National Patient Safety
Improvement Programmes

Maternity and Neonatal

Oxford and Wessex MatNeo SIP Shared Learning Event
Optimisation of the Preterm Infant

Event Chair: Eleri Adams, Consultant Neonatologist & GIRFT Neonatal Clinical Lead , Oxford University Hospitals
Co-Chair: Emma Johnston, Neonatal Parent & Family Engagement Lead, Thames Valley & Wessex ODN

Via Microsoft Teams
Thursday 10th March 2022

Delivered by:
TheAHSNNetwork

Led by:
NHS England
NHS Improvement

Welcome to the Oxford and Wessex MatNeo SIP Shared Learning Event
Optimisation of the Preterm Infant

10 March 2022
12:00-15:00

- Please mute yourself and ensure your camera is switched off unless you are speaking.
- This Event is being recorded and will be shared after the session
- Please use the chat box and the hand-up reaction if you have a question
- The session will start promptly at 12:00 and finish at 15:00

- FEEDBACK-There will be a link to a short Feedback form in the chat during the event, please can we ask that you complete.

- If you would like to get in touch or would be interested in attending more of our Patient Safety Collaborative events, please contact:
- Eileen.Dudley@oxfordahsn.org or Tara.Gradwell@oxfordahsn.org

Rebecca.savage@wessexahsn.net or James.lynch@wessexahsn.net

Mr Lawrence Impey

- Lawrence Impey is a Consultant in Obstetrics and the Lead for Fetal Medicine in Oxford University Hospitals NHS Foundation Trust.
- Lawrence is the Clinical Lead for the Oxford AHSN Maternity & Neonatal Network.
- He is interested in patient safety in maternity care, primarily through the development of safe and equitable systems.
- He has published widely on breech birth, fetal growth and the role of labour in determining neonatal outcomes and is author of the leading undergraduate text book in Obstetrics and Gynaecology.

National Patient Safety
Improvement Programmes

Maternity
and Neonatal

Mortality versus morbidity: term perinatal mortality risk reduction …this is relevant to preterm birth…

Mr. Lawrence Impey

Consultant in Obstetrics & Fetal Medicine, Oxford University Hospitals
Clinical Lead for the Maternity & Neonatal Network, Oxford AHSN

@NatPatSIP / @MatNeoSIP

www.improvement.nhs.uk

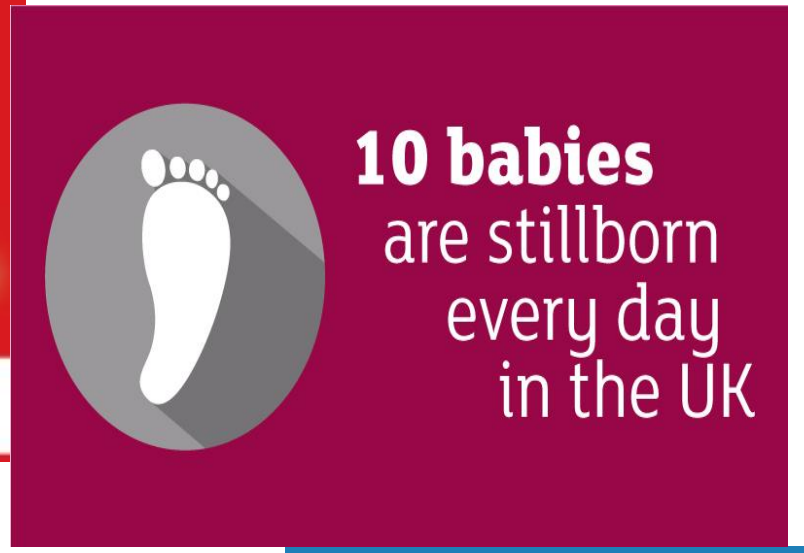
Delivered by:
The AHSN Network

Led by:
NHS England
NHS Improvement

THE SUNDAY TIMES

NHS REFORM

Safer births



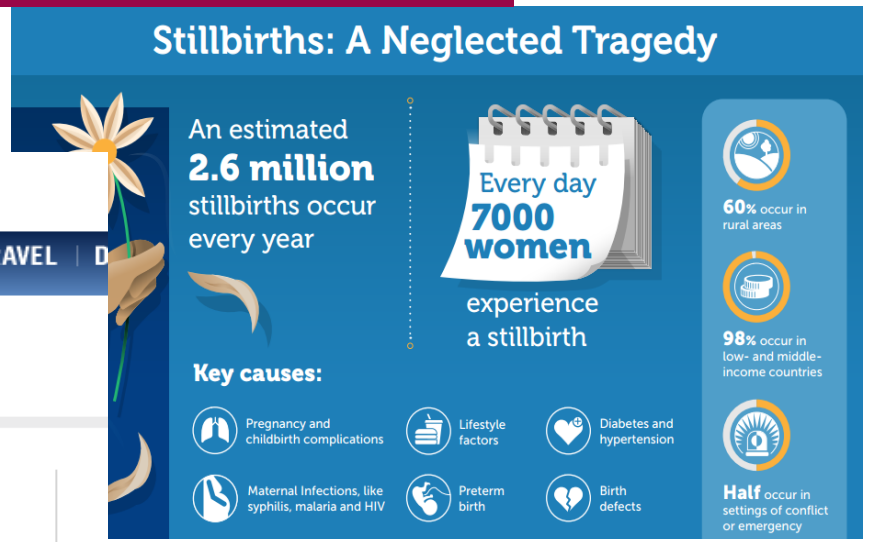
THE SUNDAY TIMES

NEWS | SPORT | BUSINESS | COMMENT | NEWS REVIEW | CULTURE | STYLE | TRAVEL | D

HOME / NEWS / UK NEWS / HEALTH

NEWS

Britain's shocking stillborn baby rate



What can we do to prevent mortality?

Advice on lifestyle eg smoking, BMI,

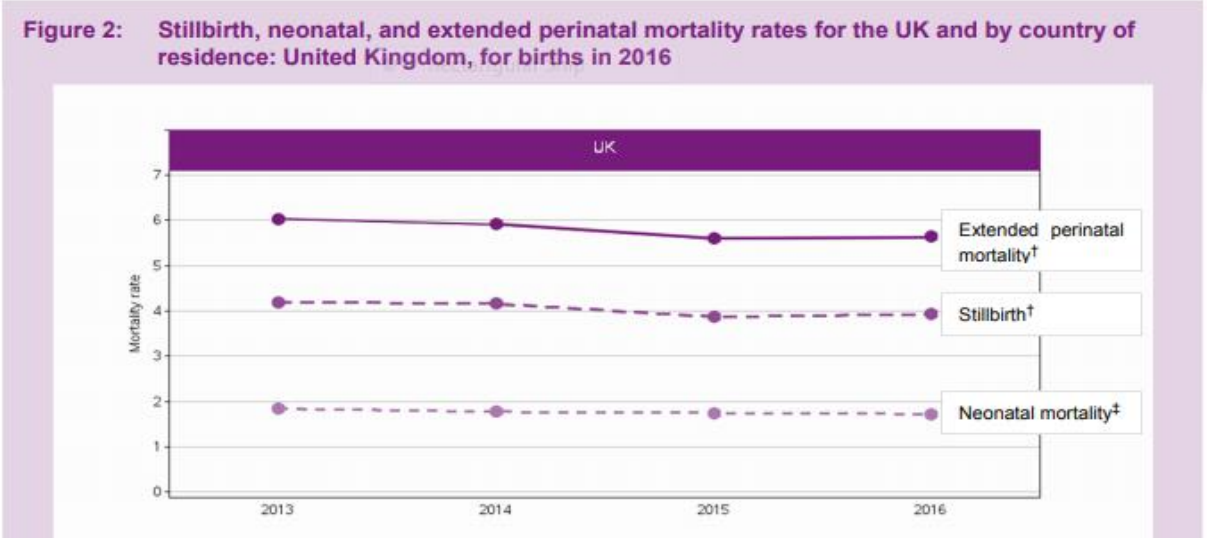
Aspirin (better targeted)

Progesterone, +/- cerclage

Diet/ metformin/ insulin

Treatment for maternal illness

Fancy fetal medicine things



2016: MBRRACE 2018

To expedite birth or wait and see

All the scans, tests, or preferably risk assessments are to find the babies for whom we think we should expedite birth

Delivery is our major mechanism for stillbirth/ perinatal mortality prevention

The question is who, and when

Royal College of Obstetricians & Gynaecologists

Induction of Labour at Term in Older Mothers

Scientific Impact Paper No. 34
February 2013

THE LANCET

Online First | Current Issue | All Issues | Special Issues | Multimedia | Information for Authors

All Content | Search | Advanced Search

< Previous Article | Volume 385, No. 9987, p2600–2605, 27 June 2015 | Next Article >

Articles

Induction of labour versus expectant management for large-for-date fetuses: a randomised controlled trial

Prof Michel Boulvain, MD, Prof Marie-Victoire Senat, MD, Prof Franck Perrotin, MD, Norbert Winer, MD, Gael Beucher, MD, Prof Damien Subtil, MD, Prof Florence Bretelle, MD, Elie Azria, MD, Dominique Hejaiej, MD, Françoise Vendittelli, MD, Marianne Capelle, MD, Prof Bruno Langer, MD, Richard Matis, MD, Laure Connan, MD, Philippe Gillard, MD, Christine Kirkpatrick, MD, Gilles Ceysens, MD, Gilles Faron, MD, Prof Olivier Irion, MD, Prof Patrick Rozenberg, MD for the Groupe de Recherche en Obstétrique et Gynécologie (GROG)

Published: 08 April 2015
Altmetric 64
DOI: http://dx.doi.org/10.1016/S0140-6736(14)61904-8 | CrossMark

Article Info

BMJ

BMJ 2012;344:e2838 doi: 10.1136/bmj.e2838 (Published 10 May 2012)

RESEARCH

Outcomes of elective induction of labour compared with expectant management: population based study

OPEN ACCESS

Sarah J Stock *clinical lecturer and subspecialty trainee in maternal fetal medicine*[1], Evelyn Ferguson *consultant obstetrician*[2], Andrew Duffy *information analyst*[3], Ian Ford *professor of biostatistics*[4], James Chalmers *consultant in public health medicine*[3], Jane E Norman *professor of maternal and fetal health*[1]

[1]Tommy's Centre for Maternal and Fetal Health, MRC Centre for Reproductive Health, University of Edinburgh, Queen's Medical Research Institute, Edinburgh EH16 4SA, UK; [2]NHS Lanarkshire, Wishaw General Hospital, Wishaw, UK; [3]Information Services Division, NHS National Services Scotland, Edinburgh; [4]University of Glasgow Robertson Centre for Biostatistics, Glasgow, UK

inbertteen.com

MIDWIVES BREW

85% SUCCESS RATE FOR SPONTANEOUS LABOR WITHIN 24 HRS

- 10 OZ APRICOT JUICE
- 8 OZ LEMON VERBENA TEA
- 2 TBS ALMOND BUTTER
- 2 TBS CASTOR OIL

*Mix completely in a blender until smooth, and enjoy on an empty stomach (can be taken over ice).

labor should start within 24 hours!

