage of babies admitted to a neonatal unit have:
  a) one or more episodes of a pure growth of a pathogen from blood
  b) one or more episodes of a pure growth of a pathogen from CSF
  c) either a pure growth of a skin commensal or a mixed growth with ≥3 clinical signs at the time of blood sampling
- Do all babies < 1501g or a gestational age of < 32 weeks at birth undergo the first retinopathy of prematurity (ROP) screening in accordance with the current guideline recommendations?
- What proportion of babies of <33 weeks gestation at birth are receiving any of their mother's milk when discharged from a neonatal unit?
- Are rates of normal survival at two years comparable in similar babies from similar neonatal units?

4.2 Data completeness

For the 2016 data, quarterly reports were produced by the NNAP project team and disseminated to all neonatal unit NNAP clinical leads in order to provide regular updates on their data completeness and adherence to the NNAP standards. All NNUs were provided with a summary report of their 2016 data in mid-February 2017 after which they were given a final six week window of opportunity to review and amend their 2016 data on the Badger system. The final 2016 data download for this report was extracted from Badger after the reviewing process had closed at the end of March 2017.

4.3 Data analysis

The 2016 download included data on care provided for 99,849 babies discharged in 2016. The number of babies eligible for each audit question varies depending on the gestational age covered by the question and the episode of care under consideration.

In addition, numerators may vary from figures extracted locally; for example, in the analysis of the consultation with parents audit measure, some babies born, first admitted and discharged in 2016 may not appear in the analysis because the baby had a subsequent episode which continued into 2017. By the same reasoning, there are some episodes which finished during 2015 that were used for the 2016 data analysis. The NDAU conducts NNAP analyses using the age of the baby in minutes from birth, as opposed to calendar days, for reasons relating to patient anonymity. This can result in minor variations in the numerators for age critical fields, such as the timing of ROP screening.

4.4 Neonatal unit designations

The NNAP asks neonatal units and networks to let the project team know if their unit designation changes at any time. The Department of Health (2009) *Toolkit for High Quality Neonatal Services* defined the different levels of neonatal unit as follows:

- Special care units (SCUs) provide special care for their own local population. Depending on arrangements within their neonatal network, they may also provide some high dependency services. In addition, SCUs provide a stabilisation facility for babies who need to be transferred to a neonatal intensive care unit (NICU) for intensive or high dependency care, and they also receive transfers from other network units for continuing special care.

- Local neonatal units (LNUs) provide neonatal care for their own catchment population, except for the sickest babies. They provide all categories of neonatal care, but they transfer babies who require complex or longer-term intensive care to a NICU, as they are not staffed to provide longer-term intensive care. The majority of babies over 27 weeks of gestation will usually receive their full care, including short periods of intensive care, within their LNU. Some networks have agreed variations on this policy, due to local requirements. Some LNUs provide high dependency care and short periods of intensive care for their network population. LNUs may receive transfers from other neonatal services in the network, if these fall within their agreed work pattern.

- Neonatal intensive care units (NICUs) are sited alongside specialist obstetric and feto-maternal medicine services, and provide the whole range of medical neonatal care for their local population, along with additional care for babies and their families referred from the neonatal network. Many NICUs in England are co-located with neonatal surgery services and other specialised services. Medical staff in a NICU should have no clinical responsibilities outside the neonatal and maternity services."

4.5 Note on Scotland network data presented in this report

This is the second year that Scottish data have been included in the NNAP reports with 12 out of 15 Scottish neonatal units having contributed 2016 data, an increase from 8 in 2015. A further unit started to enter data in 2017 and it is anticipated that information systems will be in place within the final two units in time for them to start contributing data from the start of 2018.

The data for Scotland are presented as a single network, combining data from the three existing managed clinical networks. The Scottish Neonatal Consultants Group and Inter Regional Data Group have agreed this approach which is in line with the recommendations for a single network in the 2017 report "The Best Start: A Five-Year Forward Plan for Maternity and Neonatal Care in Scotland".

Information regarding two-year follow-up data in Scotland is presented in the 2016 report for the first time, one year ahead of the anticipated schedule. Health boards across Scotland work with the Scottish Patient Safety Programme and the Maternity and Children Quality Improvement Collaborative (MCQIC) to optimise the outcomes for infants in Scottish neonatal units; their work includes some of the process and outcome measures within the NNAP.

4.6 Outlier analysis

Reporting at a unit level is part of a transparency process, designed so that best practice can be identified and shared and the quality of care improved. There will inevitably be a small number of units whose results show them as outliers for specific measures (i.e. results are shown to be outside the expected range).

However, it is crucial all stakeholders and organisations understand that while units could have outlying results, this does not automatically mean there are performance issues. There are a number of other factors which should be considered:

- Data may have been entered incorrectly or simply be missing for a particular measure. Therefore ensuring that data are entered completely and accurately is key.
- There may be an unusual or complex patient casemix, which cannot be adjusted for risk or performance issues.

Where verified results do show units to be outlying for specific processes, this should be seen as the beginning of a quality improvement process.

The four NNAP audit measures for which outlier analysis on 2016 NNAP data were undertaken are:

- Are all mothers who deliver babies between 24 and 34 weeks gestation inclusive given any dose of antenatal steroids?
- The percentage of babies born at less than 32 weeks with a temperature between 36.5˚–37.5˚C recorded within an hour of birth.
- The percentage of babies born at <1501g or a gestational age of <32 weeks at birth who underwent the first retinopathy of prematurity (ROP) screening in accordance with the current guideline recommendations.
- The percentage of babies for whom there was a documented consultation with parents by a senior member of the neonatal team within 24 hours of admission.

To be eligible for inclusion in the 2016 data outlier analysis for the above four audit measures a unit had to have entered data for the full calendar year of 2016. The full methodology and results for the 2016 data outlier analysis are available online via the NNAP website: www.rcpch.ac.uk/nnap.

4.7 Full 2016 results

The following section provides results of the full analysis of 2016 NNAP data, covering unit level, network level and national level results as well as results across audit years.

"NNAP Online" is the reporting tool for the audit which is available via the NNAP web pages at: www.rcpch.ac.uk/nnap It provides an opportunity to view and compare the NNAP results at a unit, network and national level in an interactive and customisable manner. This includes the ability to identify and compare specific unit and network performance on the caterpillar and outlier funnel plots for different NNAP audit measures.

The caterpillar plots that are shown in the following pages are therefore static images of the plots that are available in NNAP Online and, in the case of the unit level caterpillar plots in particular, they are included to highlight the variance of performance against the audit measures. It is only by viewing them in NNAP Online that it will be possible to identify where individual networks and units appear on the plots.

Please note that the number of units referred to in the figures that follow showing caterpillar plots of unit level results for NNAP audit measures may be slightly lower than the number of units described in the tables that precede them. That is due to the fact that in order to be included in the analysis for the production of the caterpillar and outlier funnel plots for a particular audit measure units had to meet the criteria of having entered data across the full calendar year of 1 January to 31 December 2016.

Antenatal steroids

Full key findings and recommendations for this audit measure can be found on pages 14 to 15.

NNAP audit measure: Are all mothers who deliver babies between 24 and 34 weeks gestation inclusive given any dose of antenatal steroids?

Standard: 85% of mothers should receive any dose of antenatal steroids.
Source of Standard: NNAP Board

Results:

There were **18,947** eligible mothers identified from data submitted for **21,718** babies by **181** neonatal units. Records for **81** babies were excluded from analysis because their data lacked sufficient detail to identify their mother, or were inconsistent.

At least one dose of antenatal steroids was administered to **86%** of mothers who delivered babies between 24 and 34 weeks gestation. Antenatal steroids were not administered in **13%** of cases and steroid data were missing or unknown for **1%** of babies.

Antenatal steroid administration in maternity units with SCUs was lower on average than for maternity units with LNUs and NICUs, which may reflect lower rates of anticipated preterm delivery in maternity units with SCUs. For example, just **399** of the total **7758*** babies born at <32/40 were born in SCUs.

Overall LNU performance is the same as overall NICU performance at **87%**, which is as expected.

In addition to considering quality improvement strategies to address antenatal steroid administration to mothers of babies born between 24 and 34 weeks gestation, units should address the recommendation in NICE guidance that antenatal steroid administration is considered in babies born at 23 weeks gestation, particularly in light of recent data indicating that antenatal steroids are effective at 23 weeks gestation.

Two units have unusually low (outlying) steroid administration rates in 2016 (see NNAP Online).

For the following tables responses are assigned “Other” if the mother delivered at home, in transit, in an unknown location or in a maternity unit not allied to a NNAP participating unit. Temperature details for these births were taken from the NNU of first admission.

Table 1.1

Mothers in England, Scotland and Wales who delivered their babies between 24 and 34 weeks and received any dose of antenatal steroids; mothers are assigned to the place of birth.

NNU level	Number of eligible NNU	Number of eligible mothers	Steroids given (% of eligible mothers)	Steroids not given (% of eligible mothers)	Missing/ Unknown data (% of eligible mothers)
SCU	37	1672	1387 (83%)	240 (14%)	45 (3%)
LNU	87	7813	6803 (87%)	945 (12%)	65 (1%)
NICU	57	9096	7946 (87%)	1057 (12%)	93 (1%)
Other	-	366	181 (49%)	176 (48%)	9 (2%)
Total	**181**	**18947**	**16317 (86%)**	**2418 (13%)**	**212 (1%)**

Table 1.2

Mothers in England, Scotland and Wales who delivered their babies between 24 and 34 weeks and received any dose of antenatal steroids by neonatal network of birth.

Neonatal network of birth	Number of eligible mothers	Steroids given (% of eligible mothers)	Steroids not given (% of eligible mothers)	Missing/ Unknown data (% of eligible mothers)
East of England Neonatal ODN	1635	1436 (88%)	193 (12%)	6 (0.3%)
Midlands South West Newborn Neonatal ODN	867	658 (76%)	146 (17%)	63 (7%)
North Central & North East London Neonatal ODN	1311	1131 (86%)	159 (12%)	21 (2%)
North West London Neonatal ODN	730	663 (91%)	59 (8%)	8 (1%)
North West Neonatal ODN	2348	2039 (87%)	294 (13%)	15 (1%)
Northern Neonatal ODN	844	738 (87%)	102 (12%)	4 (0.4%)
Peninsula & Western Neonatal ODN	1153	989 (86%)	155 (13%)	9 (1%)
Scotland	1106	1027 (93%)	77 (7%)	2 (0.1%)
South East Coast Neonatal ODN	1321	1150 (87%)	163 (12%)	8 (1%)
South London Neonatal ODN	1091	951 (87%)	121 (11%)	19 (2%)
Staffordshire, Shropshire and Black Country Neonatal ODN	684	589 (86%)	93 (14%)	2 (0.2%)
Thames Valley & Wessex ODN (Thames Valley)	674	604 (90%)	68 (10%)	2 (0.2%)
Thames Valley & Wessex ODN (Wessex)	753	674 (90%)	76 (10%)	3 (0.3%)
Trent Perinatal & Central Newborn Neonatal ODN	1466	1239 (85%)	211 (14%)	16 (1%)
Wales	755	657 (87%)	87 (12%)	11 (1%)
Yorkshire & Humber Neonatal ODN	1824	1581 (87%)	233 (13%)	10 (1%)
Other	385	191 (50%)	181 (47%)	13 (3%)
Total	**18947**	**16317 (86%)**	**2418 (13%)**	**212 (1%)**

Figure 1.1

Antenatal steroid administration to babies of 24-34 weeks inclusive gestation at birth, England, Scotland and Wales 2016. Values (circles) for participating units and 95% confidence intervals (bars) are shown in ascending value order.

- - - - the NNAP standard
. . . . the national rate of compliance

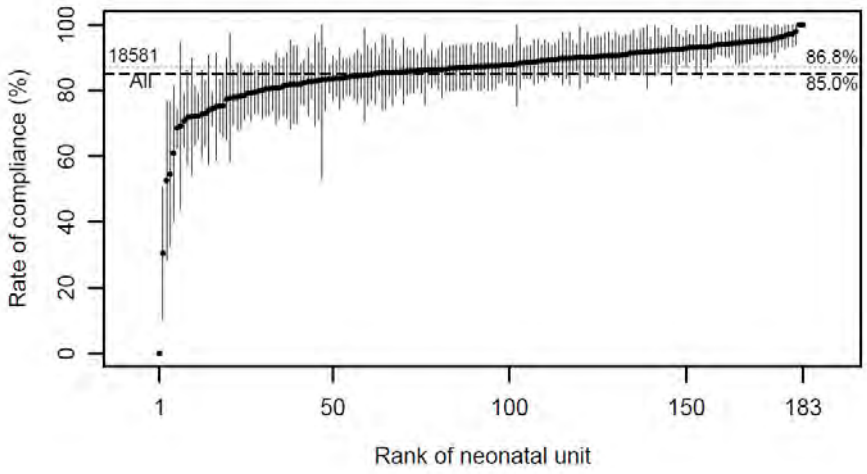


Figure 1.2

Antenatal steroid administration to babies of 24-34 weeks gestation inclusive, neonatal networks in England, Scotland and Wales for 2015 and 2016.

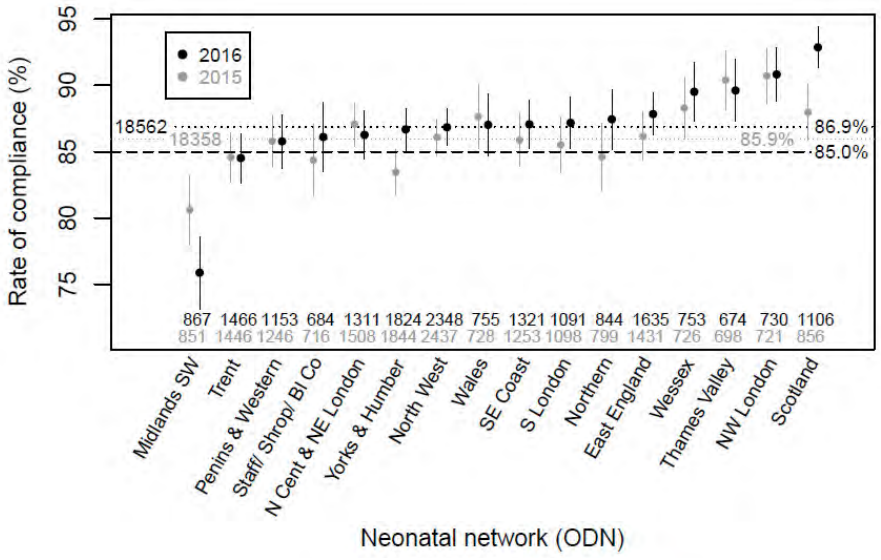


Table 1.3

Comparison to antenatal steroid audit results in previous NNAP reports.

NNAP reporting year	Number of eligible NNU	Number of eligible mothers	Percentage with any antenatal steroids given	Percentage with missing data
2008	129	9066	63%	30%
2009	167	16031	70%	7%
2010	173	16895	75%	4%
2011	164	15716	76%	3%
2012	173	16576	80%	2%
2013	176	16992	83%	1%
2014	173	17170	85%	1%
2015	179	18687	85%	1%
2016	181	18947	86%	1%

Magnesium sulphate

Full key findings and recommendations for this audit measure can be found on page 16.