*do not attempt until past your due date, please consult with your provider before attempting

Induction for all at 37 weeks

Cochrane Library

Cochrane Database of Systematic Reviews

Induction of labour at or beyond 37 weeks' gestation (Review)

Middleton P, Shepherd E, Morris J, Crowther CA, Gomersall JC

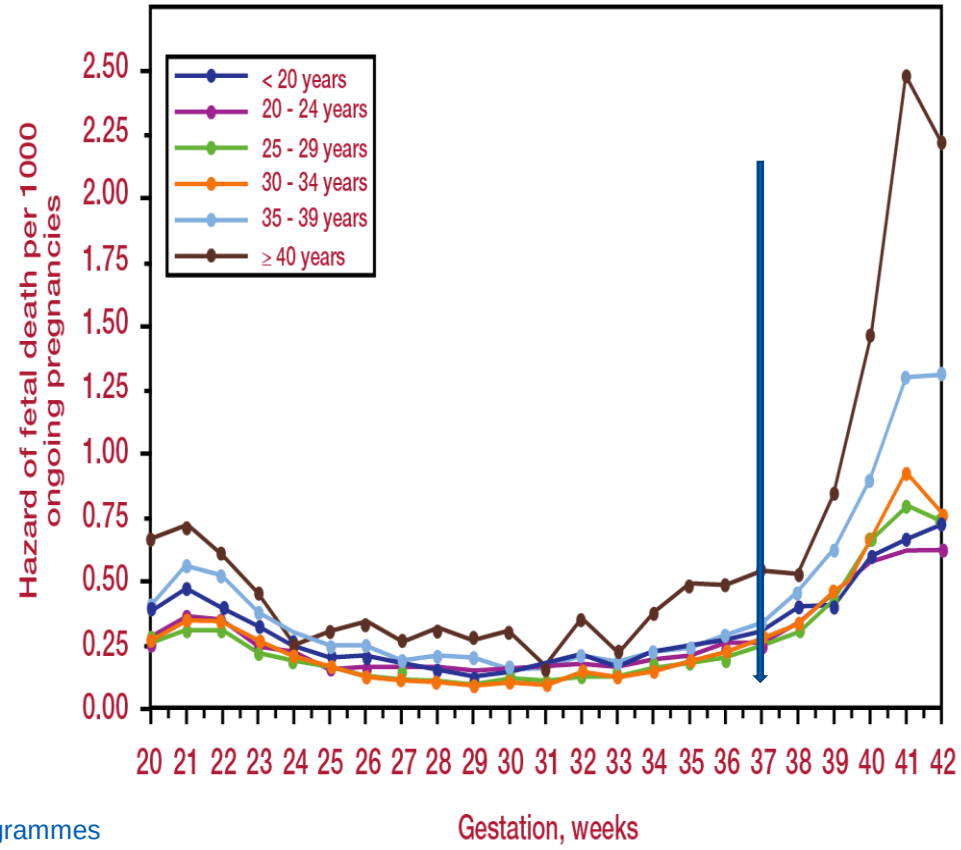
Authors' conclusions

There is a clear reduction in perinatal death with a policy of labour induction at or beyond 37 weeks compared with expectant management, though absolute rates are small (0.4 versus 3 deaths per 1000). There were also lower caesarean rates without increasing rates of operative vaginal births and there were fewer NICU admissions with a policy of induction. Most of the important outcomes assessed using GRADE had high- or moderate-certainty ratings.

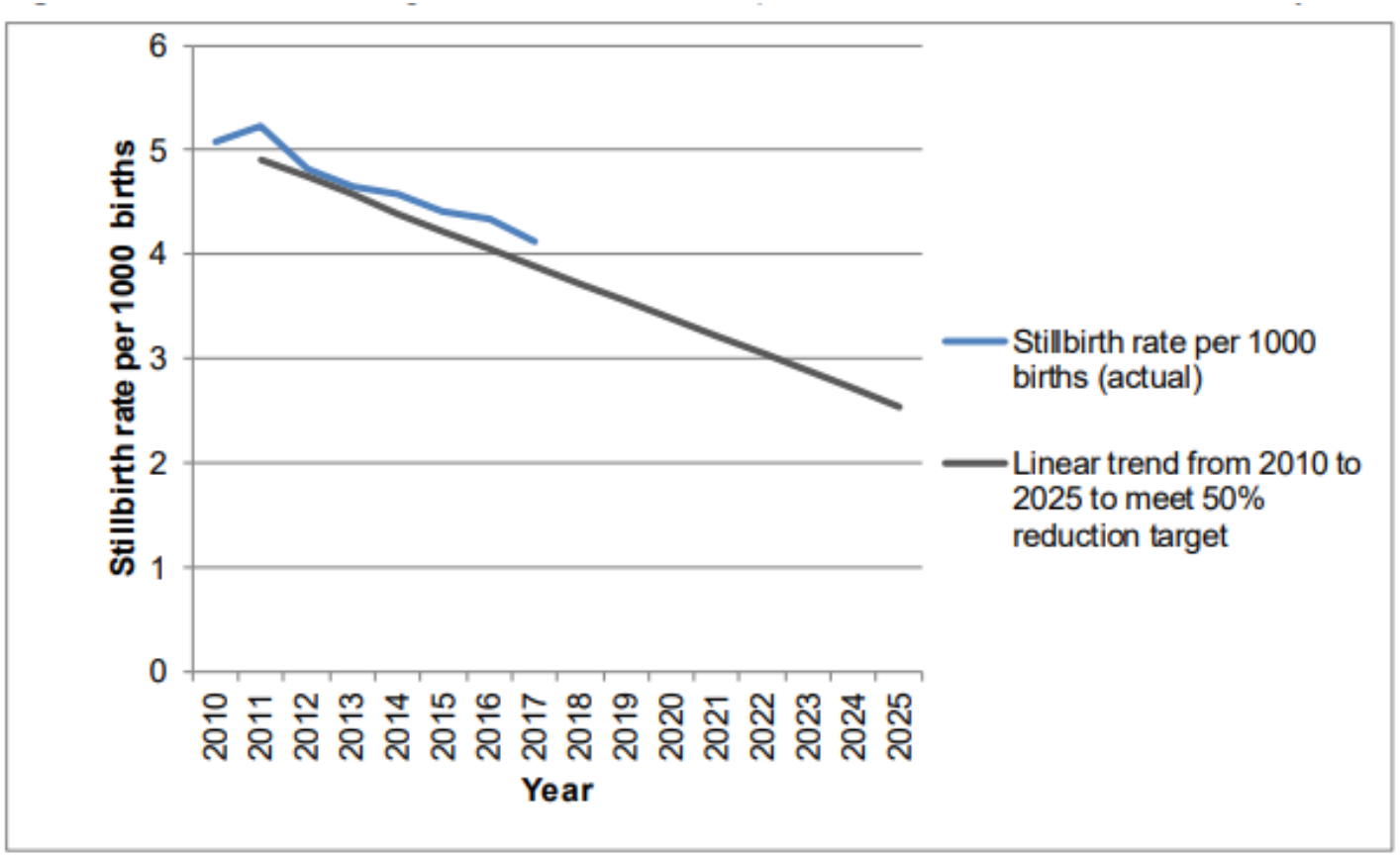
While existing trials have not yet reported on childhood neurodevelopment, this is an important area for future research.

Ending the pregnancy prevents stillbirth

About one third of perinatal mortality occurs after 36 weeks
Early onset problems are easier to detect (eg PET)



We think SB reduction may be working



Stillbirth reduction may have a price

Delivery at 37 weeks is associated with a higher infant mortality

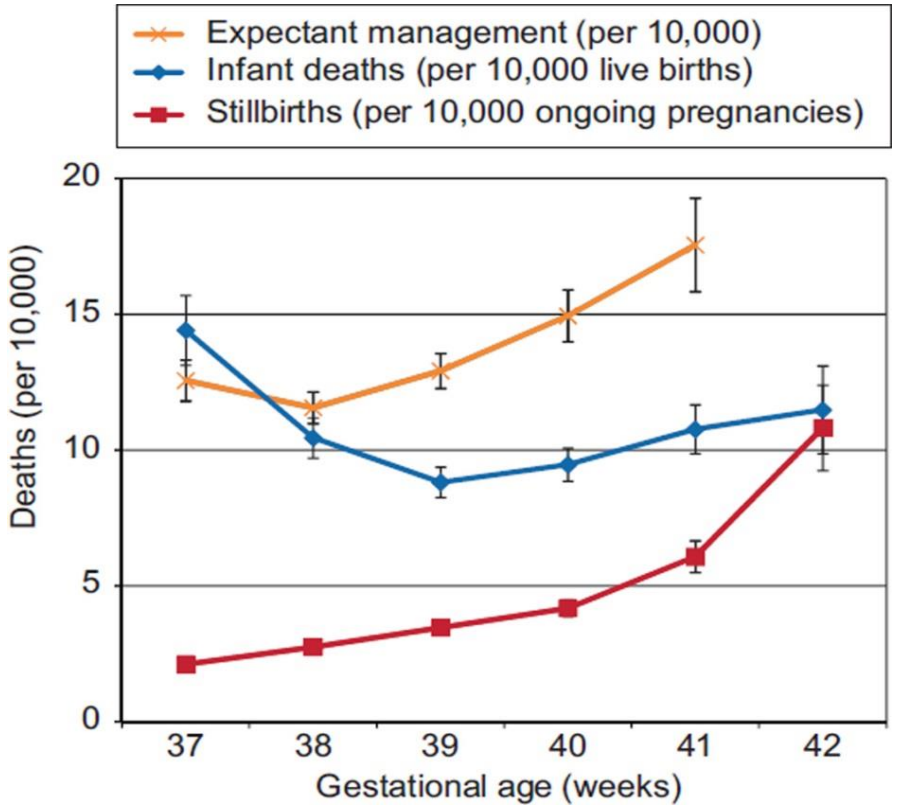
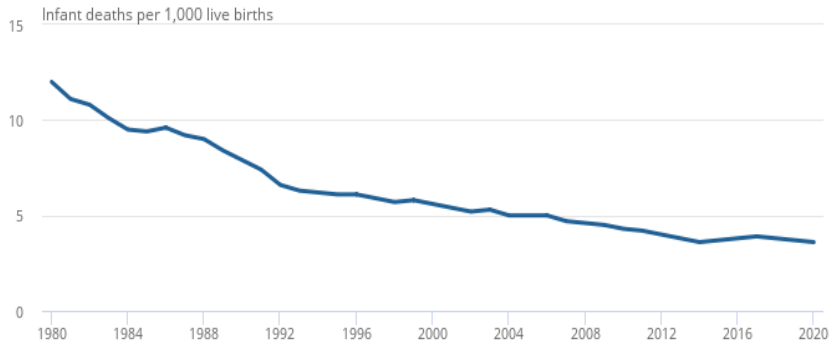


Figure 1: Overall decline in infant mortality rate since 1980

Infant mortality rate, England and Wales, 1980 to 2020



Source: Office for National Statistics – Child and infant mortality in England and Wales: 2020

And further than that…IQ

OXFORD JOURNALS American Journal of Epidemiology

Am J Epidemiol. 2010 Feb 15; 171(4): 399–406.
Published online 2010 Jan 15. doi: 10.1093/aje/kwp413

PMCID: PMC3435092
PMID: 20080810

Variation in Child Cognitive Ability by Week of Gestation Among Healthy Term Births

Seungmi Yang,* Robert W. Platt, and Michael S. Kramer

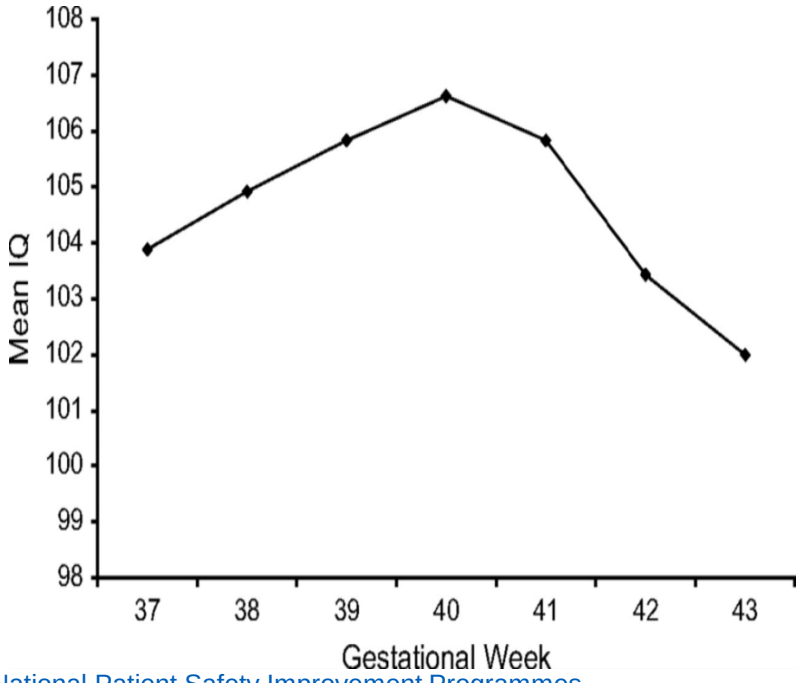
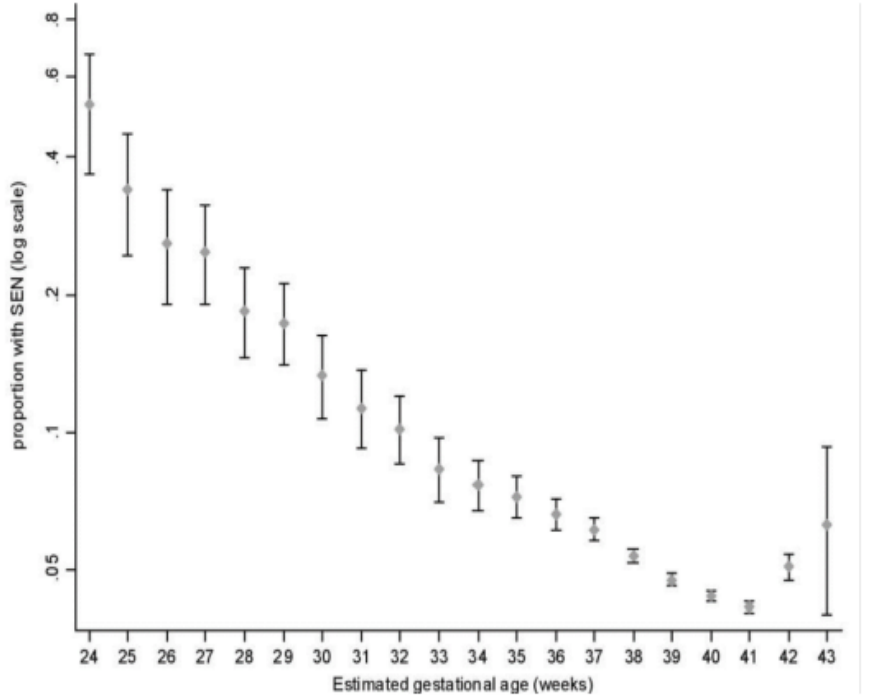
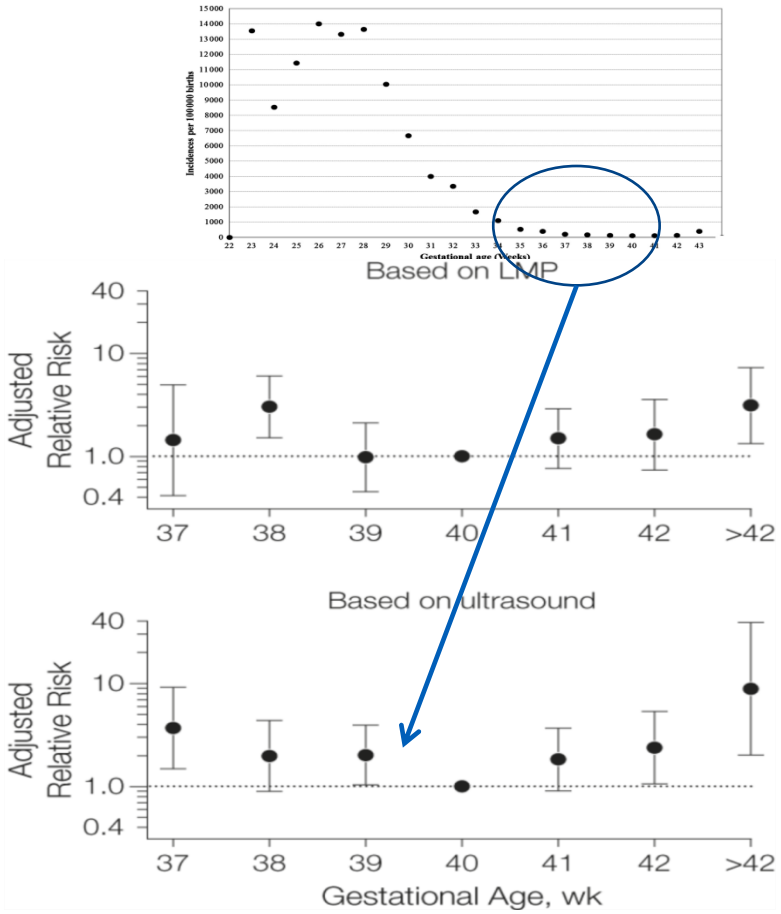
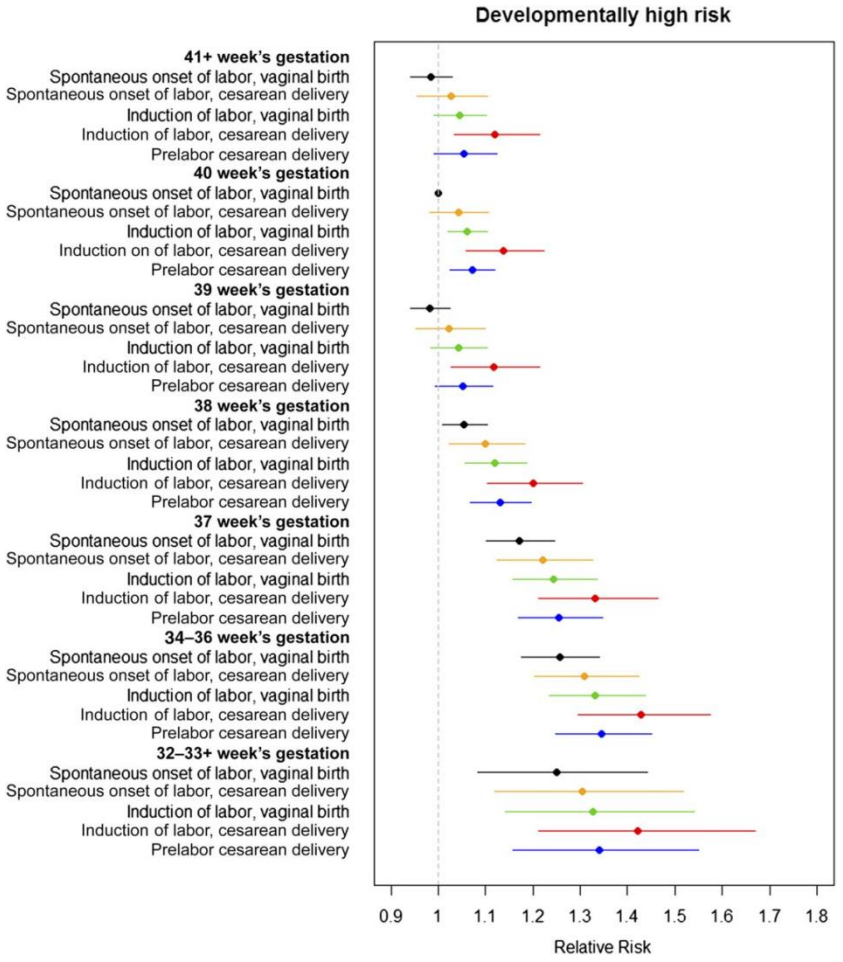


Figure 2: Prevalence of special educational needs by gestation at delivery[18].



And further than that…cerebral palsy





Relative risk of cerebral palsy (adjusted)
JAMA 2010

Indeed in tandem with SB initiatives we have NNU admission ones….

Babies born at 37-38 weeks were twice more likely to be admitted to Neonatal services compared to those born at 39-42 weeks gestation = increased vulnerability

Should we really call 37 weeks ‘term’?

Ending the pregnancy early: considerations

Potential for well meaning initiatives to do harm

39 weeks is best? But >80% of women are still pregnant

Can NHS resource cope with more inductions?

Will women accept this?

hospital stay or more painful labours. Induction of labour may also increase the workload of the maternity service which has the potential to impact the care of other women.

We need to reduce stillbirth

But we risk:

Causing death later

Causing disability and lower IQ later

Overwhelming our labour wards, causing death and disability now

Dissatisfied customers

For the biggest single ‘preventable cause’…

Triage for late onset FGR

Ultrasound Obstet Gynecol 2018; 52: 66–71
Published online in Wiley Online Library (wileyonlinelibrary.com). **DOI:** 10.1002/uog.17544

Small-for-gestational-age babies after 37 weeks: impact study of risk-stratification protocol

M. VEGLIA[1,2], A. CAVALLARO[1,3], A. PAPAGEORGHIOU[1], R. BLACK[3] and L. IMPEY[3]

[1]*Nuffield Department of Obstetrics and Gynaecology, John Radcliffe Hospital, University of Oxford, Oxford, UK;* [2]*Department of Obstetrics and Gynaecology, Ospedale Cristo Re, Rome, Italy;* [3]*Oxford Fetal Medicine Unit, Department of Maternal and Fetal Medicine, The Women's Center, Oxford University Hospitals NHS Foundation Trust, Oxford, UK*

OUH Universal scan data 2014-2019:

1081 (5.8%) babies with criteria for referral at routine 36w growth scan

Criteria for referral aligned with ISUOG diagnosis of FGR

4 'extended' deaths (3.7/1000): 1 SB not referred, 1 hypoglycaemia, 1 SIDS day 28, 1 late onset GBS

Referral criteria following 36 week growth scan

1) EFW <10th centile
2) AC reduction > 40 percentile points
3) Isolated CPR < 1.1 or isolated Umbilical PI >95th centile

Check:

1) EFW incl ACGV (consider sex adjustment: female fetus: 10th c is total population 8th c; male fetus 10th c is total population 12th c)
2) CPR
3) Uterine arteries