NNAP audit measure: Are mothers who deliver babies below 30 weeks gestation given magnesium sulphate in the 24 hours prior to delivery?

Standard: Benchmarking

It is encouraging that the missing data for this audit measure are relatively few given that this is the first year of implementation of this measure.

Results

Magnesium sulphate administration occurred more often in maternity units with an associated NICU (**48%**) compared to maternity units with a LNU (**36%**) or SCU (**23%**). This difference may be explained by case mix difference, faster uptake of NICE guidance, other factors, or a combination of factors.

Table 2.1

Mothers in England, Scotland and Wales who delivered their babies at less than 30 weeks and received magnesium sulphate 24 hours prior to delivery; mothers are assigned to the place of birth.

NNU level	Number of eligible NNU	Number of eligible mothers	Magnesium sulphate given (% of eligible mothers)	Magnesium sulphate not given (% of eligible of mothers)	Missing/ Unknown data (% of eligible mothers)
SCU	37	157	36 (23%)	87 (55%)	34 (22%)
LNU	87	1292	468 (36%)	584 (45%)	240 (19%)
NICU	58	2785	1340 (48%)	923 (33%)	522 (19%)
Other	-	111	24 (22%)	66 (59%)	21 (19%)
Total	**182**	**4345**	**1868 (43%)**	**1660 (38%)**	817 (19%)

Table 2.2

Mothers in England, Scotland and Wales who delivered their babies at less than 30 weeks and received magnesium sulphate 24 hours prior to delivery by neonatal network of birth.

Neonatal network of birth	Number of eligible mothers	Magnesium sulphate given (% of eligible mothers)	Magnesium sulphate not given (% of eligible mothers)	Missing/ Unknown data (% of eligible mothers)
East of England Neonatal ODN	313	141 (45%)	125 (40%)	47 (15%)
Midlands South West Newborn Neonatal ODN	232	62 (27%)	77 (33%)	93 (40%)
North Central & North East London Neonatal ODN	335	134 (40%)	110 (33%)	91 (27%)
North West London Neonatal ODN	210	111 (53%)	66 (31%)	33 (16%)
North West Neonatal ODN	587	221 (38%)	237 (40%)	129 (22%)
Northern Neonatal ODN	195	63 (32%)	51 (26%)	81 (42%)
Peninsula & Western Neonatal ODN	230	162 (70%)	48 (21%)	20 (9%)
Scotland	212	95 (45%)	98 (46%)	19 (9%)
South East Coast Neonatal ODN	284	130 (46%)	91 (32%)	63 (22%)
South London Neonatal ODN	309	168 (54%)	98 (32%)	43 (14%)
Staffordshire, Shropshire and Black Country Neonatal ODN	168	43 (26%)	92 (55%)	33 (20%)
Thames Valley & Wessex ODN (Thames Valley)	152	107 (70%)	36 (24%)	9 (6%)
Thames Valley & Wessex ODN (Wessex)	180	97 (54%)	65 (36%)	18 (10%)
Trent Perinatal & Central Newborn Neonatal ODN	308	126 (41%)	134 (44%)	48 (16%)
Wales	149	48 (32%)	64 (43%)	37 (25%)
Yorkshire & Humber Neonatal ODN	368	135 (37%)	201 (55%)	32 (9%)
Other	113	25 (22%)	67 (59%)	21 (19%)
Total	**4345**	**1868 (43%)**	**1660 (38%)**	**817 (19%)**

Figure 2.1

Mothers in participating units in England, Scotland and Wales who delivered their babies at less than 30 weeks and received magnesium sulphate 24 hours prior to delivery. Values (circles) for participating units and 95% confidence intervals (bars) are shown in ascending value order.

- - - - the NNAP standard
. . . . the national rate of compliance

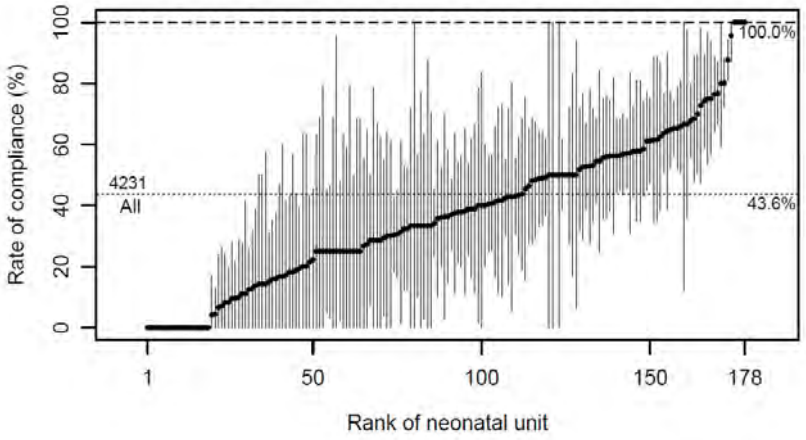
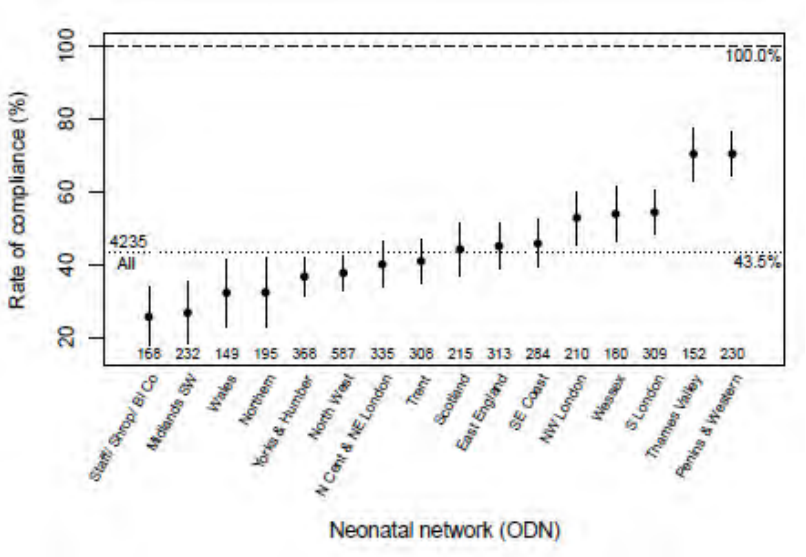


Figure 2.2
Mothers in England, Scotland and Wales who delivered their babies at less than 30 weeks and received magnesium sulphate 24 hours prior to delivery by neonatal network of birth. Values (circles) for participating units and 95% confidence intervals (bars) are shown in ascending value order.

- - - - the NNAP standard
. . . . the 2016 national rate of compliance



Temperature on admission

Full key findings and recommendations for this audit measure can be found on pages 18 and 19.

NNAP audit measure: Do all babies < 32 weeks gestation have their temperature taken within an hour after birth?

Standards: 98-100% of babies have their temperature taken within an hour of birth.
For temperatures taken within an hour of birth:
90% at 36.5°C to 37.5°C

Results:

There were **8044** babies born at a gestational age of <32 weeks reported by **181** NNU. Of these babies, **96%** had their temperature measured within the first hour of birth (Table 3.1 p57).

Babies with missing or 'unknown' temperature measurement details accounted for less than **1%** of data, whilst less than **0.2%** of eligible babies were confirmed as having no temperature measurement taken after admission. The temperature measurement was between 36.5°C and 37.5°C for **61%** of babies who had their temperature measured within an hour of birth (Table 3.5 p61).

The proportion of babies admitted normothermic has increased between 2015 and 2016, but remains well below that of the standard set by the NNAP Project Board.

Babies born in "Other" locations outside maternity units were more often admitted with a temperature below the recommended range of 36.5 to 37.5°C (**31%** in range for babies born outside of maternity units vs **63%** for those born in maternity units) and more likely to have a first temperature measured after one hour of age (**10%** vs **5%**) than those born in maternity units. (Table 3.3 p59) This is likely explained by the practical challenges of stabilising such vulnerable infants outside maternity units.

Two units have unusually low (outlying) rates of babies with a recorded temperature within the recommended range in 2016 (see NNAP Online).

In the following tables responses are assigned "Other" if the mother delivered at home, in transit, in an unknown location or in a non NNAP unit. Temperature details for these births were taken from the NNU of first admission.

Table 3.1

Babies born in England, Scotland and Wales at a gestational age <32 weeks with their temperature taken within the first hour of birth, infants are assigned to their place of birth.

NNU Level	Number of eligible NNU	Number of eligible babies	Time of temperature measurement (from birth)			
			Within an hour (% of eligible babies)	After an hour	Not taken after admission	Missing/ Unknown data
SCU	37	422	399 (95%)	16	3	4
LNU	87	2807	2723 (97%)	71	2	11
NICU	57	4695	4528 (96%)	140	7	20
Other	-	120	108 (90%)	8	1	3
Total	**181**	**8044**	**7758 (96%)**	**235**	**13**	**38**

Figure 3.1

Proportion of babies with a gestation at birth <32 weeks, admitted with a temperature of 36.5 – 37.5 C measured within an hour of birth, in participating units in England, Scotland and Wales in 2016. Values (circles) for participating units and 95% confidence intervals (bars) are shown in ascending value order.

- - - - the NNAP standard
. . . . the national rate of compliance

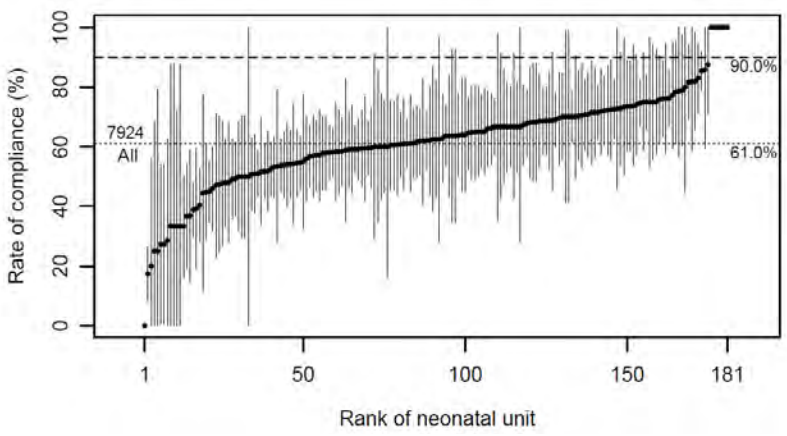


Table 3.2

Babies born in England, Scotland and Wales at a gestational age <32 weeks with their temperature taken within the first hour of birth, by neonatal network of birth.

Neonatal network of Birth	Number of eligible babies	Time of temperature measurement (from birth)			
		Within an hour (% of eligible babies)	After an hour	Not taken after admission	Missing/ Unknown data
East of England Neonatal ODN	620	607 (98%)	11	0	2
Midlands South West Newborn Neonatal ODN	414	372 (90%)	33	1	8
North Central & North East London Neonatal ODN	575	535 (93%)	32	0	8
North West London Neonatal ODN	376	351 (93%)	23	1	1
North West Neonatal ODN	996	969 (97%)	22	2	3
Northern Neonatal ODN	409	399 (98%)	10	0	0
Peninsula & Western Neonatal ODN	440	427 (97%)	13	0	0
Scotland	410	394 (96%)	15	1	0
South East Coast Neonatal ODN	547	531 (97%)	13	3	0
South London Neonatal ODN	523	504 (96%)	17	0	2
Staffordshire, Shropshire and Black Country Neonatal ODN	302	299 (99%)	3	0	0
Thames Valley & Wessex ODN (Thames Valley)	302	302 (100%)	0	0	0
Thames Valley & Wessex ODN (Wessex)	359	357 (99%)	2	0	0
Trent Perinatal & Central Newborn Neonatal ODN	599	573 (96%)	15	2	9
Wales	318	307 (97%)	10	0	1
Yorkshire & Humber Neonatal ODN	729	718 (98%)	8	2	1
Other	125	113 (90%)	8	1	3
Total	**8044**	**7758 (96%)**	**235**	**13**	**38**

Figure 3.2

Proportion of babies with a gestation at birth <32 weeks, admitted with a temperature of 36.5 – 37.5°C measured within an hour of birth, to neonatal networks in England, Scotland and Wales in 2015 and 2016. Values (circles) for participating units and 95% confidence intervals (bars) are shown in ascending value order.

- - - - the NNAP standard
. . . . the 2016 national rate of compliance

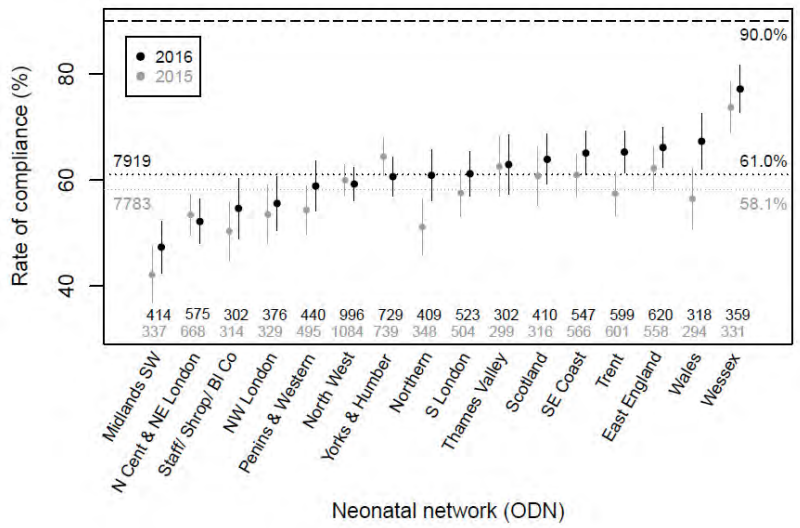


Table 3.3

Temperature values for babies born in England, Scotland and Wales at a gestational age of <32 weeks who had their temperature taken within an hour of birth. Infants are assigned to their place of birth.

NNU level	Number of eligible NNU	Number of eligible babies	Temperature values (°C)				
			< 32.0	32.0-35.9 (% of eligible babies)	36.0-36.4 (% of eligible babies)	36.5-37.5 (% of eligible babies)	> 37.5 (% of eligible babies)
SCU	37	422	1	24 (6%)	80 (19%)	253 (60%)	41 (10%)
LNU	87	2807	0	193 (7%)	519 (18%)	1715 (61%)	296 (11%)
NICU	57	4695	0	292 (6%)	753 (16%)	2866 (61%)	617 (13%)
Other	-	120	2	50 (42%)	16 (13%)	34 (28%)	6 (5%)
Total	**181**	**8044**	**3**	**559 (7%)**	**1368 (17%)**	**4868 (61%)**	**960 (12%)**

Table 3.4

Temperature values within an hour of birth for babies born in England, Scotland and Wales at a gestational age <32 weeks, by neonatal network of birth.