Management in FGA clinic

36-37 weeks:

- Deliver if EFW <10th c ***AND*** CPR < 1.1 or Umbilical PI > 95th c, OR EFW <1st c
- Deliver, irrespective of EFW, CPR<1.0 **OR** umbilical artery AEDF
  For both categories please perform CTG in clinic

Otherwise reassess </=2 weeks (clinical judgement to determine which) and see below

From 37+0 weeks:

Apply same criteria as for 36 weeks and

Deliver if:

- EFW <3rd c
- EFW >3rd <10th c ***AND*** CPR < 1.1 (do CTG if <1.0); Umbilical PI > 95th centile, or ACGV reduction <10th c)
- EFW >3rd <10th c ***AND*** 1+ of the following criteria →
- CPR < 1.1 ***AND*** 1+ of the following criteria →

  - Abnormal uterine arteries: 20 weeks total PI > 2.5 or current total PI > 2.0
  - Maternal age >/= 40
  - PAPP-A < 0.3 MoMs
  - Medicated hypertension (note for preeclampsia deliver > 36 weeks anyway)
  - Diabetes with poor control/ AC >95th c (note delivery plan should be in place)

All else normal: review at the following intervals:

1 week:

- Isolated CPR < 1.1

2 weeks:

- All others i.e. Isolated EFW >3rd c with no complicating features
- Isolated ACGV reduction (>40 centile points or <10th c) from the anomaly scan with (above) no complicating features

From 38 weeks:

Apply same criteria as for 36 and 37 weeks

From 39 weeks:

Apply same criteria as for 36 and 37 weeks

From 40 weeks:

Deliver all referral criteria, and any of age >/=40, AC reduction or PAPP-A <0.3MoMs by 41 weeks

Note: follow separate induction guideline pertaining to abnormal uterine arteries and low PAPP-A, maternal disease and age irrespective of scan findings: some will have del indicated before suggested by this guideline.

To calculate centiles etc:

To determine ACGV: https://www.calculosaurus.com/ac-growth-velocity-calculator

To determine Hadlock EFW centile: http://perinatology.com/calculators/exbiometry.htm

Creating a predictive model

What are the biggest risk factors for stillbirth?

How can we prioritise these against each other?

Requires

1. Using independent risk factors
2. continuous variable i.e. not yes/ no to integrate risk

And then discuss/ prioritise.

We already do this for Down's Syndrome

Now (this is much more difficult) we need to for adverse pregnancy outcomes

Katherine Hardy

- Katherine has worked for SCAS for 17 years, and joined as an Ambulance technician in 2005 and got her Paramedic registration in 2010.

- Katherine has worked as a clinical mentor and Team leader at Reading resource centre. Moving to Newbury Resource centre and then the Education Team in 2019.

- Currently Katherine is the Education Team Manager at Newbury Education Centre, she leads a small team of clinical educators within a much larger team of 40, technology and simulation specialists under Darren Best.

NHS
South Central Ambulance Service
NHS Foundation Trust

Fork In the road

Karen Hardy (Katherine.Hardy@scas.nhs.uk)
South Central Ambulance Service

www.improvement.nhs.uk

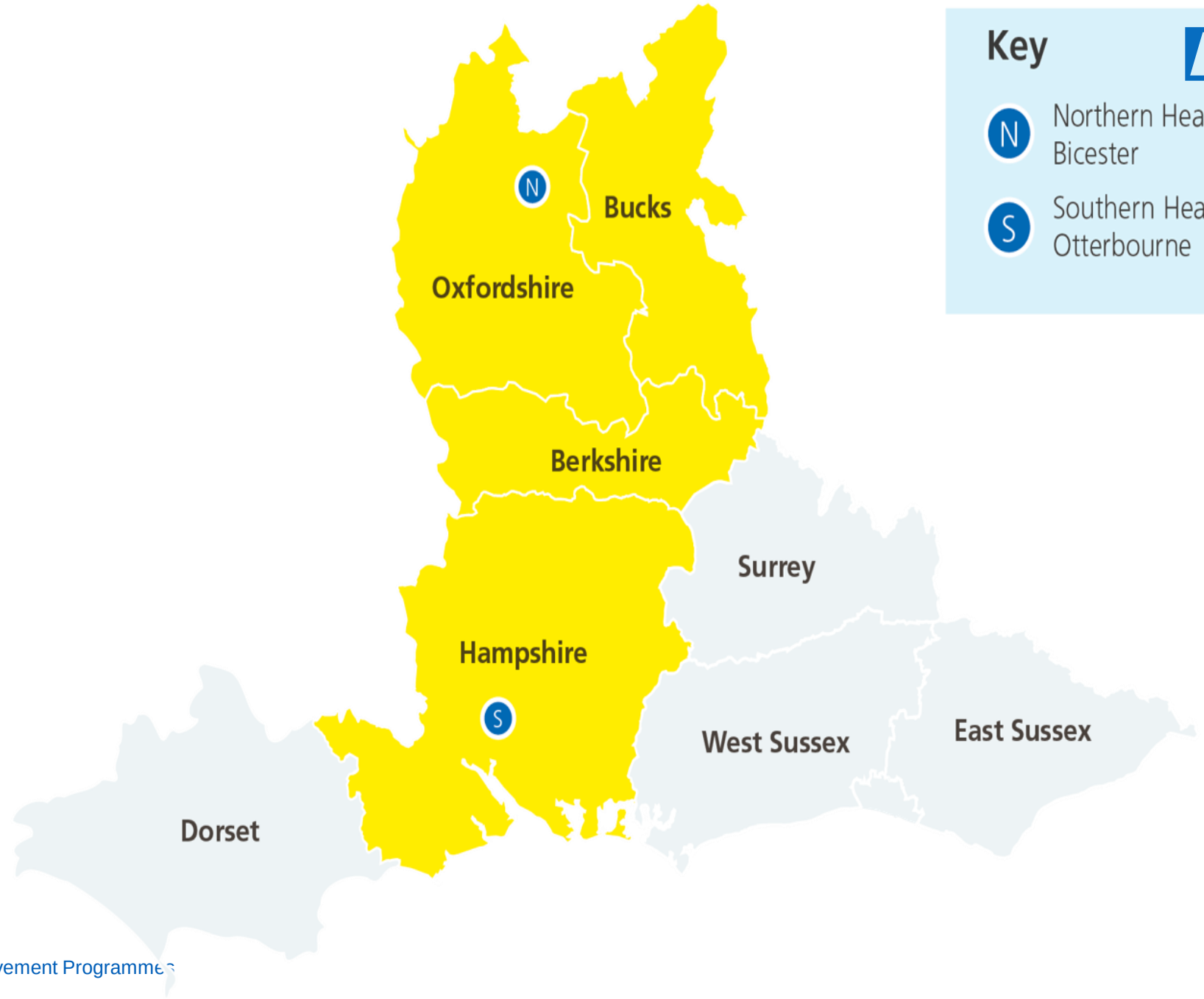
Led by:
NHS England
NHS Improvement

Maternity and Neonatal


POPULATION
7 MILLION


1.2 MILLION+
CALLS TO
NHS 111


483,000+
999 INCIDENTS

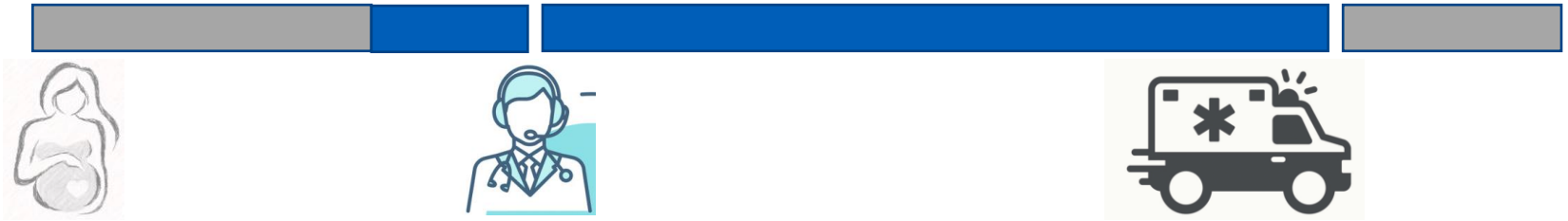

Key
NHS
N
Northern Headquarters:
Bicester
S
Southern Headquarters:
Otterbourne
Bucks
Oxfordshire
Berkshire
Surrey
Hampshire
West Sussex
East Sussex
Dorset

>How many ambulances now?

NHS pathway triage- 999 call

1. Confirm patient is conscious and breathing
2. Is the main problem labour or childbirth?
3. Has the baby been completely born yet?
4. Is she more than 20 weeks pregnant?
5. Is she struggling desperately for breath?
6. Does her skin feel a normal temperature?
7. Does she have severe and constant Abdo pain?
8. Is she bleeding from the vagina right now?
9. Is the abdomen sore to touch?
10. Has she felt faint or blacked out?
11. Are any of the following happening: umbilical cord hanging out of the vagina, seeing the baby coming, brown watery fluid from vagina, an urge to push, 5 mins between contractions?
12. Have her waters broken? Are the contractions becoming more frequent?
13. Is she 37 weeks or more?
14. **C2 ambulance arranged if under 37 weeks**
15. Is there someone that can stay with you until help arrives?
16. Has the baby started to come out?
17. Is it a water birth?
18. What part of the baby can be seen?
19. Care advice page

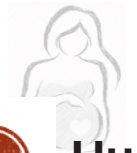
Obstetric emergency



Obstetric Related Nature Of Call:	Ambulance Response Plan (ARP)	Related Categories
C1 OBSTETRIC EMERGENCY =	7 Minute Ambulance Response	> Cardiac Arrest > Seizure, > Unconscious > Choking
C2 MATERNITY =	18 Minute Ambulance Response	▪ Major Trauma ▪ Collapse ▪ RTC ▪ Allergic Reaction
C2 IMMINENT DELIVERY HEAD OUT=	18 Minute Ambulance Response	

*C2-the dispatch team will often wait 4 mins before allocating. During this time, they may consider diverts etc.

Obstetric/Maternity emergencies




- Human Factors
  - Don’t attend many
  - Lack of Practice / Exposure = ↓ Confidence
- On Scene
  - ABCD Approach → C is a different Situation
  - JRCALC Guidance / Reference = National not local protocol
- Medical Model
  - Good Questions / Right Answers = Right Place

- End of Shift ~ *Path of least resistance*
- Risk ~ *100 miles to one hospital*
  ~ *20 miles to nearest hospital*
- Patients Move ~ *don't stay in their area*
- Maternity Notes can be complicated
  - *Many telephone numbers*
  - *No Notes at all*
- Ambulance resourcing ~ *lack of paramedic crews*
  ~ *Immediate threat to life*
- Unclear disposition ~ Midwife accepts locally / Doctor does not

LEARNING

Infrastructure

- Digital Notes
- Accessibility

Patient

- Local
- Information

Education

- Training
- PHONE course

South Central Ambulance Service
NHS Foundation Trust

Thank you

Emma Johnston

- Emma is an aerospace engineer by education with a business degree and marketing postgraduate.
- Emma took a change in career after her maternity experience took a sad turn in 2008 and her passion turned to helping improve experiences for other maternity service users.
- Emma has recently joined the Thames Valley and Wessex Neonatal ODN as the new Parents & Family Engagement Lead
- She brings lived experience to the team and is on board to ensure the family user is core to all the ODN's work towards the Neonatal Critical Care Review recommendations.

National Patient Safety
Improvement Programmes

Maternity and Neonatal

A parent perspective: Setting up the Thames Valley & Wessex Parent Advisory Group (PAG) to influence improvement & service transformation

Emma Johnston

10th March 2022

Delivered by:
*The**AHSN**Network*

Led by:
NHS England
NHS Improvement

What did the Neonatal Critical Care Review Plan say…

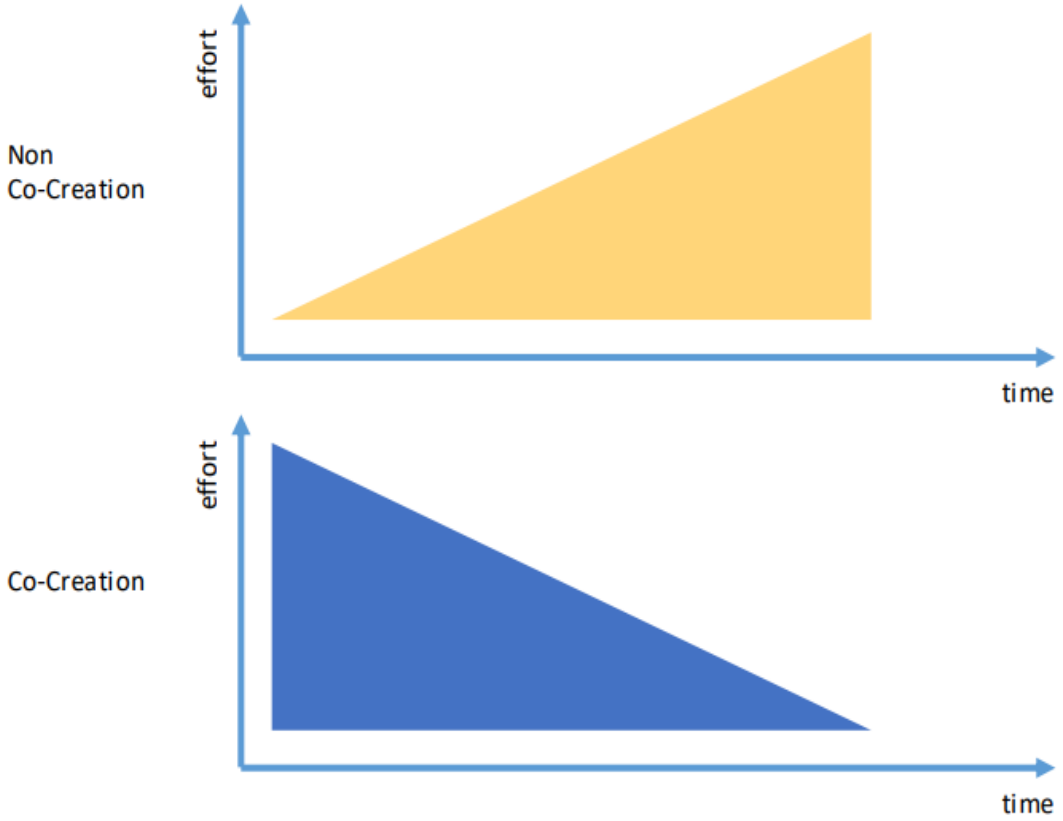
Enhancing the experience of families

As the evidence shows, high quality neonatal care must include a substantive role for parents in the care of their baby; in this respect, neonatal care differs from many branches of inpatient medicine. Parents are not bystanders as illness develops and resolves but perform an active role as a **member of the care team**.

To perform this role, and in order to minimise morbidity, parents **require support and facilitation** by a service that has appropriately focused and trained nursing or AHP staff, working alongside medical and nursing clinical practice staff.

Coproduction/cocreation

Evidence shows the sooner you include the service user voice in transformation the more time and money can be saved in getting it right first time.

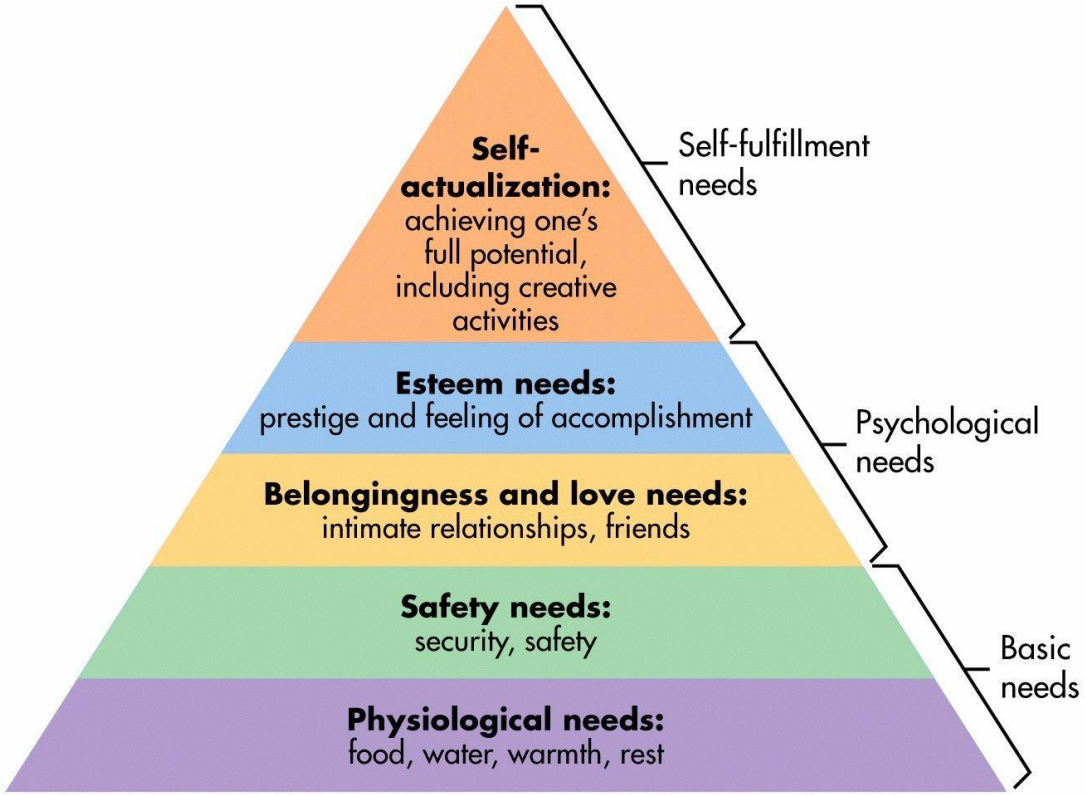


Why is coproduction important

"If you want to check if the shoe fits….

don't ask the manufacturer or the shoe shop, rather ask the person who is wearing them"

Parents and staff needs – what are they?



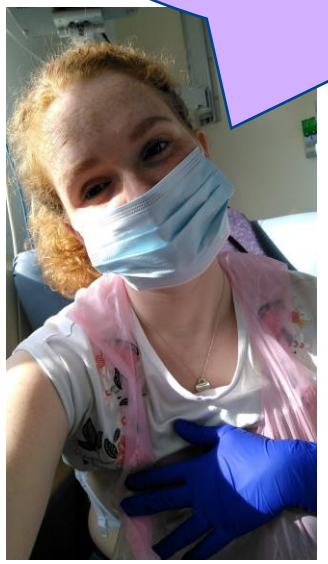
Maslow's hierarchy of needs is a motivational theory in psychology comprising a five-tier model of human needs

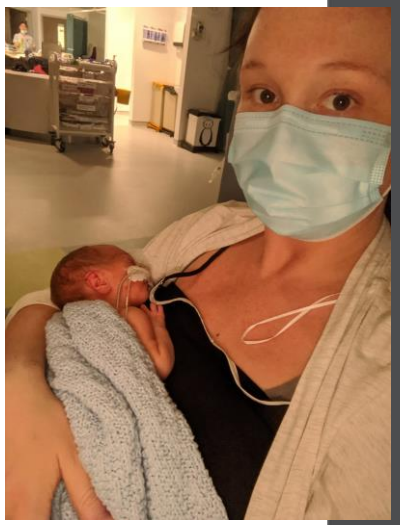
> How can we fulfil these needs in enhancing the experiences for families?

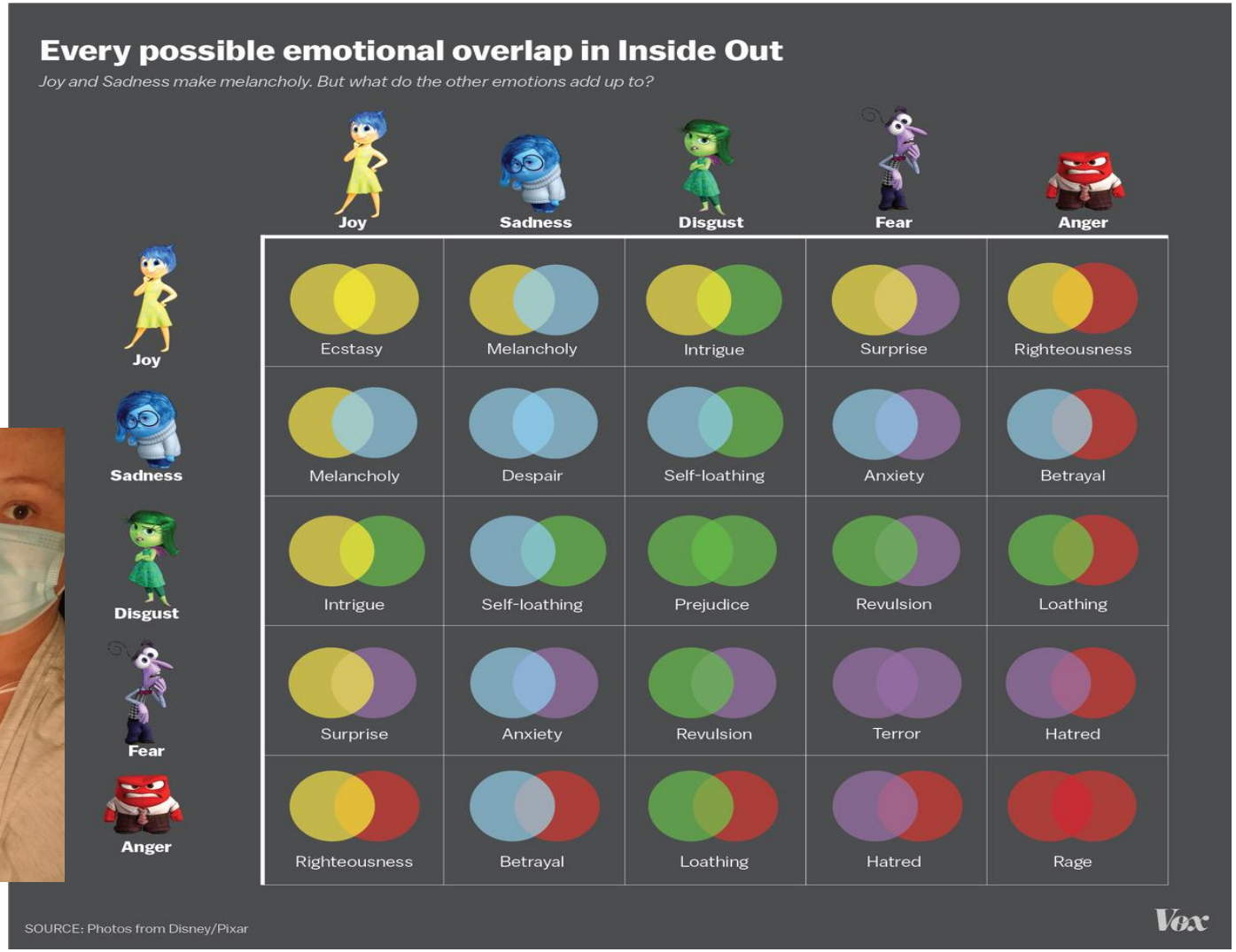
> How do we involve the people doing the jobs in this piece of transformation in enabling buy in to a new culture/way of working?