Neonatal network of Birth	Number of eligible babies	Temperature values (°C)				
		< 32.0	32.0-35.9	36.0-36.4 (% of eligible babies)	36.5-37.5 (% of eligible babies)	> 37.5 (% of eligible babies)
East of England Neonatal ODN	620	0	27	96 (15%)	410 (66%)	74 (12%)
Midlands South West Newborn Neonatal ODN	414	0	45	81 (20%)	196 (47%)	50 (12%)
North Central & North East London Neonatal ODN	575	0	62	128 (22%)	300 (52%)	45 (8%)
North West London Neonatal ODN	376	0	39	72 (19%)	209 (56%)	31 (8%)
North West Neonatal ODN	996	0	67	169 (17%)	590 (59%)	143 (14%)
Northern Neonatal ODN	409	1	21	74 (18%)	249 (61%)	54 (13%)
Peninsula & Western Neonatal ODN	440	0	25	81 (18%)	259 (59%)	62 (14%)
Scotland	410	0	25	62 (15%)	262 (64%)	45 (11%)
South East Coast Neonatal ODN	547	0	21	95 (17%)	356 (65%)	59 (11%)
South London Neonatal ODN	523	0	40	92 (18%)	320 (61%)	52 (10%)
Staffordshire, Shropshire and Black Country Neonatal ODN	302	0	32	70 (23%)	165 (55%)	32 (11%)
Thames Valley & Wessex ODN (Thames Valley)	302	0	14	57 (19%)	190 (63%)	41 (14%)
Thames Valley & Wessex ODN (Wessex)	359	0	4	38 (11%)	277 (77%)	38 (11%)
Trent Perinatal & Central Newborn Neonatal ODN	599	0	37	95 (16%)	391 (65%)	50 (8%)
Wales	318	0	16	43 (14%)	214 (67%)	34 (11%)
Yorkshire & Humber Neonatal ODN	729	0	34	98 (13%)	442 (62%)	144 (20%)
Other	125	2	50	17 (14%)	38 (30%)	6 (5%)
Total	**8044**	**3**	**559**	**1368 (17%)**	**4868 (61%)**	**960 (12%)**

Table 3.5

Comparison to temperature audit results in previous NNAP reports.

NNAP data year	Number of eligible NNU	Number of eligible babies	Number of babies with a temperature measurement within an hour (% of eligible babies)	Number of babies with a temperature between 36.5 °C and 37.5 °C within an hour of birth (% of eligible babies)
2013	170	2908	2699 (93%)	1485 (51%)
2014	167	3109	2934 (94%)	1578 (51%)
2015*	177	7864	7351 (93%)	4537 (58%)
2016*	181	8044	7758 (96%)	4868 (61%)

* For 2015 & 2016 data babies born < 32 weeks were included in the audit measure. In previous years only babies < 29 weeks were included.

Consultation with parents

Full key findings and recommendations for this audit measure can be found on pages 20 and 21.

NNAP audit measure: Is there a documented consultation with parents by a senior member of the neonatal team within 24 hours of admission?

Standard: 100%
Source of Standard: NNAP Board

Results:

There were **99,800** first episodes of care reported by **181** NNU that were considered for this question. Babies who were not categorised as receiving Healthcare Resource Group (HRG) 1, 2 or 3 on a NNU during their first day of care, or who were admitted for less than 12 hours, were excluded from the analysis; this left **60,148** episodes eligible for the audit measure.

A senior member of the neonatal team consulted parents or carers within 24 hours of admission for **90%** of eligible episodes. Consultations that occurred before admission, or more than 24 hours after admission, were recorded in **4%** of eligible episodes.

No consultation occurred for **2%** of eligible episodes and data on consultations was either missing or 'unknown' for **4%** of eligible episodes. Of the babies included in this measure, around half were born at term. (see NNAP Online)

There were 8 hospitals who had a large (more than 100 babies or greater than 20%, of eligible babies) amounts of missing data for this audit measure. (see NNAP Online)

Analysis shows that units with high levels of missing data tend to have poor compliance. (see NNAP Online)

Twenty one units have unusually low (outlying) rates of timely consultation with parents in 2016. (see NNAP Online)

Table 4.1

Documented consultation with parents, by a senior member of the neonatal team, within 24 hours of admission by NNU level.

Unit level	Number of eligible NNU	Number of eligible episodes	Time of first consultation with parents and/or carers (from admission)				
			Within 24 hours (% of eligible episode)	After 24 hours	Before admission	No consultation	Missing/ Unknown data
SCU	37	6211	5233 (84%)	172	193	228	385
LNU	87	26586	24582 (92%)	367	377	442	818
NICU	57	27351	24607 (90%)	515	454	756	1019
Total	**181**	**60148**	**54422 (90%)**	**1054 (2%)**	**1024 (2%)**	**1426 (3%)**	**2222 (3%)**

Figure 4.1

Documented consultation with parents, by a senior member of the neonatal team, within 24 hours of admission for neonatal units within England, Scotland and Wales for 2016. Values (circles) for participating units and 95% confidence intervals (bars) are shown in ascending value order.

- - - the NNAP standard
. . . . the 2016 national rate of compliance

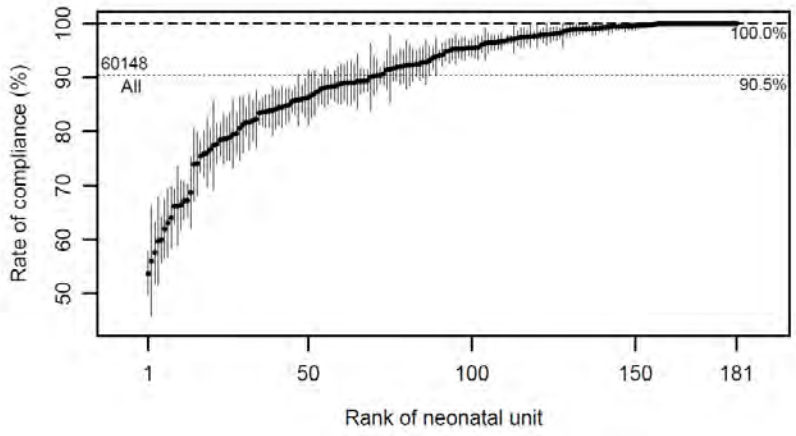


Table 4.2

Documented consultation with parents, by a senior member of the neonatal team, within 24 hours of admission by neonatal network.

Neonatal network	Number of eligible episodes	Time of first consultation with parents and/or carers (from admission)				
		Within 24 hours (% of eligible episode)	After 24 hours	Before admission	No Consultation	Missing/ Unknown data
East of England Neonatal ODN	6642	6227 (94%)	88	98	72	157
Midlands South West Newborn Neonatal ODN	2954	2295 (78%)	98	112	127	322
North Central & North East London Neonatal ODN	4579	4069 (89%)	60	64	126	260
North West London Neonatal ODN	2398	2138 (89%)	61	57	31	111
North West Neonatal ODN	7352	6455 (88%)	220	100	251	326
Northern Neonatal ODN	2219	2000 (90%)	37	62	52	68
Peninsula & Western Neonatal ODN	4163	3685 (89%)	120	77	122	159
Scotland	4426	3923 (89%)	63	118	181	141
South East Coast Neonatal ODN	3734	3486 (93%)	36	54	53	105
South London Neonatal ODN	3805	3525 (93%)	35	33	75	137
Staffordshire, Shropshire and Black Country Neonatal ODN	2099	1906 (91%)	31	44	79	39
Thames Valley & Wessex ODN (Thames Valley)	2211	2206 (100%)	1	1	3	0
Thames Valley & Wessex ODN (Wessex)	2463	2441 (99%)	6	0	8	8
Trent Perinatal & Central Newborn Neonatal ODN	3758	3399 (90%)	95	63	68	133
Wales	2463	2062 (84%)	30	102	84	185
Yorkshire & Humber Neonatal ODN	4811	4550 (95%)	73	33	92	63
Other	71	55 (77%)	0	6	2	8
Total	**60148**	**54422 (90%)**	**1054**	**1024**	**1426**	**2222**

Figure 4.2

Documented consultation with parents, by a senior member of the neonatal team, within 24 hours of admission for neonatal networks within England, Scotland and Wales for 2015 and 2016. Values (circles) for participating units and 95% confidence intervals (bars) are shown in ascending value order.

- - - the NNAP standard
. . . . the 2016 national rate of compliance

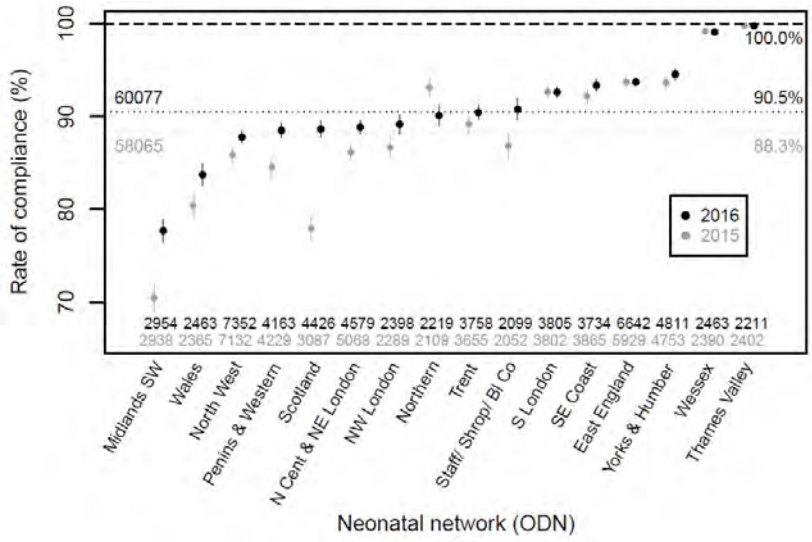


Table 4.3

Comparison to first consultation results in previous NNAP audits.

Year	Number of eligible NNU	Number of eligible episodes	Time of first consultation with parents and/or carers (from admission)				
			Within 24 hours (% of eligible episode)	After 24 hours (% of eligible episodes)	Before admission (% of eligible episodes	No consultation (% of eligible episodes)	Missing/ Unknown data (% of eligible episodes)
2012*	174	54409	42792 (79%)	1754 (3%)	4165 (8%)	2146 (4%)	3552 (7%)
2013	176	50757	42807 (84%)	1386 (3%)	2273 (4%)	1555 (3%)	2736 (5%)
2014	174	52372	46485 (89%)	1451 (3%)	1134 (2%)	1598 (3%)	1704 (3%)
2015	179	58077	51300 (88%)	1261 (2%)	1204 (2%)	2075 (4%)	2237 (4%)
2016	181	60148	54422 (90%)	1054 (2%)	1024 (2%)	1426 (3%)	2222 (3%)

* For the purpose of comparison with previous years, neonatal admissions that lasted for less than 12 hours were included in the 2012 analysis, but were excluded form subsequent years.

Encephalopathy

Full key findings and recommendations for this audit measure can be found on page 22.

NNAP audit measure: What proportion of babies born > 34 weeks gestation have an encephalopathy within the first three full calendar days after birth?

Definition:

Encephalopathy is defined as an infant showing two or all three of the following signs on the same day; abnormal tone, lethargic or comatose consciousness level, convulsions.

The data presented here are for infants born between 01 February 2013 and 31 December 2015 due to a large amount of missing live birth data for January 2013. All results for this measure are reported by the year and trust of birth.

Background:

The NNAP have sought to answer this audit question every year since 2011, for which data were last presented. At that time the denominator data were obtained from trusts, but this year we are able to present estimates of encephalopathy rates based on available denominator data derived from routine sources. We present rates over the three years 2013 - 2015. The rates are presented with 95% confidence intervals based only on the denominator data for which gestational age is known.

This measure will include babies with encephalopathy due to different causes, and is not limited to encephalopathy caused when babies experience difficulty during the birth process. However, the babies identified as experiencing encephalopathy by this measure were reported by units as having had evidence of neurological abnormality in the first three days after birth. This total could be expected to include babies whose illness stemmed from the birth process, an illness referred to medically as “hypoxic ischaemic encephalopathy”.

Results:

There were 1,866,913 infants born at > 34 weeks gestation between 1 February 2013 and 31 December 2015. Of these 3,154 were recorded as having an encephalopathy within 3 days of birth. Encephalopathy occurred in 1.68 babies per 1000 births (95% confidence intervals: 1.63 – 1.74).

This rate should be treated with caution as gestational age at birth is missing for up to 9% of live births in some units. Further, up to 60% of infants had some data missing which might have contributed to correct classification of infants as encephalopathic. In units with high levels of missing data the rates of encephalopathy may be underestimated. Full unit tables of results for encephalopathy of the period 1 February 2013 to 31 December 2015 can be viewed in NNAP Online.

Table 5.1

Babies born in England and Wales at a gestational age > 34 weeks with an encephalopathy reported by trust for infants born between 01 February 2013 and 31 December 2015.

Total number of live births	Number of live births with missing gestation (% of live births)	Number of live births > 34 weeks gestation	Number of babies admitted to NNU (born > 34 weeks gestation) with encephalopathy	Number of babies admitted to NNU (born > 34 weeks gestation) with uncertain encephalopathy status (% of live births > 34 weeks)	Encephalopathy rate per 1000 births (95% CI)
1959223	29838 (2%)	1866913	3154	2475 (>1%)	1.68 (1.63-1.74)

Bronchopulmonary dysplasia

Full key findings and recommendations for this audit measure can be found on pages 23 and 24.

NNAP audit measure: What is the proportion of babies born <32 weeks who develop bronchopulmonary dysplasia?

Definition of bronchopulmonary dysplasia:
A: Mild: Respiratory support (ventilation, continuous positive airway pressure (CPAP), bilevel positive airway pressure (BiPAP), heated humidified high flow nasal cannula (HHFNC) and or any oxygen) on day 28 + air at 36 weeks corrected gestation or from the time of discharge if discharged earlier.

B: Significant: Respiratory support on day 28 + respiratory support at 36 weeks corrected gestation or from the time of discharge if discharged earlier.

Results:

There were **25,006** babies born <32 weeks and discharged between 1 January 2014 and 31 December 2016, as reported by **183** NNU who were considered for this audit measure. Of these babies, **2,161** were excluded from analysis for BPD because they died before reaching 36 weeks corrected gestation. A further **186** babies were removed as the complete respiratory data required for analysis of BPD were not available from NNAP-participant units. In total **22,659** babies were eligible for inclusion in the analysis.

Over 3 years there was no indication of BPD for **52%** of babies, whilst **16%** of babies were defined as having mild BPD and **31%** were categorised as having significant BPD. BPD could not be determined for **1%** of babies.

Significant BPD occurs more in some neonatal networks than others (**26%** - **39%**). Case mix and mortality are not likely to vary so significantly between ODNs. This suggests that clinical care varies between networks to either confound the application of the NNAP surveillance definition of BPD or to change outcomes (or both).

There were higher rates of BPD in babies born within NICUs, probably reflecting the higher risk population of babies born <32/40 selected for delivery at maternity units with a NICU.

All babies were assigned to their recorded place of birth for this analysis. For the following tables responses are assigned “Other” if the mother was recorded as delivering at home, in transit, in an unknown location or in a maternity unit not allied with a NNAP participating unit in the first NNU admission.

Table 6.1
Bronchopulmonary dysplasia for babies born <32 weeks gestation and discharged between 1 January 2014 and 31 December 2016 in England, Scotland and Wales.