Postnatal mental health – short-term and long-term

"I remember coming into the hospital one morning and going into the nursery and he wasn't there - a different baby was in his bed space and it just felt like my heart stopped and my stomach was in my mouth. They'd moved him to the next nursery along the corridor, but didn't ring me as it was a "positive move" so it could wait until I came in to tell me!" 💔🤱♀ Hannah, PAG Mummy







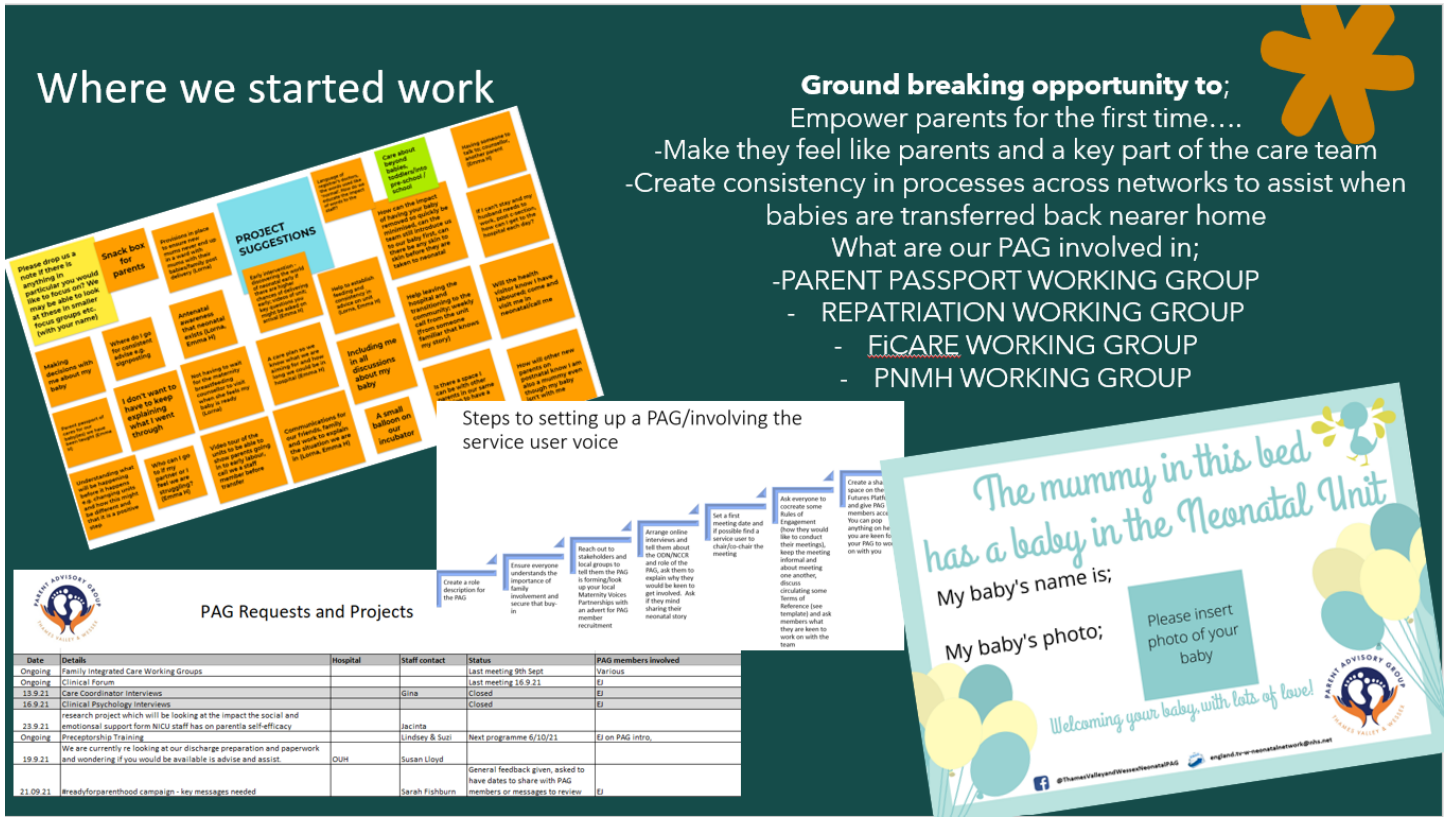
In the first year we have coproduced setting up a Neonatal ODN Team for this work

- Recruitment of 16 parent representatives to TV&W Parent Advisory Group (PAG), including one dad (non birthing partner)
- PAG representation at;
  - Clinical Forums, Governance Board, Preceptorship education programme, Family Integrated Care Working Group, Neonatal Postnatal Mental Health Group
- PAG member coproduced job description/interview questions and sat on the interview panel for;
  - 2 x ODN Neonatal Lead Care Coordinators,
  - 3 x Band 7 Care Coordinators,
  - Network Clinical Psychologist.

What is the PAG doing

Helping us understand;

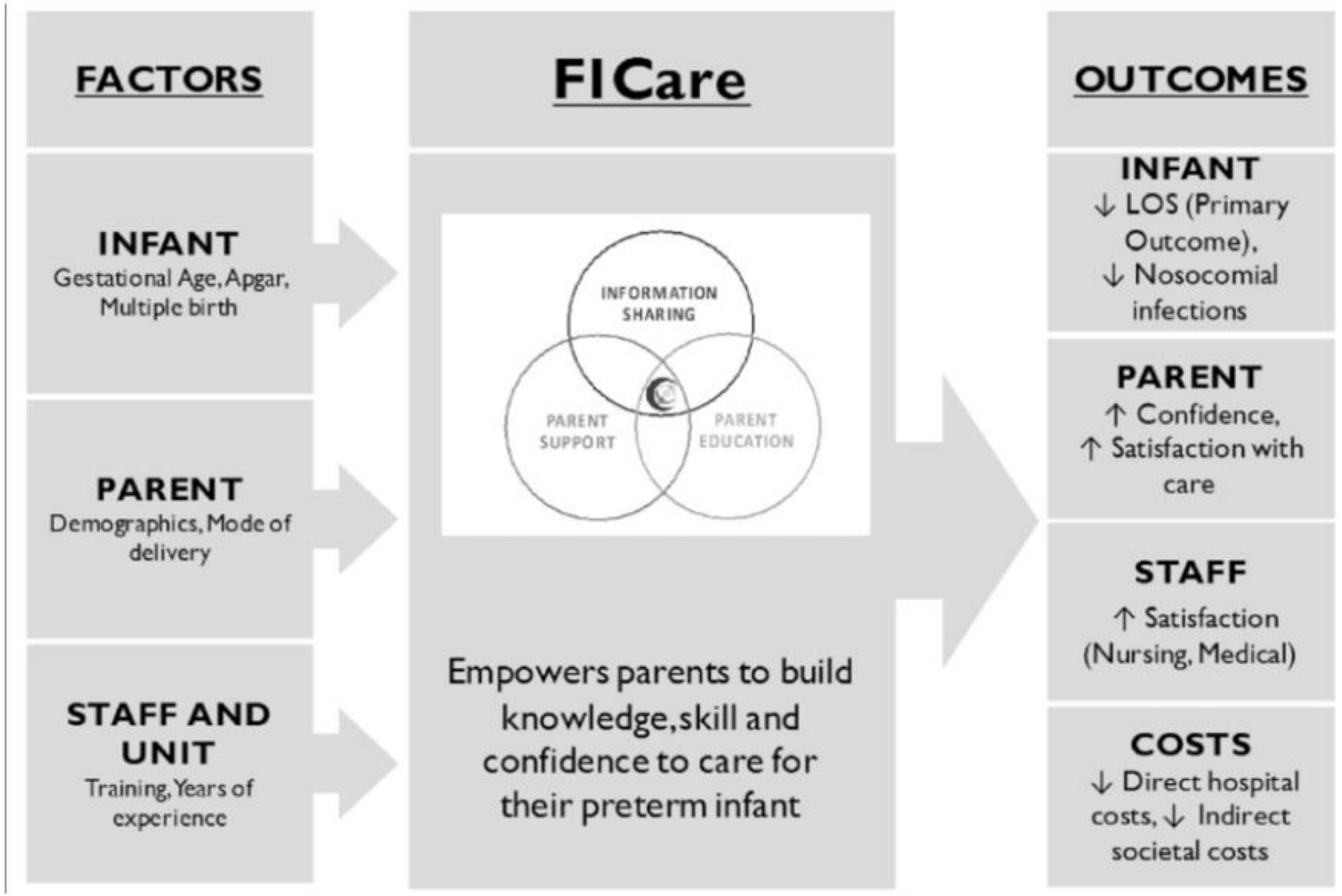
- Parents psychological needs and how best to meet these
- Impact of staff support on parent self efficacy
- Education of staff
- Mapping routes of support for signposting parents
- Building resources – sibling project, leaflets



What can we do to assist the best possible outcomes for these babies…

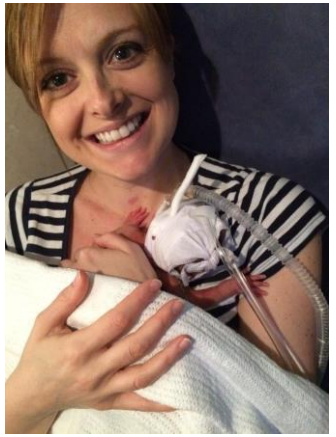
- Delivery room cuddles – having a baby removed immediately at birth is hugely traumatic and detrimental to parents, this first look and touch is a first we should never take away
- Skin to skin – this empowers parents to feel like parents, and assists with early supply of milk, as well as helping form that important first bond
- Parent led ward rounds – empowers parents to feel part of the care team looking after their baby which is a huge asset as they are able to watch their baby 24/7, it ensures they remain informed and part of the decisions being made about their baby
- Babies cares – Can support staff, and grow parents confidence, which is seen to get babies home sooner
- Looking at the way we communicate – reframing language so parents know they are a very important part of the care team, always ensuring ‘they’ are referred to as the parent
- Parent education – teaching parents how to look after their baby so they feel useful and not bystanders or spectators
- Parent support- even peer to peer is quoted to be hugely beneficial in letting parents know it is ok to not be ok, and there is a life to focus on together after neonatal

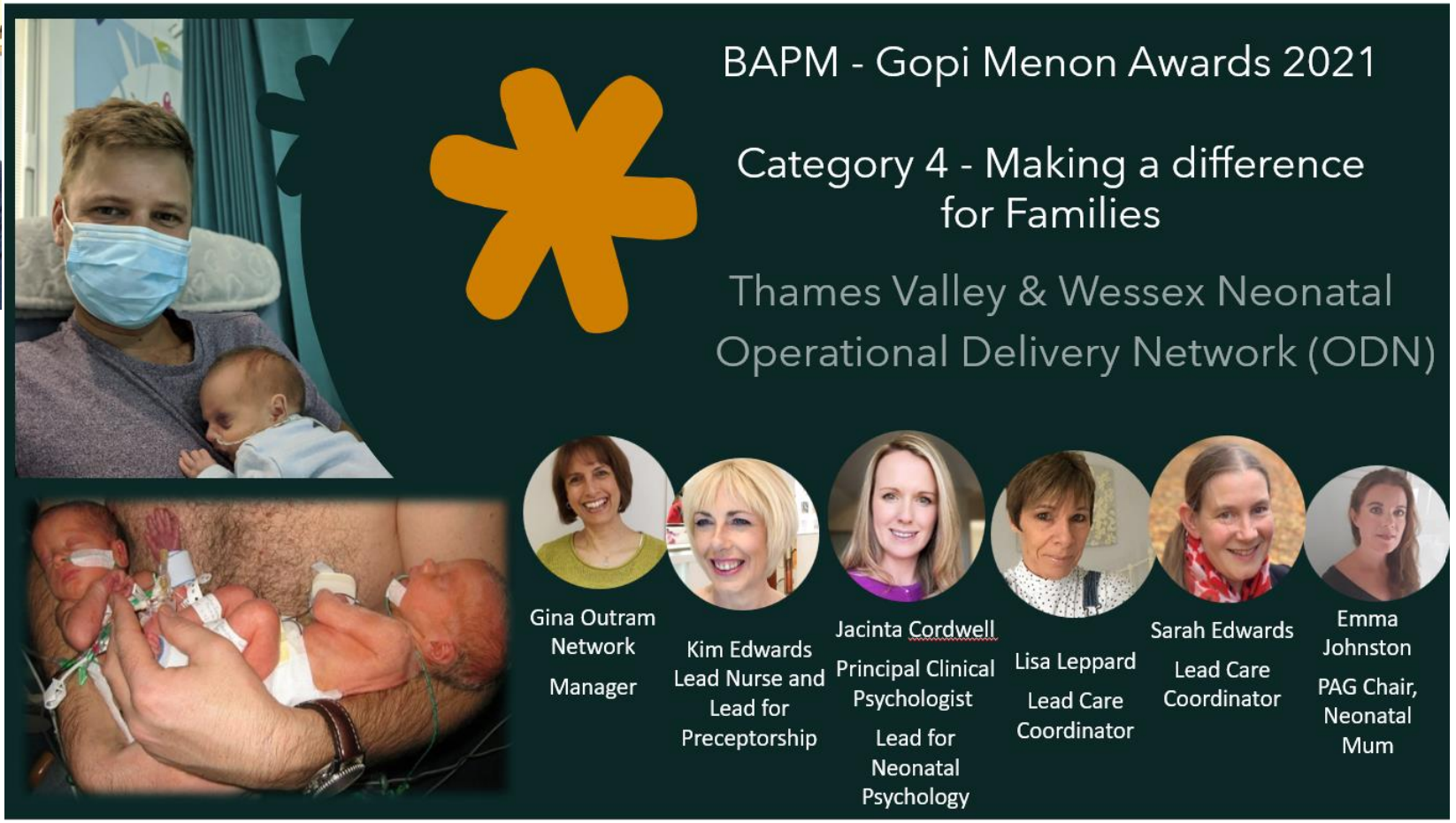
FiCare Model of Change



https://www.researchgate.net/figure/FICare-model-of-change_fig2_326243220

Thank you




BAPM - Gopi Menon Awards 2021
Category 4 - Making a difference for Families
Thames Valley & Wessex Neonatal Operational Delivery Network (ODN)
Gina Outram
Network Manager
Kim Edwards
Lead Nurse and Lead for Preceptorship
Jacinta Cordwell
Principal Clinical Psychologist
Lead for Neonatal Psychology
Lisa Leppard
Lead Care Coordinator
Sarah Edwards
Lead Care Coordinator
Emma Johnston
PAG Chair, Neonatal Mum

Dr Charles C Roehr

- Charles is a Consultant Neonatologist at Southmead Hospital, Bristol.

- His interest are in physiology, newborn resuscitation research, and non-invasive ventilation.

- Between 2012-2014 he spent two years as post-doc researcher with Professors S. Hooper and P. Davis in Melbourne, Australia, before settling in the UK.

National Patient Safety
Improvement Programmes

Maternity
and Neonatal

“Is there news regarding ventilation on the uncut cord?” Research update.

Charles Roehr

Honorary Professor of Neonatology & Perinatal Research,
South Mead Hospital, North Bristol NHS Foundation Trust

Delivered by:
TheAHSNNetwork

Led by:
NHS England
NHS Improvement

A research update: What's new regarding ventilation on the uncut cord?

Charles Christoph Roehr MD, PhD
Southmead Hospital
University of Bristol
and
National Perinatal Epidemiology Unit Medical Sciences Division
University of Oxford

ILCOR 2020 & ERC 2021

Circulation

Neonatal Life Support

2020 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations

ABSTRACT: This *2020 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations* (CoSTR) for neonatal life support includes evidence from 7 systematic reviews, 3 scoping reviews, and 12 evidence updates. The Neonatal Life Support Task Force generally determined by consensus the type of evidence evaluation to perform; the topics for the evidence updates followed consultation with International Committee on Resuscitation member resuscitation councils. CoSTRs for neonatal life support are published either as or, if appropriate, reiterations of existing statements found they remained valid.

Evidence review topics of particular inter in the presence of both clear and mec sustained inflations for initiation of oxygen concentrations for init preterm and term infants, use of e ntilation and compressions fail to st ppropriate routes of drug delivery d eration of when it is appropriate to ter significant efforts have failed.

All sections tation Algorithm are addressed, from preparation resuscitation care. This document now forms the basis fo vidence evaluation and reevaluation, which will be triggered as ner evidence is published.

Over 140 million babies are born annually worldwide (https://ourworldindata.org/grapher/births-and-deaths-projected-to-2100). If up to 5% receive positive-pressure ventilation, this evidence evaluation is relevant to more than 7 million newborn infants every year. However, in terms of early care of the newborn infant, some of the topics addressed are relevant to every single baby born.

Myra H. W
Chair

available on page

No suggestion of ventilation on the cord!

ELSEVIER

Available onlin

jou .com/locate/resuscitation

EUROPEAN RESUSCITATION COUNCIL

Europe on Council Guidelines 2021:
Ne ation and support of transition of

*, Charles C. Roehr[b,c,d], Sean Ainsworth[e], Hege Ersdal[f,g], rley[h,i], Mario Rüdiger[j,k], Christiane Skåre[l], Tomasz Szczapa[m], Arjan te Pas[n], ele Trevisanuto[o], Berndt Urlesberger[p], Dominic Wilkinson[q,r,s], Jonathan P. Wyllie[t]

[a] Department of Neonatology, University Hospitals Plymouth, Plymouth, UK
[b] Newborn Services, John Radcliffe Hospital, Oxford University Hospitals, Oxford, UK
[c] Department of Paediatrics, Medical Sciences Division, University of Oxford, Oxford, UK
[d] Nuffield Department of Population Health, National Perinatal Epidemiology Unit, Medical Sciences Division, University of Oxford, Oxford, UK
[e] Directorate of Women's and Children's Services, Victoria Hospital, Kirkcaldy, UK
[f] Department of Anaesthesiology and Intensive Care, Stavanger University Hospital, Stavanger, Norway
[g] Faculty of Health Sciences, University of Stavanger, Stavanger, Norway
[h] University of Melbourne, Australia
[i] Department of Obstetrics, University of Cambridge, UK
[j] Department for Neonatology and Pediatric Intensive Care Medicine, Clinic for Pediatrics, University Hospital C.G.Carus, Technische Universität Dresden, Germany
[k] Center for Feto-Neonatal Health, Technische Universität Dresden, Germany
[l] Department of Anaesthesiology, Oslo University Hospital, Norway
[m] Department of Neonatology, Neonatal Biophysical Monitoring and Cardiopulmonary Therapies Research Unit, Poznan University of Medical Sciences, Poznan, Poland
[n] Department of Paediatrics, Division of Neonatology, Leiden University Medical Center, Leiden, The Netherlands
[o] Department of Woman's and Child's Health, University Hospital of Padova, Padova, Italy
[p] Division of Neonatology, Medical University Graz, Austria
[q] Oxford Uehiro Centre for Practical Ethics, Faculty of Philosophy, University of Oxford, UK
[r] John Radcliffe Hospital, Oxford, UK
[s] Murdoch Children's Research Institute, Melbourne, Australia
[t] James Cook University Hospital, Middlesbrough, UK

Wyckoff M, Aziz K et al. Circulation 2020
Madar J, Roehr C et al. Resuscitation 2021

NLS 2021

CORD CLAMPING

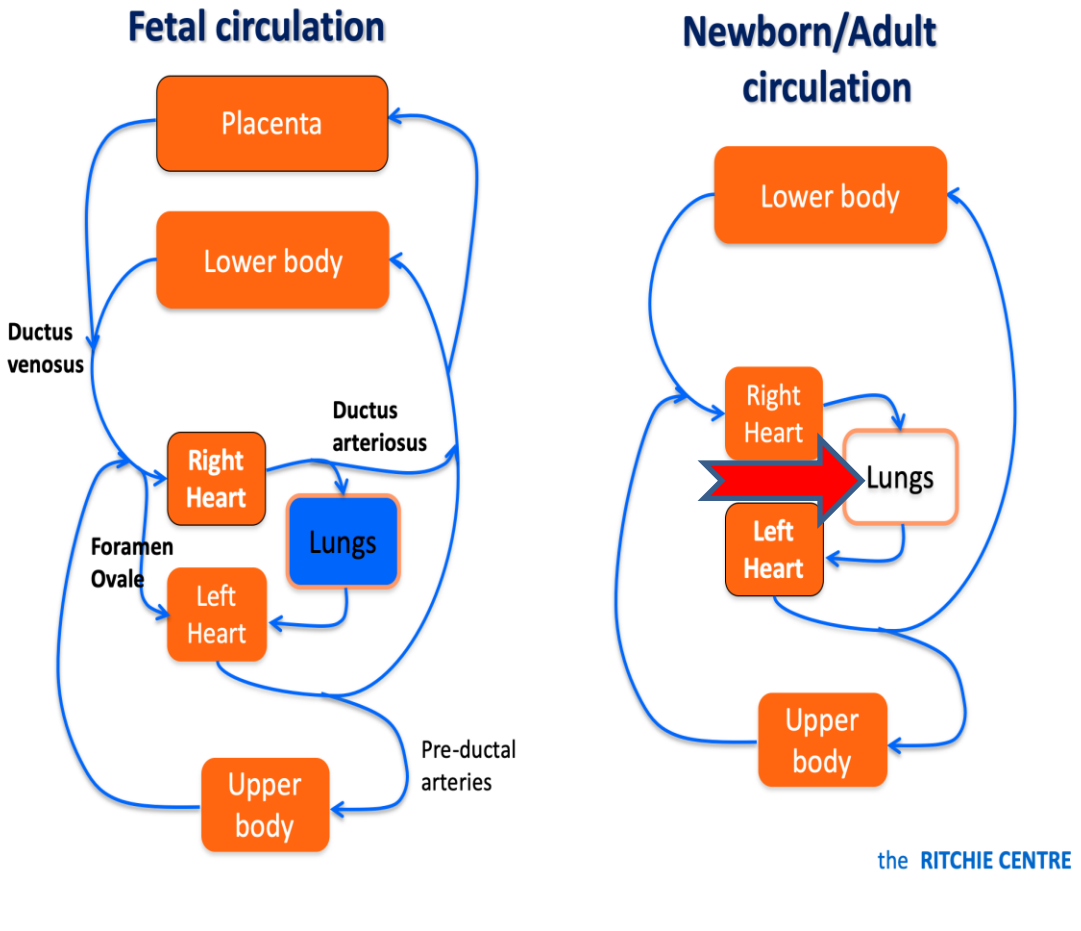
EUROPEAN RESUSCITATION COUNCIL

KEY EVIDENCE

Delayed cord clamping improves survival and haematological and circulatory stability especially in preterm infants