Unit level	Number of eligible NNU	Number of eligible babies	BPD status			
			No BPD	Mild BPD	Significant BPD (% of eligible babies)	BPD not determinable
SCU	38	1212	782	178	245 (20%)	7
LNU	87	8229	5045	1345	1803 (22%)	36
NICU	58	12608	5710	2126	4744 (38%)	28
Other	-	610	186	66	145	213
Total	**183**	**22659**	**11723**	**3715**	**6937 (31%)**	**284**

Figure 6.1
Rates of significant bronchopulmonary dysplasia, in babies born at <32 weeks gestation in England, Scotland and Wales across 2014 to 2016. Values (circles) for participating units and 95% confidence intervals (bars) are shown in ascending value order.

. . . . the national rate of significant BPD

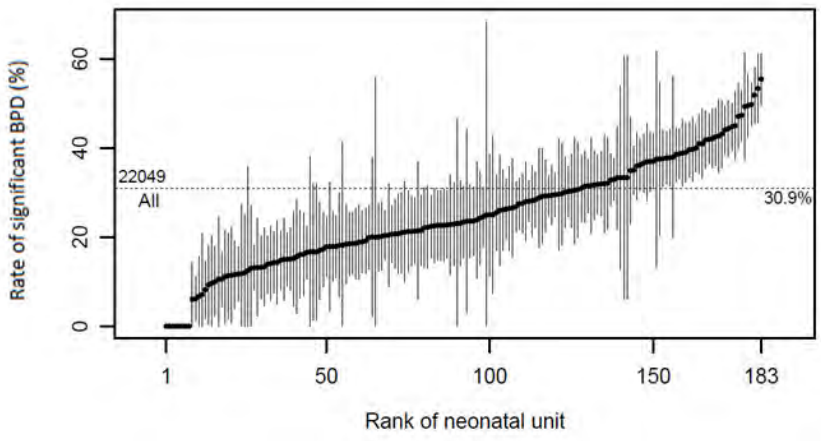


Table 6.2

Bronchopulmonary dysplasia for babies born <32 weeks gestation and discharged between 1 January 2014 and 31 December 2016 in neonatal networks in England, Scotland and Wales.

Neonatal network of birth	Number of eligible babies	BPD status			
		No BPD	Mild BPD	significant BPD (% of eligible babies)	BPD not determinable
East of England Neonatal ODN	1861	1077	308	476 (26%)	0
Midlands South West Newborn Neonatal ODN	1028	581	153	289 (28%)	5
North Central & North East London Neonatal ODN	1719	877	303	523 (30%)	16
North West London Neonatal ODN	1046	534	168	330 (32%)	14
North West Neonatal ODN	2898	1377	466	1054 (36%)	1
Northern Neonatal ODN	1027	472	145	403 (39%)	7
Peninsula & Western Neonatal ODN	1363	698	243	412 (30%)	10
Scotland	845	399	168	277 (33%)	1
South East Coast Neonatal ODN	1542	870	256	415 (27%)	1
South London Neonatal ODN	1481	789	213	476 (32%)	3
Staffordshire, Shropshire and Black Country Neonatal ODN	815	412	153	248 (30%)	2
Thames Valley & Wessex ODN (Thames Valley)	826	460	151	213 (26%)	2
Thames Valley & Wessex ODN (Wessex)	961	505	153	303 (32%)	0
Trent Perinatal & Central Newborn Neonatal ODN	1694	893	281	516 (30%)	4
Wales	876	454	167	254 (29%)	1
Yorkshire & Humber Neonatal ODN	2063	1135	321	603 (29%)	4
Other	614	190	66	145 (24%)	213
Total	**22659**	**11723**	**3715**	**6937 (31%)**	**284**

Figure 6.2

Rates of significant bronchopulmonary dysplasia, in babies born at <32 weeks gestation in England, Scotland and Wales across 2013 to 2015 (grey lines and dots) and 2014 to 2016 (black lines and dots). Values (circles) for participating units and 95% confidence intervals (bars) are shown in ascending value order.

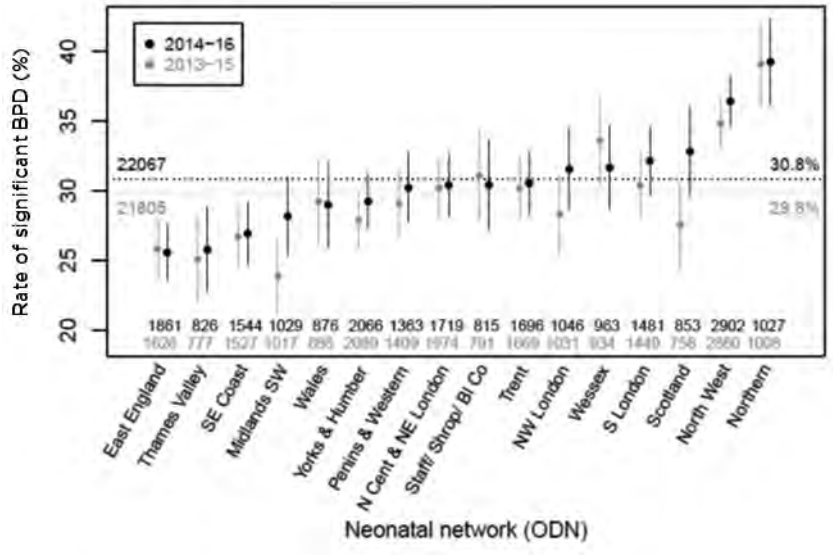


Table 6.3

Comparison of bronchopulmonary dysplasia results in previous NNAP audits.

Year group	Number of eligible NNU	Number of eligible babies	BPD status			
			No BPD	Mild BPD	Significant BPD (% of eligible babies)	BPD not determinable
2013 – 2015	182	22377	11791	3603	6628 (30%)	355
2014 - 2016	183	22659	11723	3715	6937 (31%)	284

Measuring rates of infection on neonatal units

Measures

The NNAP has used three measures to indicate levels of infection for the 2016 data. One group of measures considers rates of blood and cerebrospinal fluid (CSF) infection, and for some organisms, incorporates data on both culture results and clinical symptoms and signs. A second measure (CLABSI) considers rates of infection against a denominator of central line days. A newly introduced measure (the Clinical Reference Group/ NNAP quality improvement surveillance definition of central line associated bloodstream infection, or QISDCLABSI, uses a less complex definition of bloodstream infection to measure the number of children affected by CLABSI using central line days as a denominator.

Data completeness

Overall, **71,627** blood cultures are reported from **99,849** babies - an average of less than one culture per baby. This is consistent with a significant level of under reporting. At lower gestations a higher number of blood cultures are reported (**8134** cultures from **2593** babies <28/40), while at higher gestations far fewer blood cultures are reported than babies are admitted (e.g. **34645** cultures from **61,827** babies >36/40).

On aggregate blood culture results are entered for **85%** of entered blood cultures. However the proportion of positive blood cultures whose results are entered remains unknown, except in the 25 neonatal units who have affirmed they have entered 100% of all positive blood cultures.

Of all blood cultures entered - just over half (**55%**) have clinical symptoms and signs data entered.

These findings make clear that inter-unit comparisons based on NNAP reported rates of bloodstream infections and CLABSI can only be made with any level of confidence for the units with known 100% entry of positive cultures and even then only for measures of bloodstream infection with “known pathogens” and for the QISDCLABSI measure.

Prevalence of central line associated bloodstream infections (CLABSI)

Full key findings and recommendations for the following two audit measures can be found on page 25.

In 2016 NNAP used two different measures to assess CLABSI. The measure used from 2012 operates as a surveillance measure for CLABSI using data on line placement and positive cultures. This measure 'counts' episodes of mixed growth or skin commensals only where symptoms and signs have been entered to support a diagnosis of infection.

From 2016 the NNAP has used the CRG/ NNAP quality improvement surveillance definition of CLABSI which rests on a simpler definition of bloodstream infection - any positive blood culture. The intention is to facilitate measurement that does not depend on entry of symptoms and signs which are incompletely entered at present. Twenty five units have made clear that they had entered all positive blood cultures relating to babies on their unit for the 2016 data year - these units will be able to compare rates of bloodstream infection and CLABSI on NNAP Online using the CRG/NNAP measure.

NNAP audit measure: Central line associated bloodstream infection (CLABSI): How many blood stream infections[a] are there on NNU per 1000 days of central line[b] care?

a: the growth of a recognised pathogen in pure culture, or in the case of a mixed growth, or growth of skin commensal, the added requirement for 3 or more of 10 predefined clinical signs
b: central line = umbilical artery catheter(UAC), umbilical venous catheter (UVC), percutaneous long line or surgically inserted long line.

Standard: Standard not set, benchmarking
Source of Standard: NNAP Board

Attribution:
For unit level tables, positive blood cultures are attributed to the unit where the baby was admitted when the blood culture was taken. Line days are assigned to the unit where they took place. Where two units provide central line care on one day, the central line day is attributed to both units.

Results

99,849 babies in **182 NNU** received **1,168,650** days of care. In total **13%** of all care days included a central line and **361** bloodstream infections (definition as outlined above) were reported for these central line days; **2.29** bloodstream infections per 1000 central line days**.** This result should be treated with significant caution given the potential for under reporting of blood stream and CSF infections described above.

Table 7.1

Occurrence of central line associated bloodstream infection[a] in NNAP participating NNU; babies who died or were discharged during 2016.

Gestational age group	Number of eligible babies	Number of line days	Number of central line associated blood stream infections	CLABSI per 1000
Missing	106	0	0	-
< 32 weeks	8412	104831	319	3.04
>= 32 weeks	91331	52648	42	0.79
Total	**99849**	**157479**	**361**	**2.29**

NNAP audit measure: Clinical Reference Group/NNAP quality improvement surveillance definition of central line associated bloodstream infection (QISDCLABSI): How many babies experienced bloodstream infection[c] on a NNU per 1000 days of central line[b] care?

b: central line = umbilical artery catheter(UAC), umbilical venous catheter (UVC), percutaneous long line or surgically inserted long line.
c: any positive blood culture.

Standard: Standard not set, benchmarking
Source of Standard: NHSE Clinical Reference Group and NNAP Board

Attribution:
For unit level tables, positive blood cultures are attributed to the unit where the baby was admitted when the blood culture was taken. Line days are assigned to the unit where they took place. Where two units provide central line care on one day, the central line day is attributed to both units.

Results

99,849 babies in **182 NNU** received **1,168,650** days of care. In total **13%** of all care days included a central line and **681** infants with **846** bloodstream infections (definition outlined above) were reported for these central line days; **4.32** bloodstream infections per 1000 central line days**.**
This aggregate result should be treated with significant caution given the potential for under reporting of blood stream and CSF infections described above, but the figure for units who are confident all positive blood cultures have been reported to NNAP may be of comparative value.

Table 7.2

Number of infants with one or more central line associated bloodstream infections[c] in NNAP participating NNU.

Gestational age group	Number of eligible babies	Number of line days	Number of infants with central line associated blood stream infections	QISD CLABSI per 1000
Missing	106	0	0	-
< 32 weeks	8412	104831	583	5.56
>= 32 weeks	91331	52648	98	1.86
Total	**99849**	**157479**	**681**	**4.32**

Bloodstream and cerebrospinal fluid (CSF) infection

Full key findings and recommendations for this audit measure can be found on page 25.

NNAP audit measure: What percentage of babies admitted to a neonatal unit have:

a. one or more episodes of a pure growth of a pathogen from blood;
b. one or more episode of a pure growth of a pathogen from CSF;
c. pure growth of a skin commensal or a mixed growth with ≥3 clinical signs at the time of blood sampling?

Standard: Benchmarking
Source of Standard: NNAP Board

Results:

There were **114,231** admissions and **99,849** babies reported from **181** NNU who were included in this question. A total of **79,094** blood and CSF cultures were recorded for these babies; pathogens results, including 'no growth' were entered for **85%** of cultures.

The results for each section of the analysis were:

a. 445 babies had one or more blood culture result recorded with a pure growth of a pathogen.
b. 11 babies had one or more positive CSF culture result recorded with a pure growth of a pathogen.
c. For blood cultures, 87 babies had a growth of a skin commensal with three or more clinical predefined clinical signs, and 17 a mixed growth with three or more predefined clinical signs.

Table 7.3

Completeness of available culture data by gestational age. Entered blood culture results include the confirmation of "no growth".

Gestational age group	Number of eligible babies	Blood cultures			CSF cultures	
		Number of blood cultures	Number of blood cultures with results entered (% of blood cultures)	Number of blood cultures with results and clinical signs entered* (% of blood cultures)	Number of CSF cultures	Number of CSF cultures with results entered (% of CSF cultures)
Missing	106	3	3 (100%)	1 (33%)	0	0 (0%)
<= 27 weeks	2593	8134	6908 (85%)	4192 (52%)	969	805 (83%)
28-31 weeks	5819	8522	7413 (87%)	4820 (57%)	551	466 (85%)
32-36 weeks	29504	20323	17519 (86%)	11652 (57%)	1087	930 (86%)
>= 37 weeks	61827	34645	29102 (84%)	18824 (54%)	4860	3983 (82%)
Total	**99849**	**71627**	**60945 (85%)**	**39489 (55%)**	**7467**	**6184 (83%)**

** includes cultures that confirmed that "none" of the predefined clinical signs were present at the time the culture was taken.*

Table 7.4

Positive blood culture results by NNU level and gestational age.

Gestational age group	Number of eligible babies	Number of admissions	Number of babies with one or more pure growths of a pathogen (% of eligible babies)	Number of babies with one or more skin commensal growths and ≥ 3 clinical signs	Number of babies with one or more mixed growths and ≥ 3 clinical signs
Missing	106	106	0 (0%)	0	0
<= 27 weeks	2593	5416	276 (11%)	52	11
28-31 weeks	5819	8861	98 (2%)	24	6
32-36 weeks	29504	33466	41 (0.1%)	7	0
>= 37 weeks	61827	66382	40 (0.06%)	4	0
Total	**99849**	**114231**	**455 (0.5%)**	**87**	**17**

Table 7.5

Positive CSF culture results by NNU level and gestational age.

Gestational age group	Number of eligible babies	Number of admissions	Number of babies with one or more pure growths of a pathogen (% of eligible babies)
Missing	106	106	0 (0%)
<= 27 weeks	2593	5416	2 (0.1%)
28-31 weeks	5819	8861	4 (0.1%)
32-36 weeks	29504	33466	0 (0%)
>= 37 weeks	61827	66382	5 (0.01%)
Total	**99849**	**114231**	**11 (0.01%)**

Retinopathy of prematurity (ROP) screening

Full key findings and recommendations for this audit measure can be found on pages 26 and 27.

NNAP audit measure: Do all babies < 1501g or a gestational age of < 32 weeks at birth undergo the first retinopathy of prematurity (ROP) screening in accordance with the current guideline recommendations?

Standards: 100% of eligible babies should receive ROP screening within the time window for first screening recommended in the guidelines:

- If the infant's gestational age at birth is < 27 weeks, the first screening should be between 30+0 and 30+6 weeks corrected gestation inclusive
- If the infant's gestational age at birth is ≥ 27 weeks, ROP screening should be at or after four weeks, and before five weeks of age
- All babies < 32 weeks gestational age or birth weight < 1501g should have their first ROP screening examination prior to discharge.

Source of Standard: National standard (RCPCH, RCOphth, BAPM and Bliss, *Guideline for the Screening and Treatment of Retinopathy of Prematurity,* 2008)

Note: In interpreting the national standards for this NNAP analysis, the Project Board has decided that a baby will be regarded as having had ROP screening "on time" if:

- A baby who was discharged before the ROP screening window opened had their first screening conducted prior to discharge; or
- A ROP screen takes place within the ROP screening window, before or after discharge.

The NNAP Project Board has also agreed to allow an extra week either side of the ROP screening window as follows:

Gestational age at birth (completed weeks)	ROP screening windows	
	National Guideline ROP screening window	NNAP ROP screening window
< 27	30^{+0} to 30^{+6} weeks corrected gestational age inclusive	29 to 31 weeks corrected gestational age inclusive
≥ 27	4 to 5 weeks from birth (28-35 days)	3 to 6 weeks from birth (21-42 days)

Results:

There were **9778** babies born with a birth weight <1501g or with a gestational age at birth <32 weeks in a NNAP contributing NNU. Of these babies, **17** were excluded because they did not have a recorded episode of care in a NNU until after the closure of the ROP screening window. A further **32** babies were excluded because they were transferred to non-neonatal units before, or during, the ROP screening window. Finally, **598** babies were excluded because they died before the closure of the screening window and had not been screened.

This left **9131** babies eligible for ROP screening from **181** NNU. Including post-discharge screenings, **98%** of eligible babies had at least one screening for ROP recorded, while **94%** of babies were screened 'on time' in accordance with current NNAP criteria, including **13%** of babies who were screened "on time" after neonatal discharge. Of the remaining babies, **4%** were first screened after the closure of the screening window, and less than **1%** were screened before the screening window opened. No screening data were available for **2%** of eligible babies.

Units should pay particular attention to ensuring that babies born after 32 weeks but less than 1501g are screened on time and that details of the screening are recorded given that, of the 163 babies with no screening data, 108 were in this category.

15% of babies meeting eligibility criteria were born at gestations over 31 weeks. There appear to be far less questionable birthweights than in 2015 data.

Four units have unusually low (outlying) rates of on time screening for ROP in 2016 (see NNAP Online).

Table 8.1

ROP screening for babies born <1501g or gestation at birth <32 weeks by NNU level in England, Scotland and Wales.

NNU Level	Number of eligible NNU	Number of eligible babies	Number of babies with a known ROP screening (% of eligible babies)	Screened on time			Screened early (% of eligible babies)	Screened late (% of eligible babies)	Number of babies with no screening data (% of eligible babies)
				During care	After discharge	Total (% of eligible babies)			
SCU	37	738	714 (97%)	550	135	685 (93%)	6 (1%)	23 (3%)	24 (3%)
LNU	87	3786	3727 (98%)	3034	543	3577 (94%)	16 (0.4%)	134 (4%)	59 (2%)
NICU	57	4607	4527 (98%)	3872	463	4335 (94%)	16 (0.3%)	176 (4%)	80 (2%)
Total	**181**	**9131**	**8968 (98%)**	**7456**	**1141**	**8597 (94%)**	**38 (0.4%)**	**333 (4%)**	**163 (2%)**

Figure 8.1

On time screening for ROP (first screen only) for units in England, Scotland and Wales in 2016 for babies with a birthweight of less than 1,501g or a gestation at birth of less than 32 weeks. Values (circles) for units and 95% confidence intervals (bars) are shown in ascending value order.

- - - - indicates the NNAP standard
. . . . indicates national rate of compliance

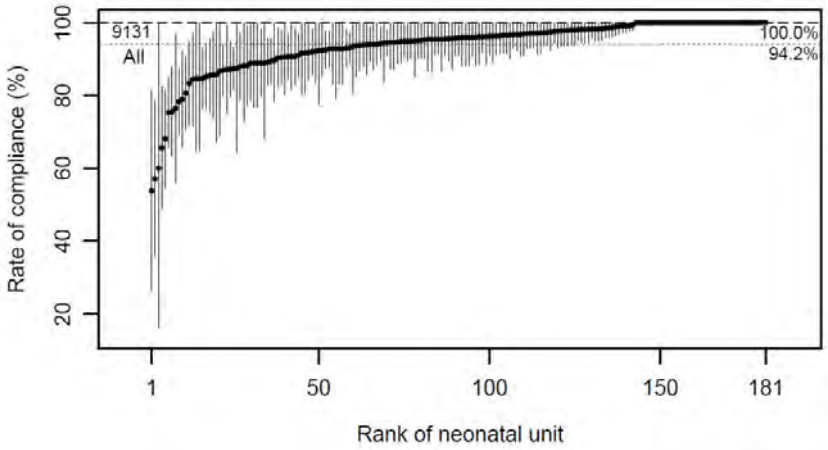


Figure 8.2

On time screening for ROP (first screen only) for networks in England, Scotland and Wales in 2015 and 2016 for babies with a birthweight of less than 1,501g or a gestation at birth of less than 32 weeks. Values (circles) for units and 95% confidence intervals (bars) are shown in ascending value order.

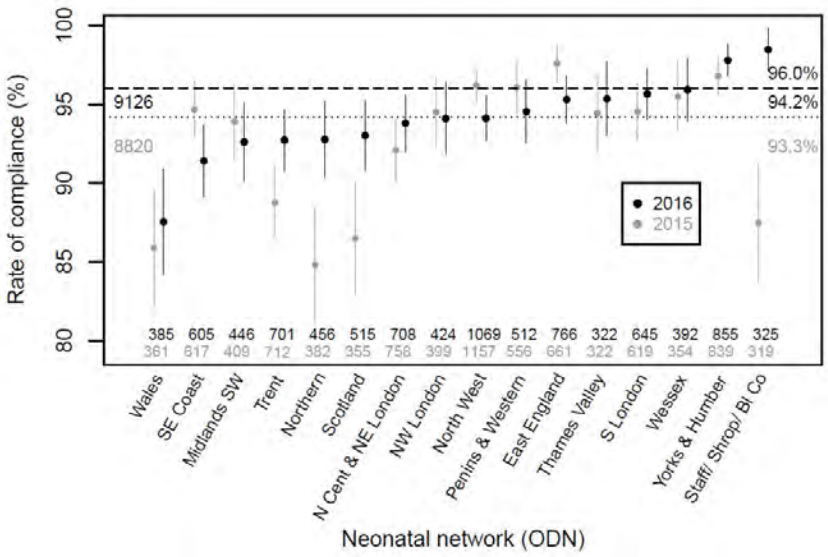


Table 8.2

ROP screening for babies born <1501g or gestation at birth <32 weeks by neonatal network.

Neonatal network	Number of eligible babies	Number of babies with a known ROP screening (% of eligible babies)	Screened on time			Number of babies with no screening data (% of eligible babies)
			During care	After discharge	Total (% of eligible babies)	
East of England Neonatal ODN	766	753 (98%)	631	99	730 (95%)	13 (2%)
Midlands South West Newborn Neonatal ODN	446	436 (98%)	358	55	413 (93%)	10 (2%)
North Central & North East London Neonatal ODN	708	695 (98%)	603	61	664 (94%)	13 (2%)
North West London Neonatal ODN	424	414 (98%)	319	80	399 (94%)	10 (2%)
North West Neonatal ODN	1069	1058 (99%)	868	138	1006 (94%)	11 (1%)
Northern Neonatal ODN	456	446 (98%)	344	79	423 (93%)	10 (2%)
Peninsula & Western Neonatal ODN	512	499 (97%)	432	52	484 (95%)	13 (3%)
Scotland	515	506 (98%)	430	49	479 (93%)	9 (2%)
South East Coast Neonatal ODN	605	582 (96%)	469	84	553 (91%)	23 (4%)
South London Neonatal ODN	645	641 (99%)	531	86	617 (96%)	4 (1%)
Staffordshire, Shropshire and Black Country Neonatal ODN	325	324 (100%)	289	31	320 (98%)	1 (0%)
Thames Valley & Wessex ODN (Thames Valley)	322	320 (99%)	268	39	307 (95%)	2 (1%)
Thames Valley & Wessex ODN (Wessex)	392	387 (99%)	334	42	376 (96%)	5 (1%)
Trent Perinatal & Central Newborn Neonatal ODN	701	683 (97%)	564	86	650 (93%)	18 (3%)
Wales	385	370 (96%)	296	41	337 (88%)	15 (4%)
Yorkshire & Humber Neonatal ODN	855	851 (100%)	717	119	836 (98%)	4 (0%)
Other	5	3 (60%)	3	0	3 (60%)	2 (40%)
Total	**9131**	**8968 (98%)**	**7456**	**1141**	**8597 (94%)**	**163 (2%)**

Table 8.3

Comparison to ROP audit results in previous NNAP audits.

NNAP reporting year	Number of eligible NNU	Number of eligible babies	Number of babies with a known ROP screening (% of eligible babies)	ROP screening known		
				On time (% of eligible babies)	Early (% of eligible babies)	Late* (% of eligible babies)
2008	148	3414	1936 (57%)			
2009	167	7913	5336 (67%)	2098 (27%)	1859 (23%)	1379 (17%)
2010	171	8235	5853 (71%)	4777 (58%)	308 (4%)	768 (9%)
2011	164	7887	6460 (82%)	5310 (67%)	233 (3%)	917 (13%)
2012	173	7996	6312 (79%)	5319 (67%)	122 (2%)	871 (11%)
2013	175	8000	7497 (94%)	6995 (87%)	70 (1%)	432 (5%)
2014	173	8224	7997 (97%)	7653 (93%)	61 (1%)	283 (3%)
2015	179	8821	8604 (98%)	8226 (93%)	54 (1%)	324 (4%)
2016	181	9131	8968 (98%)	8597 (94%)	38 (0.4%)	333 (4%)

**For data from 2008-2011 inclusive all screenings that occurred after the time of final neonatal discharge were considered as 'late'.*

Table 8.4

ROP screening for babies born <1501g or gestation at birth <32 weeks by NNU level in England, Scotland and Wales. Adherence to standard by indication for screening, and whether transfer had occurred before the end of the screening window.

Group	Number of eligible babies	Babies with any screening data (% of eligible babies)	On time (% of eligible babies)	Late	Early
< 27 weeks	1362	1358 (99%)	1280 (93%)	76	2
27-28 weeks	1738	1735 (99%)	1674 (96%)	60	1
29-31 weeks	4667	4617 (98%)	4464 (95%)	139	14
≥ 32 weeks	1364	1258 (92%)	1179 (68%)	58	21
> 1500g	1999	1960 (98%)	1883 (94%)	69	8
Not transferred before ROP window closed	4971	4808 (97%)	4614 (93%)	188	6
Transferred before ROP window closed	4160	4160 (100%)	3983 (96%)	145	32

Mother's milk at discharge

Full key findings and recommendations for this audit measure can be found on pages 28 and 29.

NNAP audit measure: What proportion of babies < 33 weeks gestation at birth were receiving any of their own mother's milk at discharge to home from a neonatal unit?

Standard: Benchmarking
Source of Standard: NNAP Board

Only babies who had a final discharge to 'home' at the end of their first episode of care are included in this analysis, i.e. all the babies included in this question were admitted to and stayed in only one NNU before being discharged home.

Results:

Of the **11,449** babies born and admitted in NNAP NNU at less than 33 weeks there were **6,574** babies born < 33 weeks reported by **176** NNU who met the criteria for inclusion in this question.

Daily data summaries for the last or penultimate day of care indicated that **59%** of eligible babies were receiving mother's milk, exclusively or with another form of feeding, at the time of their discharge from neonatal care.

Of the remaining babies, **40%** were recorded as receiving other types of feeding* at discharge and **2%** had no feeding data available from the last or penultimate day of care.

This question concentrates on non-transferred babies so that unit level analysis can attribute this outcome to unit processes. However, in doing so **43%** of otherwise eligible babies are excluded from analysis, which remains a limitation with the quality of this metric.

**Other types of enteral feeds that could be selected were 'Formula', 'Donor expressed breast milk' and 'Nil by mouth'.*

Table 9.1

Babies born <33 weeks and receiving any of their mother's milk when discharged from a neonatal unit by NNU level.

NNU level	Number of eligible NNU	Number of eligible babies	Enteral feeds at the time of discharge		
			Feeding with any mothers milk (% of eligible babies)	Feeding without mother's milk (% of eligible babies)	Missing data (% of eligible babies)
SCU	32	297	179 (60%)	117 (39%)	1 (0%)
LNU	87	2972	1836 (62%)	1126 (38%)	10 (0%)
NICU	57	3305	1851 (56%)	1364 (41%)	90 (3%)
Total	176	6574	3866 (59%)	2607 (40%)	101 (2%)

Figure 9.1

Proportion of babies with gestation at birth <33 weeks, who were discharged home on some of their mothers own milk, participating units in England, Scotland and Wales in 2016. Values (circles) for units and 95% confidence intervals (bars) are shown in ascending value order.

- - - - indicates the NNAP standard
. . . . indicates the national rate of compliance

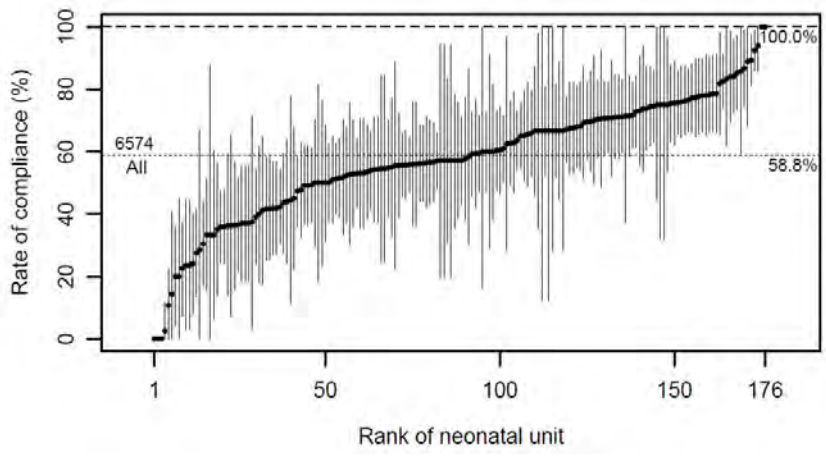


Table 9.2

Non-transferred babies born < 33 weeks and receiving any of their mother's milk when discharged from a NNU by neonatal network.

Neonatal network	Number of eligible babies	Enteral feeds at the time of discharge		
		Feeding with any mother's milks (% of eligible babies)	Feeding without mother's milk (% of eligible babies)	Missing data (% of eligible babies)
East of England Neonatal ODN	586	384 (66%)	202 (34%)	0 (0%)
Midlands South West Newborn Neonatal ODN	274	162 (59%)	108 (39%)	4 (1%)
North Central & North East London Neonatal ODN	458	343 (75%)	110 (24%)	5 (1%)
North West London Neonatal ODN	242	186 (77%)	55 (23%)	1 (0%)
North West Neonatal ODN	786	348 (44%)	356 (45%)	82 (10%)
Northern Neonatal ODN	262	103 (39%)	157 (60%)	2 (1%)
Peninsula & Western Neonatal ODN	384	239 (62%)	145 (38%)	0 (0%)
Scotland	451	212 (47%)	236 (52%)	3 (1%)
South East Coast Neonatal ODN	456	304 (67%)	152 (33%)	0 (0%)
South London Neonatal ODN	451	350 (78%)	100 (22%)	1 (0%)
Staffordshire, Shropshire and Black Country Neonatal ODN	250	112 (45%)	138 (55%)	0 (0%)
Thames Valley & Wessex ODN (Thames Valley)	241	170 (71%)	71 (29%)	0 (0%)
Thames Valley & Wessex ODN (Wessex)	303	207 (68%)	96 (32%)	0 (0%)
Trent Perinatal & Central Newborn Neonatal ODN	530	288 (54%)	239 (45%)	3 (1%)
Wales	230	117 (51%)	113 (49%)	0 (0%)
Yorkshire & Humber Neonatal ODN	663	337 (51%)	326 (49%)	0 (0%)
Other	7	4 (57%)	3 (43%)	0 (0%)
Total	**6574**	**3866 (59%)**	**2607 (40%)**	**101 (2%)**

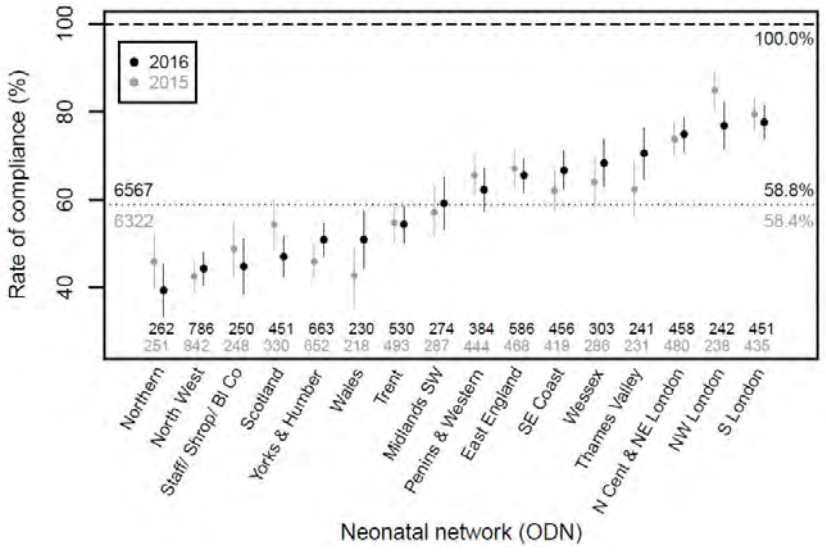
Table 9.3

Comparison to mother's milk at discharge results in previous NNAP audits.

NNAP Year	Number of eligible NNU	Number of eligible babies	Enteral feeds at the time of discharge		
			Feeding with any mothers milk (% of eligible babies)	Feeding without mother's milk (% of eligible babies)	Missing data (% of eligible babies)
2011	159	5578	3007 (54%)	2438 (44%)	133 (2%)
2012	169	5678	3271 (58%)	2371 (42%)	36 (< 1%)
2013	170	5920	3509 (59%)	2393 (40%)	18 (< 1%)
2014	169	5942	3570 (60%)	2296 (39%)	76 (1%)
2015	175	6323	3693 (58%)	2575 (41%)	55 (1%)
2016	176	6574	3866 (59%)	2607 (40%)	101 (2%)

Figure 9.2

Proportion of babies with gestation at birth <33 weeks, who were discharged home on some of their mothers own milk, participating networks in England, Scotland and Wales across 2015 and 2016. Values (circles) for networks and 95% confidence intervals (bars) are shown in ascending value order.



Clinical follow-up at two years of age

Full key findings and recommendations for this audit measure can be found on pages 30 and 31.

NNAP audit measure: Are rates of normal survival at two years comparable in similar babies from similar neonatal units?

Standard: 100% of babies with data entered
Analysis: (a) number of babies with some/all health data entered
(b) number of babies lost to follow up
(c) number of babies who died after discharge
(d) number of babies with no data entered
(e) number of babies classified as mildly/moderately/severely impaired

Source of Standard: NNAP Board

NNAP audited the number of eligible babies born at a gestational age of <30 weeks for whom a two year (corrected post term) health status follow-up has been partially or fully completed. Follow up data were available up to March 2017, and babies born during the 12 month period of July 2013 to June 2014 were selected, as these babies could have been expected to have had a follow up appointment by the end of 2016.

Preterm infants are at high risk of neonatal mortality and adverse developmental outcomes. It is important that the development of very preterm babies who were admitted to a neonatal unit is monitored after their discharge from the neonatal unit. The purpose of this follow up is to detect significant medical or developmental problems attributable to preterm delivery, and arrange appropriate treatment. Such follow up is also important to facilitate quality improvement in neonatal care.

NICE guideline [NG72] "Developmental follow-up of children and young people born preterm", published on 9 August 2017, describes what form follow up should take, but at the time of 2016 data entry the *National Neonatal Service Specification for Critical Care* mandates that medical follow up should be undertaken at two years corrected age.

Results:

There were **4,023** babies <30 weeks gestation born between July 2013 and June 2014 who survived and were discharged from a NNU to home, to a ward or to foster care, of these babies:

61% of babies had some/all health data entered
64 babies were recorded as being lost to follow up
29 babies were reported to have died after discharge
39% had no follow-up data entered at all

Of the **2,450** babies with health data entered, **50%** had no neurodevelopmental impairment, **21%** had mild/moderate impairment, **17%** had severe impairment and **11%** had insufficient data to determine the impairment category.

Only 1358/4023 (**34%**) eligible infants had a standardised assessment performed as part of their 2 year follow up in comparison to 36% in 2015).

Some possible rise in data quality (4% rise in impairment determinable to 53% of all babies <30/40 from 49% in 2015).

Table 10.1

Clinical follow up data recorded at two years of age for 4023 babies < 30 weeks gestation born between July 2013 and June 2014 who survived and were discharged from a NNU to home, to a ward or to foster care.

Year	Eligible babies	Some health data entered = 61%					No health data entered = 39%		
		Impairment not determinable*	No impairment	Mild/ moderate impairment	Severe impairment	Died post discharge	Lost to follow up	Not assessed for other reason	No data or reason entered
2016	4023	279 (7%)	1219 (30%)	515 (13%)	408 (10%)	29 (1%)	64 (2%)	542 (13%)	967 (24%)
Total	**4023**	**2450/4023 (61%)**					**1573/4023 (39%)**		

*An infant's two year follow up data is classified as "Impairment not determinable" when there is not enough data entered to derive the extent (if any) of the impairment.

Figure 10.1

Clinical follow up at two years of age, in babies born at <30 weeks gestation born between July 2013 and June 2014 who survived and were discharged from a NNU to home, to a ward or to foster care in participating units in England, Scotland* and Wales. Values (circles) for units and 95% confidence intervals (bars) are shown in ascending value order.

- - - - indicates the NNAP standard
. . . . indicates national rate of compliance

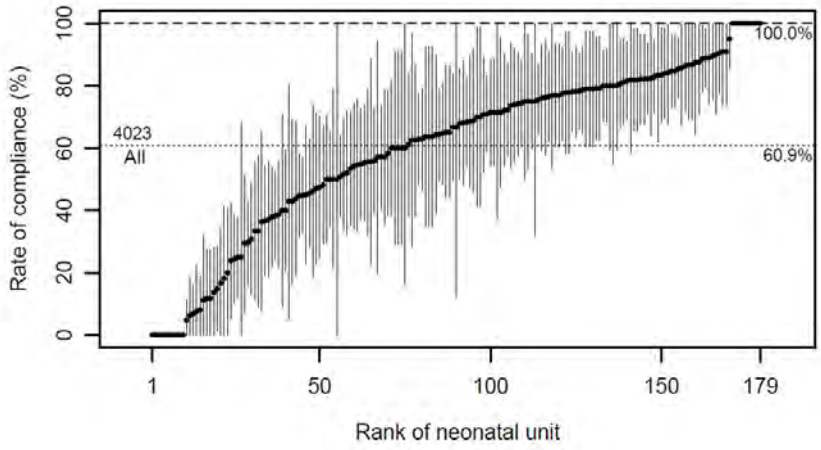


Figure 10.2

Clinical follow up at two years of age, in babies born at <30 weeks gestation born between July 2013 and June 2014 who survived and were discharged from a NNU to home, to a ward or to foster care in participating networks in England, Scotland* and Wales. Values (circles) for networks and 95% confidence intervals (bars) are shown in ascending value order.

- - - - indicates the NNAP standard
. . . . indicates national rate of compliance

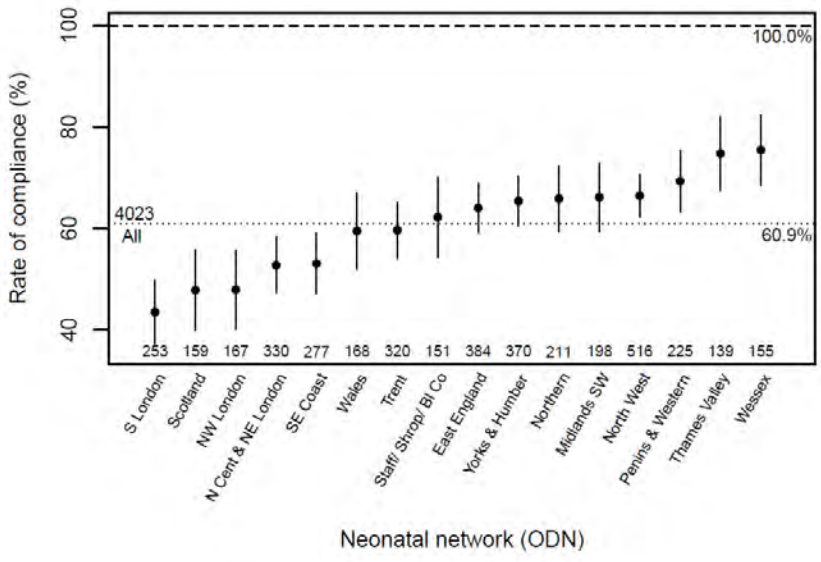
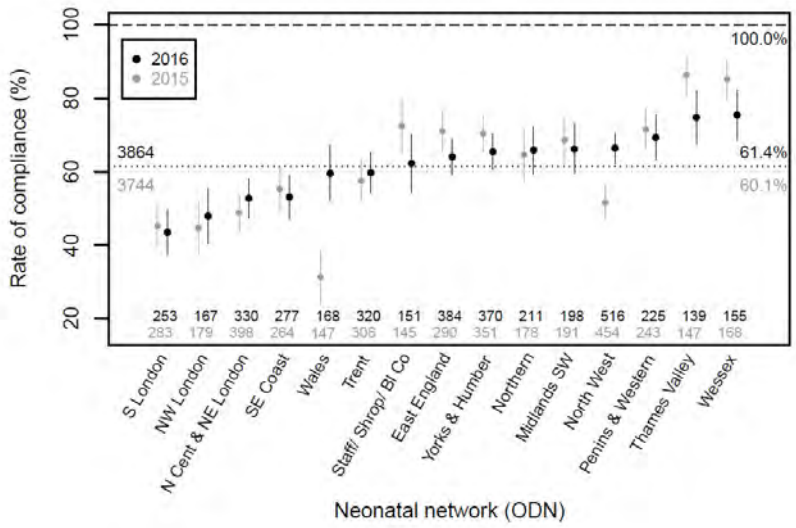


Figure 10.3

Clinical follow up at two years of age, in babies born at <30 weeks gestation born between July 2012 and June 2013 and between July 2013 and June 2014 who survived and were discharged from a NNU to home, to a ward or to foster care in participating networks in England, Scotland* and Wales. Values (circles) for networks and 95% confidence intervals (bars) are shown in ascending value order.



*No data were available for the two year follow-up for Scotland in 2015 as Scottish units were not participating in the audit in 2012/13.

Table 10.2

Neurodevelopmental outcomes and health data completeness from two year (corrected post term) health follow up recorded by neonatal network, babies born < 30 weeks gestation between July 2013 and June 2014 who survived to discharge from neonatal care.

Neonatal network of final discharge	Eligible babies	Some health data entered						No health data entered		
		Impairment not determinable	Impairment determinable*	No impairment	Mild/ moderate impairment	Severe impairment	Died post discharge	Lost to follow-up	Not assessed for other reason	No data or reason entered
East of England Neonatal ODN	384	31	208	110	55	43	7	1	55	82
Midlands South West Newborn Neonatal ODN	198	11	117	58	33	26	3	2	23	42
North Central & North East London Neonatal ODN	330	23	150	78	37	35	1	5	28	123
North West London Neonatal ODN	167	8	72	48	16	8	0	0	18	69
North West Neonatal ODN	516	38	301	181	61	59	4	14	60	99
Northern Neonatal ODN	211	11	127	73	29	25	1	0	19	53
Peninsula & Western Neonatal ODN	225	31	123	65	35	23	2	0	25	44
Scotland	159	10	64	42	12	10	2	2	32	49
South East Coast Neonatal ODN	277	20	126	72	29	25	1	0	52	78
South London Neonatal ODN	253	7	102	44	37	21	1	14	17	112
Staffordshire, Shropshire and Black Country Neonatal ODN	151	11	82	48	20	14	1	7	23	27
Thames Valley & Wessex ODN (Thames Valley)	139	3	101	58	28	15	0	0	33	2

Neonatal network of final discharge	Eligible babies	Some health data entered						No health data entered		
		Impairment not determinable	Impairment determinable*	No impairment	Mild/ moderate impairment	Severe impairment	Died post discharge	Lost to follow-up	Not assessed for other reason	No data or reason entered
Thames Valley & Wessex ODN (Wessex)	155	7	110	73	22	15	0	4	25	9
Trent Perinatal & Central Newborn Neonatal ODN	320	32	159	90	44	25	0	5	63	61
Wales	168	10	89	45	25	19	1	2	14	52
Yorkshire & Humber Neonatal ODN	370	26	211	134	32	45	5	8	55	65
Total	**4023**	**279**	**2142**	**1219**	**515**	**408**	**29**	**64**	**542**	**967**

*An infant's two year follow up data is classified as "Impairment determinable" when there is enough data entered to categorise the infant as having "No impairment", "Mild/moderate impairment", "Severe impairment".

Table 10.3

Respiratory and gastro-intestinal outcomes and health from two year (corrected post term) health follow-up recorded by neonatal network, babies born <30 weeks gestation between July 2013 and June 2014 who survived to discharge from neonatal care.

Neonatal network of final discharge	Eligible babies with health data entered	Respiratory				Gastro-intestinal			
		Impairment not determinable	No impairment	Mild/ moderate impairment	Severe impairment	Impairment not determinable	No impairment	Mild/ moderate impairment	Severe impairment
East of England Neonatal ODN	239	5	229	3	2	4	223	6	6
Midlands South West Newborn Neonatal ODN	128	1	125	2	0	2	120	1	5
North Central & North East London Neonatal ODN	173	8	161	1	3	12	156	3	2
North West London Neonatal ODN	80	3	77	0	0	3	74	2	1
North West Neonatal ODN	339	22	299	11	7	19	302	12	6
Northern Neonatal ODN	138	5	126	3	4	4	125	2	7
Peninsula & Western Neonatal ODN	154	13	141	0	0	14	133	5	2
Scotland	74	6	62	4	2	6	64	1	3
South East Coast Neonatal ODN	146	3	140	1	2	4	133	4	5
South London Neonatal ODN	109	1	104	1	3	1	93	8	7
Staffordshire, Shropshire and Black Country Neonatal ODN	93	0	92	1	0	1	88	2	2
Thames Valley & Wessex ODN (Thames Valley)	104	1	100	0	3	2	92	7	3

Neonatal network of final discharge	Eligible babies with health data entered	Respiratory				Gastro-intestinal			
		Impairment not determinable	No impairment	Mild/ moderate impairment	Severe impairment	Impairment not determinable	No impairment	Mild/ moderate impairment	Severe impairment
Thames Valley & Wessex ODN (Wessex)	117	2	108	2	5	2	108	3	4
Trent Perinatal & Central Newborn Neonatal ODN	191	3	178	4	6	5	171	10	5
Wales	99	3	95	1	0	4	93	1	1
Yorkshire & Humber Neonatal ODN	237	3	226	4	4	5	222	3	7
Total	**2421**	**79**	**2263**	**38**	**41**	**88**	**2197**	**70**	**66**

Table 10.4

Year	Eligible babies	Some health data entered						No Health data entered		
		Impairment not determinable	Impairment determinable	No Impairment	Mild/ moderate impairment	Severe impairment	Died post discharge	Lost to follow-up	Not assessed for other reason	No data or reason entered
2012	2967	228 (8%)	1004 (34%)	568 (19%)	215 (7%)	221 (7%)	10 (0%)	46 (2%)	120 (4%)	1559 (53%)
2013	3488	350 (10%)	1201 (34%)	676 (19%)	270 (8%)	255 (7%)	10 (0%)	31 (1%)	310 (9%)	1586 (45%)
2014	3656	392 (11%)	1581 (43%)	889 (24%)	337 (9%)	355 (10%)	20 (1%)	80 (2%)	379 (10%)	1204 (33%)
2015	3744	411 (11%)	1841 (49%)	963 (26%)	506 (14%)	372 (10%)	13 (0%)	58 (2%)	399 (11%)	1022 (27%)
2016	4023	279 (7%)	2142 (53%)	1219 (30%)	515 (13%)	408 (10%)	29 (1%)	64 (2%)	542 (13%)	967 (24%)

Comparison to clinical follow up at two years of age results in previous NNAP audits.

Table 10.5

Recorded provision of standardised assessments to babies < 30 weeks born between July 2013 and June 2014 who had health data available

Neonatal network of Final Discharge	Number of eligible babies	Number of eligible babies with health data entered	No data on a standardised assessment	Standardised assessment (% of eligible babies)	Standardised assessment used				
					Bayley-III	Griffiths	Schedule of growing	Other	Unknown
East of England Neonatal ODN	384	239	8	185 (48%)	164	6	12	3	0
Midlands South West Newborn Neonatal ODN	198	128	39	88 (44%)	30	0	56	1	1
North Central & North East London Neonatal ODN	330	173	14	137 (42%)	111	6	5	10	5
North West London Neonatal ODN	167	80	1	37 (22%)	30	0	1	6	0
North West Neonatal ODN	516	339	5	60 (12%)	15	0	9	18	18
Northern Neonatal ODN	211	138	9	102 (48%)	100	1	0	0	1
Peninsula & Western Neonatal ODN	225	154	14	133 (59%)	104	24	5	0	0
Scotland	159	74	10	50 (31%)	36	1	13	0	0
South East Coast Neonatal ODN	277	146	8	94 (34%)	57	0	36	0	1
South London Neonatal ODN	253	109	4	87 (34%)	46	26	11	2	2
Staffordshire, Shropshire and Black Country Neonatal ODN	151	93	4	52 (34%)	49	0	0	2	1
Thames Valley & Wessex ODN (Thames Valley)	139	104	10	50 (36%)	44	1	3	0	2
Thames Valley & Wessex ODN (Wessex)	155	117	7	48 (31%)	30	0	8	7	3
Trent Perinatal & Central Newborn Neonatal ODN	320	191	6	87 (27%)	14	3	60	1	9
Wales	168	99	6	82 (49%)	60	17	4	1	0
Yorkshire & Humber Neonatal ODN	370	237	9	66 (18%)	0	0	54	6	6
Total	**4023**	**2421**	**154**	**1358 (34%)**	**890**	**85**	**277**	**57**	**49**

Appendix A: Neonatal units that contributed 2016 data

Units represented in this report by less than 12 months of data are indicated by an asterisk (*).

NNU Name	NNU level
Bassetlaw District General Hospital	SCU
Bedford Hospital	SCU
Conquest Hospital	SCU
Cumberland Infirmary	SCU
Darent Valley Hospital	SCU
Darlington Memorial Hospital	SCU
Dewsbury & District Hospital	SCU
Epsom General Hospital	SCU
Furness General Hospital	SCU
George Eliot Hospital	SCU
Good Hope Hospital	SCU
Harrogate District Hospital	SCU
Hereford County Hospital	SCU
Hinchingbrooke Hospital	SCU
James Paget Hospital	SCU
North Devon District Hospital	SCU
Oxford University Hospitals, Horton Hospital	SCU
Pilgrim Hospital	SCU
Princess Royal Hospital	SCU
Princess Royal University Hospital	SCU
Queen Elizabeth Hospital, Gateshead	SCU
Queen Elizabeth The Queen Mother Hospital	SCU
Royal Surrey County Hospital	SCU
Scarborough General Hospital	SCU
South Tyneside District Hospital	SCU
The Royal Free Hospital	SCU
Torbay Hospital	SCU
University Hospital Of North Durham	SCU
Wansbeck General Hospital	SCU
Warwick Hospital	SCU
West Cumberland Hospital	SCU
West Middlesex University Hospital	SCU
West Suffolk Hospital	SCU
Worthing Hospital	SCU
Yeovil District Hospital	SCU
Ysbyty Gwynedd	SCU

NNU Name	NNU level
Airedale General Hospital	LNU
Barnet Hospital	LNU
Barnsley District General Hospital	LNU
Basildon Hospital	LNU
Basingstoke & North Hampshire Hospital	LNU
Borders General, Melrose	LNU
Broomfield Hospital	LNU
Calderdale Royal Hospital	LNU
Chesterfield & North Derbyshire Royal Hospital	LNU
City Hospital, Birmingham	LNU
Colchester General Hospital	LNU
Countess Of Chester Hospital	LNU
Croydon University Hospital	LNU
Diana Princess Of Wales Hospital	LNU
Doncaster Royal Infirmary	LNU
Dorset County Hospital	LNU
Dumfries & Galloway Royal Infirmary	LNU
East Surrey Hospital	LNU
Forth Valley Royal Hospital	LNU
Frimley Park Hospital	LNU
Glangwili General Hospital	LNU
Gloucestershire Royal Hospital	LNU
Great Western Hospital	LNU
Hillingdon Hospital	LNU
Ipswich Hospital	LNU
Kettering General Hospital	LNU
King's Mill Hospital	LNU
Kingston Hospital	LNU
Leighton Hospital	LNU
Lincoln County Hospital	LNU
Lister Hospital	LNU
Macclesfield District General Hospital	LNU
Manor Hospital	LNU
Milton Keynes Foundation Trust Hospital	LNU
Nevill Hall Hospital	LNU
Newham General Hospital	LNU
Nobles Hospital	LNU
North Manchester General Hospital	LNU
North Middlesex University Hospital	LNU
Northampton General Hospital	LNU
Northwick Park Hospital	LNU
Ormskirk District General Hospital	LNU

NNU Name	NNU level
Peterborough City Hospital	LNU
Pinderfields General Hospital	LNU
Poole Hospital NHS Foundation Trust	LNU
Prince Charles Hospital	LNU
Princess Alexandra Hospital	LNU
Princess Of Wales Hospital	LNU
Queen Elizabeth Hospital, King's Lynn	LNU
Queen Elizabeth Hospital, Woolwich	LNU
Queen's Hospital, Burton On Trent	LNU
Queen's Hospital, Romford	LNU
Raigmore Hospital, Inverness	LNU
Rotherham District General Hospital	LNU
Royal Albert Edward Infirmary	LNU
Royal Alexandra, Paisley	LNU
Royal Berkshire Hospital	LNU
Royal Cornwall Hospital	LNU
Royal Derby Hospital	LNU
Royal Devon & Exeter Hospital	LNU
Royal Glamorgan Hospital	LNU
Royal Hampshire County Hospital	LNU
Royal Lancaster Infirmary	LNU
Royal Shrewsbury Hospital	LNU
Royal United Hospital	LNU
Russells Hall Hospital	LNU
Salisbury District Hospital	LNU
Scunthorpe General Hospital	LNU
Southend Hospital	LNU
St Helier Hospital	LNU
St Mary's Hospital, IOW	LNU
St Mary's Hospital, London	LNU
St Richard's Hospital	LNU
Stepping Hill Hospital	LNU
Stoke Mandeville Hospital	LNU
Tameside General Hospital	LNU
Taunton & Somerset Hospital	LNU
Tunbridge Wells Hospital	LNU
University Hospital Lewisham	LNU
University Hospital Of South Manchester	LNU
Victoria Hospital, Blackpool	LNU
Warrington Hospital	LNU
Watford General Hospital	LNU
Wexham Park Hospital	LNU

NNU Name	NNU level
Whipps Cross University Hospital	LNU
Whiston Hospital	LNU
Whittington Hospital	LNU
Worcestershire Royal Hospital	LNU
York District Hospital	LNU
Aberdeen Maternity Hospital	NICU
Arrowe Park Hospital	NICU
Ayrshire Maternity Unit	NICU
Birmingham Heartlands Hospital	NICU
Birmingham Women's Hospital	NICU
Bradford Royal Infirmary	NICU
Chelsea & Westminster Hospital	NICU
Derriford Hospital	NICU
Glan Clwyd Hospital	NICU
Guy's & St Thomas' Hospital	NICU
Homerton Hospital	NICU
Hull Royal Infirmary	NICU
James Cook University Hospital	NICU
King's College Hospital	NICU
Lancashire Women & Newborn Centre	NICU
Leeds Neonatal Service[1]	NICU
Leicester Neonatal Service[2]	NICU
Liverpool Women's Hospital	NICU
Luton & Dunstable Hospital	NICU
Medway Maritime Hospital	NICU
New Cross Hospital	NICU
Ninewells, Dundee	NICU
Norfolk & Norwich University Hospital	NICU
North Bristol NHS Trust (Southmead)	NICU
Nottingham City Hospital	NICU
Nottingham University Hospital (QMC)	NICU
Oxford University Hospitals, John Radcliffe Hospital	NICU
Princess Anne Hospital	NICU
Princess Royal Maternity, Glasgow	NICU
Queen Alexandra Hospital	NICU
Queen Charlotte's Hospital	NICU
The Rosie Maternity Hospital, Cambridge	NICU
Royal Bolton Hospital	NICU
Royal Gwent Hospital	NICU
Royal Hospital For Children	NICU
Royal Oldham Hospital	NICU
Royal Preston Hospital	NICU

NNU Name	NNU level
Royal Stoke University Hospital	NICU
Royal Sussex County Hospital	NICU
Royal Victoria Infirmary	NICU
Singleton Hospital	NICU
St George's Hospital	NICU
St Mary's Hospital, Manchester	NICU
St Michael's Hospital	NICU
St Peter's Hospital	NICU
Sunderland Royal Hospital	NICU
The Jessop Wing, Sheffield	NICU
The Royal London Hospital	NICU
University College Hospital	NICU
University Hospital Coventry	NICU
University Hospital Of North Tees	NICU
University Hospital Of Wales	NICU
Victoria Hospital, Fife	NICU
William Harvey Hospital	NICU
Wishaw General Hospital	NICU
Wrexham Maelor Hospital	NICU

1 Data from Leeds Neonatal Service includes data from Leeds General Hospital and St James's Hospital.

2 Data from Leicester Neonatal Service includes data from Leicester Royal Infirmary and Leicester General Hospital.

Appendix B: RCPCH Research & Policy Division resources and publications

Invited Reviews

Our invited reviews service aims to support healthcare organisations and clinical teams to resolve service, practice or individual concerns or 'benchmark' their paediatric and/or neonatal service provision. This can include issues around safety, training, compliance with standards, and proposals for reconfiguration, expansion or service design.

This confidential, established and influential service offers independent external peer opinion backed by a respected professional body. We have worked with over 60 organisations, and their teams, in the four years since the service was established, including individual neonatal units and networks in Wales, Scotland and all parts of England.

Seeking assistance?

More details about the review service can be found on our website www.rcpch.ac.uk/invitedreviews.

We welcome enquiries from healthcare organisations or commissioners and would be happy to discuss in confidence, without obligation, how the service may be able to help. Please contact the team on invited.reviews@rcpch.ac.uk or call Sue Eardley on 020 7092 6091.

Meds IQ

Meds IQ is an online library of QI resources in improving paediatric medication safety. The resources vary in scope and level of quality assurance – from small, Trust approved practice improvement projects to nationally accredited, innovative tools.

An example of a resource on Meds IQ is NeoMate – a smartphone app that aims to improve outcomes for newborn babies who require intensive care following birth.

Recognising that sick babies are often born unexpectedly in smaller hospitals without a tertiary neonatal intensive care service, the app aims to bridge the gap between regional centres and local peripheral hospitals by giving all staff the information they need to make decisions safely, for free.

The app is endorsed by the London Neonatal Transfer Service, and drug calculations have been quality checked by the trust neonatal pharmacy team. Checklists were created by a consortium of neonatal consultants, registrars and nurses. The app won an NHS Innovation Challenge Award in 2015. It is also MHRA certified.

NeoMate and other useful tools, projects and e-learning can be found on www.medsiq.org.

Paediatric workforce data

The College collects data regarding the paediatric workforce, child health services provision and issues facing the service and workforce through its biennial Paediatric Workforce Census and other data collection activities. The Census tells us where neonatal services are located, at what level, and how they are staffed. It also tells us how many paediatricians specialise in, or have a special interest in, neonatology, and where they are employed.

These data can be used to identify pressure areas, and to inform workforce planning and national policy development. The College supports members to use these data to inform service development in their local area.

A short report, State of Child Health: The Paediatric Workforce, based on the findings of the 2015 RCPCH Medical Workforce Census, was published in May 2017.

For more information, and to access both reports, visit:
www.rcpch.ac.uk/workforce or contact workforce@rcpch.ac.uk.

Research &US: Infants', Children's and Young People's Child Health Research Charter

Working with children, young people, parents, carers and healthcare professionals, the RCPCH developed the Infants', Children's and Young People's Child Health Research Charter (Charter) to provide guiding principles for anyone; whether that be a child, young person, parent, doctor, nurse, allied healthcare professional, researcher or anyone working with and involving children and young people in research.

The Charter is one of the commitments the RCPCH made in the Turning the Tide report and builds on the work of the Nuffield Council on Bioethics, Generation R, National Institute of Health Research, the National Children's Bureau, UNICEF and more.

Child health research is important and the RCPCH supports the need for clinicians to involve children and young people in research and discussions surrounding this. It is important to remember that children are different from adults and their bodies' responds differently to treatments, they have different opinions and what matters to them may be different to what matters to the adults around them. The Charter highlights the need to appropriately involve children and young people in all stages of research, form the development and design to dissemination of results.

For more information or advice about research please contact the RCPCH Research and Evaluation Team at research@rcpch.ac.uk, or to find out more about involving children and young people contact and_us@rcpch.ac.uk.

Paediatric Care Online (PCO UK)

PCO UK (www.pcouk.org) is an online decision support system designed for healthcare professionals who see children at the point of presentation, providing immediate access to clinically assured information to inform decisions at point of care. PCO UK includes Key Practice Points; from abdominal distension to wheezing they offer clinically assured advice on 'red flag' signs and symptoms and referral pathways, incorporating national clinical guidance where available.

To respond to user demand, the PCO UK app has been created to provide quick and easy access to this powerful resource, even when you're offline. The app now makes it even easier to access the information you need, when you need it, and you can enjoy access to over 100 Key Practice Points, the RCPCH Child Protection Companion and PHE's Green Book, all in one place on your phone or tablet.

PCO UK is developed by a partnership group, hosted by the RCPCH and funded by the Department of Health. Partners include the Royal College of General Practitioners, the Royal Pharmaceutical Society, the Royal College of Nursing, the Institute of Health Visiting and the American Academy of Pediatrics.

All RCPCH members have access to PCO UK included in their membership, and can email membership@rcpch.org.uk with any queries. For other subscription options, including individual and institutional licences, please contact the team at pco@rcpch.ac.uk to discuss. For general enquiries, please contact the PCO UK Team on pco@rcpch.ac.uk.

Appendix C – Key recommendations by audience

The NNAP 2017 Annual Report on 2016 data makes a number of key recommendations of how to address the issues identified within the key findings and results of the audit.

The tables below indicate where the recommendations are particularly directed towards either:

- The NNAP neonatal unit teams that provide direct neonatal care
- The regional neonatal operational delivery networks (ODNs) in England and the neonatal networks in Scotland and Wales that provide advice on neonatal services to health boards, trusts and commissioners
- Those who commission neonatal services
- The health board / trust senior management that supports neonatal services locally
- The NNAP Project Board
- Parents
- Developers of related clinical guidelines
- Colleagues at the National Maternal and Perinatal Audit

Audit measure	For neonatal unit clinical teams
Antenatal steroids	**Neonatal units**, together with the lead obstetrician responsible for the implementation of the NICE guidance on preterm labour (NICE NG25, 2015), should formally review records of babies born at <35 weeks admitted for neonatal care where antenatal steroids were not given to the mother, in order to identify potential missed opportunities and themes as to why these were not given.
Magnesium sulphate	**Neonatal units**, together with the lead obstetrician responsible for the implementation of the NICE guidance on preterm labour, should formally review records of babies born at <30 weeks admitted for neonatal care where magnesium sulphate was not given to the mother, in order to identify potential missed opportunities and themes as to why these were not given.

Temperature on admission	**Neonatal units** with an existing focus on promoting admission normothermia should maintain these initiatives, using quality improvement methodology. **Neonatal units** should ensure that they have a care bundle in place, developed with multidisciplinary input, which mandates the use of evidence-based strategies to encourage admission normothermia of very preterm infants. **Neonatal units** that have above average rates of admission hypothermia recorded for their babies should firstly consider whether they have such an evidence-based care bundle and, if they do, should audit whether they are applying it effectively, and seek local quality improvement and learning opportunities by comparing their practices to units with better performance using NNAP Online. **Neonatal units** should report all infants admitted with marked hypothermia (admission temperature <36.0°C) through local governance structures to identify opportunities to improve practices. **Neonatal units** should, if existing focus on promoting admission normothermia does not result in sustained improvements, consider using real time temperature measurement between birth and admission to guide interventions during this period.
Consultation with parents	**Neonatal units** should review the reasons why timely parental consultations did not occur in their units, asking whether documentation and recording processes describe, on a daily basis, whether or not parents have seen a senior member of staff. They should seek to identify themes among the underlying reasons and put processes in place in order to strengthen their support of parental partnership in care. **Neonatal units** should ensure they have a same day process for the electronic capture of information about parental consultation. **Neonatal units** should make use of guidance on parent involvement in their baby's care which is readily available in the Bliss Baby Charter Standards. **Neonatal units** should refer to the NNAP Online reporting tool to identify suitable units for comparison to inform local quality improvement for this audit measure. **Neonatal units** should promote the aims and importance of the NNAP with parents by discussing the NNAP booklet "Your Baby's Care" with them and by openly displaying their latest NNAP results for parents in the unit using the poster generation function within NNAP Online. **Neonatal units** should ensure that they enter data for the new audit measure on the involvement of parents in ward rounds which was introduced by the NNAP for 2017. **Neonatal units** with poor data completeness should be aware that it is likely their underlying adherence to this communication standard is also poor.

Encephalopathy	**Neonatal units** should ensure that all cases of encephalopathy identified by the criteria used by the NNAP have been reviewed by a multidisciplinary group seeking modifiable factors, including representatives of obstetrics and midwifery, in accordance with the approach taken in the Royal College of Obstetricians and Gynaecologists' "Each Baby Counts" programme. **Neonatal units, hospital managers, commissioners, healthcare review bodies and the** public should not use the data from the first three years of this measure to make direct inferences about the quality of obstetric care delivered in organisations until collaboration with others in the field has developed appropriate case mix adjustment which may explain some of the variation observed in the data.
Bronchopulmonary dysplasia (BPD)	**Neonatal units** should consider reviewing their reported rates of significant BPD and use the NNAP online data reporting tool to identify similar units with which to compare themselves and identify potential quality improvement opportunities.
Measuring rates of infection on neonatal units	**Neonatal units** that have entered the positive blood cultures for all babies in their units should compare their rates of bloodstream infection with "known pathogens" and rates of bloodstream infection with central line use as measured by the clinical reference group (CRG)/ NNAP quality improvement surveillance definition of central line associated bloodstream infection. **Neonatal units** that have not provided assurance of entry of all positive blood cultures should develop means to do so, based on review of microbiology records and the Badger system.
Retinopathy of prematurity (ROP) screening	**Neonatal units** should strive to achieve the standard of 100% "on time" screening for ROP for all eligible babies. Where this does not occur due to late or absent screening, units should, as part of a formal local risk incident investigation, formally review their clinical, organisational and administrative pathways in discussion with their ophthalmology colleagues. **Neonatal units** identified as low outliers should review their clinical, organisational and administrative pathways with the aim of documenting comprehensive ROP screening in collaboration with their ophthalmology colleagues. **Neonatal units** with multiple missed ROP screening cases should use the NNAP Online data reporting tool to find units with which to compare themselves in order to identify quality improvement opportunities. **Neonatal units** should clearly describe to parents, prior to the opening of the screening window, but after the first week of life, the need for ROP screening using an individualised written resource which sets out for the parents the anticipated date of first screening for their baby.

Mother's milk at discharge	**Neonatal and midwifery staff** should, as part of active use of a multidisciplinary policy, inform women before delivery of a preterm baby of the major health benefits of breastmilk feeding for preterm babies and advocate breastmilk feeding. Staff should provide information and support about the practical aspects of breastmilk expression prior to, and after, delivery of the baby in order to help mothers of preterm infants to breastfeed. **Neonatal units** should use these data, alongside available data concerning breastfeeding practices in full term babies in their local area, to inform local quality improvement activity **Neonatal units** should aim to deliver sustainable sequential improvements in breastmilk feeding at discharge. **Neonatal networks and units** should use the NNAP online data reporting tool to compare their performance and its trajectory over time to that of suitable comparable networks. **Neonatal units, hospitals, neonatal networks and outside bodies** should interpret the breast milk feeding at discharge rates of individual units alongside data describing breastfeeding in the population local to that unit.
Clinical follow-up at two years of age	**Neonatal units** with incomplete data capture should develop specific plans to improve documented follow up of babies born at <30 weeks gestation. **Neonatal medical staff** should discuss the indications and arrangements for two year follow up with families in the period leading up to the discharge home of their baby, and support this communication with written information which details the expected timeframe for the two year follow up consultation.

Audit measure	For regional neonatal networks
Antenatal steroids	**Neonatal networks** should keep administration rates of antenatal steroids in their units under regular review, identify any quality improvement opportunities and support units to achieve the best possible neonatal outcomes.
Magnesium sulphate	**Neonatal networks** should keep administration rates of magnesium sulphate in their units under regular review, identify any quality improvement opportunities and support units to achieve the best possible neonatal outcomes.
Consultation with parents	**Neonatal networks** should review the parental consultation rates of units within their network, and offer encouragement and support to lower performing units to enhance parental partnership in care. Networks should encourage units to identify suitable comparator units with better performance using NNAP Online in order to identify quality improvement opportunities.
Encephalopathy	**Neonatal units, hospital managers, commissioners, healthcare review bodies and the** public should not use the data from the first three years of this measure to make direct inferences about the quality of obstetric care delivered in organisations until collaboration with others in the field has developed appropriate case mix adjustment which may explain some of the variation observed in the data.

Retinopathy of prematurity (ROP) screening	**Neonatal networks** should regularly review their units' adherence to ROP screening guidance, and consider supporting units in conducting quality improvement and education activities, especially where poor performance is repeated. **Commissioners and neonatal networks** should work together to ensure that sufficient trained personnel are available to perform ROP screening in neonatal units.
Mother's milk at discharge	**Neonatal networks and units** should use the NNAP online data reporting tool to compare their performance and its trajectory over time to that of suitable comparable networks. **Neonatal networks** should consider whether standardising aspects of support for breastmilk feeding across units would improve parental experience, particularly where babies are transferred. **Neonatal units, hospitals, neonatal networks and outside bodies** should interpret the breast milk feeding at discharge rates of individual units alongside data describing breastfeeding in the population local to that unit.
Clinical follow-up at two years of age	**Neonatal networks** should use the NNAP Online reporting tool to identify networks or units that have, as suggested by their higher results, better procedures or practices, and support their units to deliver and record follow up with higher levels of completeness.

Audit measure	For the NNAP
Antenatal steroids	**The NNAP and the National Maternity and Perinatal Audit** should collaborate to report antenatal steroid administration rates as part of the national Maternity Dashboard. **The NNAP** should seek to understand the clinical and audit processes in the parts of Scotland participating in NNAP in order to understand what practices other networks may be able to emulate.
Magnesium sulphate	**The NNAP** should investigate if an indication for antenatal magnesium sulphate administration could be added to the BadgerNet NNAP data quality checklist.
Temperature on admission	**The NNAP** should revisit the audit standard for the proportion of infants admitted normothermic, and review this standard every five years. **The NNAP** should consider whether to confine comparisons of rates of admission normothermia (in networks, or by unit level) to babies who were born in maternity units.
Consultation with parents	**The NNAP** should continue to measure adherence to this communication standard (using 12-hour admission duration cut off) in future reports
Encephalopathy	**The NNAP** should further develop the denominator data flow for this measure so as to minimise uncertainty in reported rates of encephalopathy.

Bronchopulmonary dysplasia (BPD)	**The NNAP** should, when reporting this measure of significant BPD in future, adjust for potential confounding variables such as mortality, in addition to reporting unadjusted rates in order to promote review of underlying processes and outcomes at network and unit level.
Measuring rates of infection on neonatal units	**The NNAP** should review the existing definition of bloodstream infection (and CLABSI) with organisms not defined as "known pathogens" in order to make them simpler and more practicable. **The NNAP** should seek to achieve linkage between Public Health England Second Generation Surveillance System and the National Neonatal Research Database (NNRD) in order to report meaningful data about bloodstream infection and thus facilitate quality improvement. **The NNAP** should consider deferring reporting on measures dependent on data about symptoms and signs contemporaneous with blood cultures until such time as the data are of adequate completeness.
Retinopathy of prematurity (ROP) screening	**The NNAP** should maintain continued surveillance of delivery of ROP screening in 2018 and beyond.
Mother's milk at discharge	**The NNAP** should consider longitudinal outlier analysis to identify networks or units who trajectory is different to that of other networks or units. **The NNAP** should consider including the transferred baby in this measure.
Clinical follow-up at two years of age	**The NNAP** should consider whether forthcoming NICE guidance about developmental follow up of preterm babies can be subject to audit by the NNAP.

Audit measure	For commissioners of neonatal services
Encephalopathy	**Neonatal units, hospital managers, commissioners, healthcare review bodies and the** public should not use the data from the first three years of this measure to make direct inferences about the quality of obstetric care delivered in organisations until collaboration with others in the field has developed appropriate case mix adjustment which may explain some of the variation observed in the data.
Retinopathy of prematurity (ROP) screening	**Commissioners and neonatal networks** should work together to ensure that sufficient trained personnel are available to perform ROP screening in neonatal units. **Commissioners** should consider using contractual mechanisms and Key Performance Indicators (KPIs) to encourage trusts to ensure comprehensive screening for ROP is conducted and sustained.
Clinical follow-up at two years of age	**NHS England commissioners, and their equivalents in Scotland and Wales**, should use contractual means such as Key Performance Indicators (KPIs) to encourage networks and units to deliver this key aspect of follow up care more effectively.

Audit measure	For health board / Trust senior management
Encephalopathy	**Neonatal units, hospital managers, commissioners, healthcare review bodies and the** public should not use the data from the first three years of this measure to make direct inferences about the quality of obstetric care delivered in organisations until collaboration with others in the field has developed appropriate case mix adjustment which may explain some of the variation observed in the data.
Mother's milk at discharge	**Neonatal units, hospitals, neonatal networks and outside bodies** should interpret the breast milk feeding at discharge rates of individual units alongside data describing breastfeeding in the population local to that unit.

Audit measure	For parents
Consultation with parents	**Parents** who feel they haven't had an early consultation should ask their baby's nurse to arrange one and use such meetings to discuss how they can work in partnership with the neonatal unit staff in their baby's care.
ROP screening	**Parents** should talk to neonatal unit staff and find out whether ROP screening might be needed for their baby. If it is, they should also find out when their baby's screening might be due. If their baby is due to be screened after being discharged from the unit, parents should make every effort to attend the appointment.
Clinical follow up at two years of age	**Parents** should ensure that they support the follow up of their preterm infants by attending appointments or engaging in alternative arrangements in the event that follow up becomes impractical, for example in situations where families move house at some distance from the discharging unit.

Audit measure	For guideline developers
ROP screening	**Guideline developers** should take the successful deployment of on time post discharge screening into account when describing appropriate clinical practice for ROP screening.

Audit measure	For the National Maternity and Perinatal Audit
Antenatal steroids	**The NNAP and the National Maternity and Perinatal Audit (NMPA)** should collaborate to report antenatal steroid administration rates as part of the national Maternity Indicators.
Mother's milk at discharge	**The National Maternity and Perinatal Audit** (**NMPA**) should align any future work concerning breastmilk feeding with that of the NNAP.

Royal College of
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Royal College of Paediatrics and Child Health
5-11 Theobalds Road, London, WC1X 8SH