Changes in Circulation at Birth

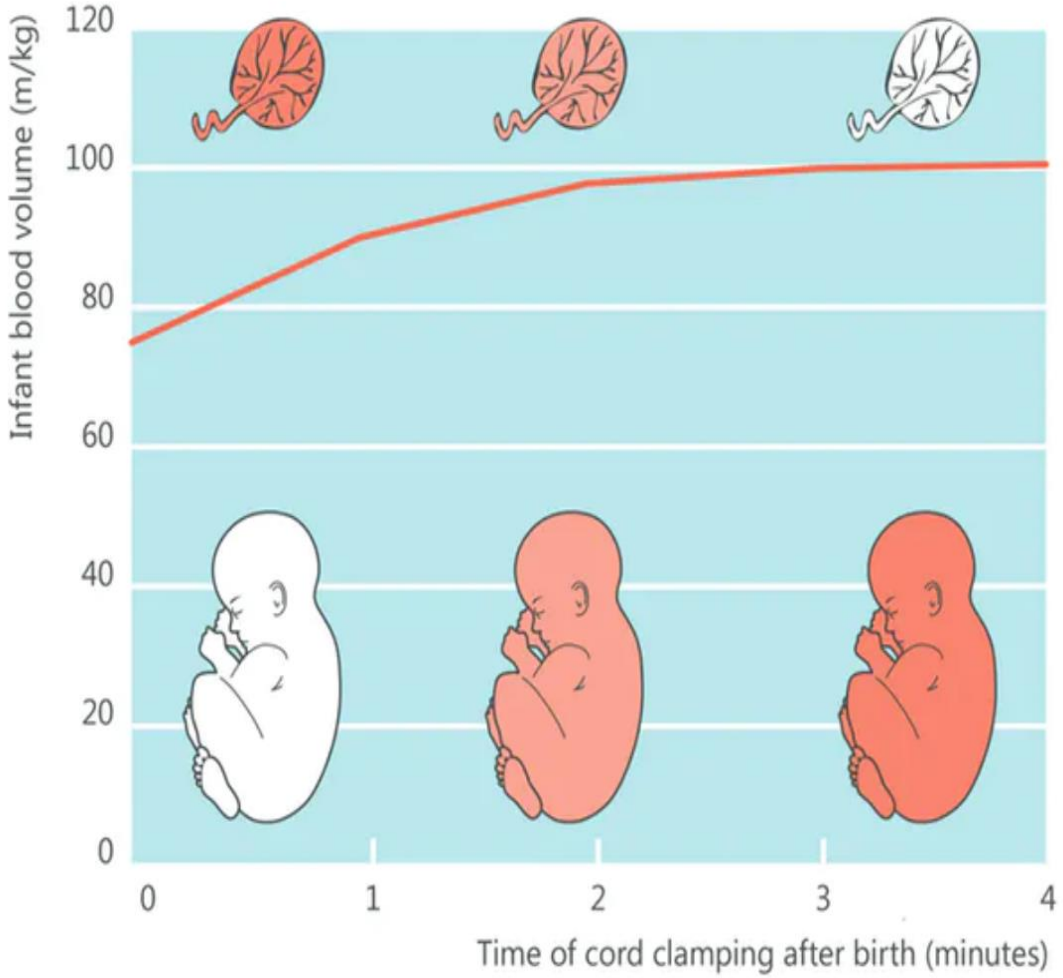
- **Switch of circulatory phenotypes** from fetal to transitional to neonatal/adult
- Placental circulation discontinues
- **Systemic** vascular resistance increases
- Pulmonary blood flow increases
- **Right** ventricular afterload decreases
- **Left** ventricular preload decreases temporarily



Concept of Placental Blood Transfusion

TIME AFTER CORD CLAMPING	PLACENTA	BABY
Instantly –15 seconds after delivery	90ml	15ml
60 seconds after delivery	60ml	45ml

Yao A et al. Am J Dis Child1974; 127: 128-41



https://concordneonatal.com/cordclamping/

Fetal Blood Volume and Circulation

- Blood volume (BV) in fetal/placental unit is 110 to 115 mL/Kg throughout gestation

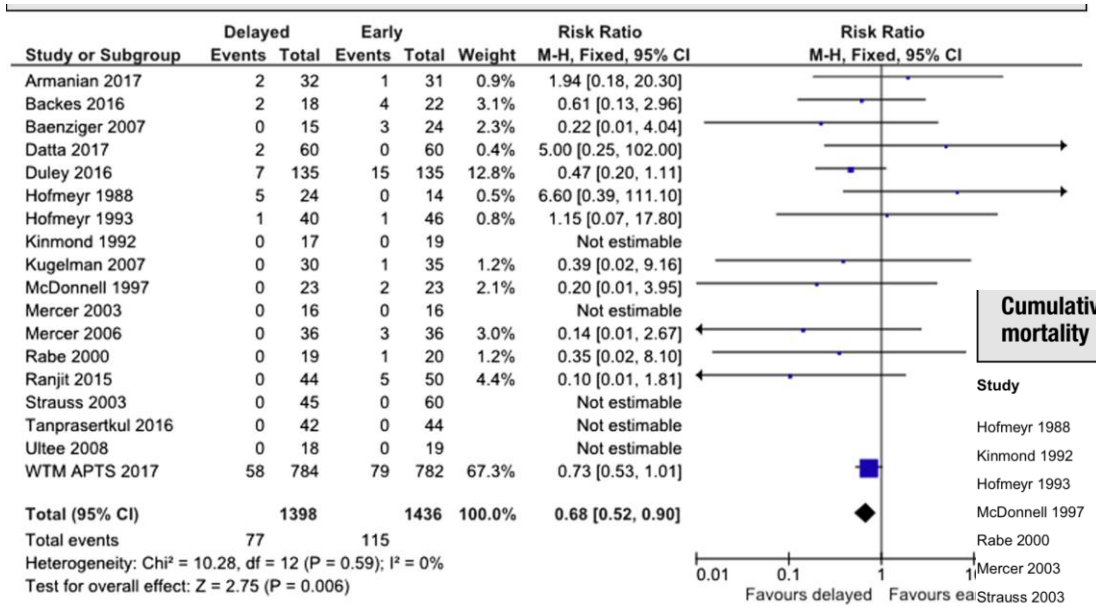
- At term, 2/3 BV in fetus, 1/3 in placenta

- At 30 weeks, 1/2 BV in fetus and 1/2 in placenta

Aladangady Pediatrics 2005

Delayed vs early umbilical cord clamping for preterm infants: a systematic review and meta-analysis

Michael Fogarty; David A. Osborn; Lisa Askie; Anna Lene Seidler; Kylie Hunter; Kei Lui; John Simes; William Tarnow-Mordi



Study or Subgroup	Delayed Events	Delayed Total	Early Events	Early Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Armanian 2017	2	32	1	31	0.9%	1.94 [0.18, 20.30]
Backes 2016	2	18	4	22	3.1%	0.61 [0.13, 2.96]
Baenziger 2007	0	15	3	24	2.3%	0.22 [0.01, 4.04]
Datta 2017	2	60	0	60	0.4%	5.00 [0.25, 102.00]
Duley 2016	7	135	15	135	12.8%	0.47 [0.20, 1.11]
Hofmeyr 1988	5	24	0	14	0.5%	6.60 [0.39, 111.10]
Hofmeyr 1993	1	40	1	46	0.8%	1.15 [0.07, 17.80]
Kinmond 1992	0	17	0	19		Not estimable
Kugelman 2007	0	30	1	35	1.2%	0.39 [0.02, 9.16]
McDonnell 1997	0	23	2	23	2.1%	0.20 [0.01, 3.95]
Mercer 2003	0	16	0	16		Not estimable
Mercer 2006	0	36	3	36	3.0%	0.14 [0.01, 2.67]
Rabe 2000	0	19	1	20	1.2%	0.35 [0.02, 8.10]
Ranjit 2015	0	44	5	50	4.4%	0.10 [0.01, 1.81]
Strauss 2003	0	45	0	60		Not estimable
Tanprasertkul 2016	0	42	0	44		Not estimable
Ultee 2008	0	18	0	19		Not estimable
WTM APTS 2017	58	784	79	782	67.3%	0.73 [0.53, 1.01]
Total (95% CI)		**1398**		**1436**	**100.0%**	**0.68 [0.52, 0.90]**
Total events	77		115			

Heterogeneity: Chi² = 10.28, df = 12 (P = 0.59); I² = 0%
Test for overall effect: Z = 2.75 (P = 0.006)

Risk Ratio M-H, Fixed, 95% CI

0.01 0.1 1 1

Favours delayed Favours ea

Cumulative meta-analysis of effect of delayed clamping on hospital mortality

Study	Risk Ratio	95% Confidence Interval	P Value
Hofmeyr 1988	6.60	0.39-111.11	0.19
Kinmond 1992	6.60	0.39-111.11	0.19
Hofmeyr 1993	3.34	0.52-21.51	0.20
McDonnell 1997	1.40	0.38-5.16	0.61
Rabe 2000	1.13	0.35-3.61	0.84
Mercer 2003	1.13	0.35-3.61	0.84
Strauss 2003	1.13	0.35-3.61	0.84
Mercer 2006	0.74	0.27-2.04	0.56
Kugelman 2007	0.70	0.27-1.81	0.46
Baenziger 2007	0.60	0.24-1.47	0.26
Ultee 2008	0.60	0.24-1.47	0.26
Ranjit 2015	0.46	0.20-1.05	0.07
Tanprasertkul 2016	0.46	0.20-1.05	0.07
Duley 2016	0.46	0.25-0.84	0.01
Backes 2016	0.48	0.27-0.84	0.01
Datta 2017	0.54	0.32-0.92	0.02
Armanian 2017	0.57	0.34-0.96	0.04
APTS 2017	0.68	0.52-0.90	0.006

0 1 4

Favours delayed clamping Favours early clamping

Fogarty et al.
https://doi.org/10.1016/j.ajog.2017.10.231

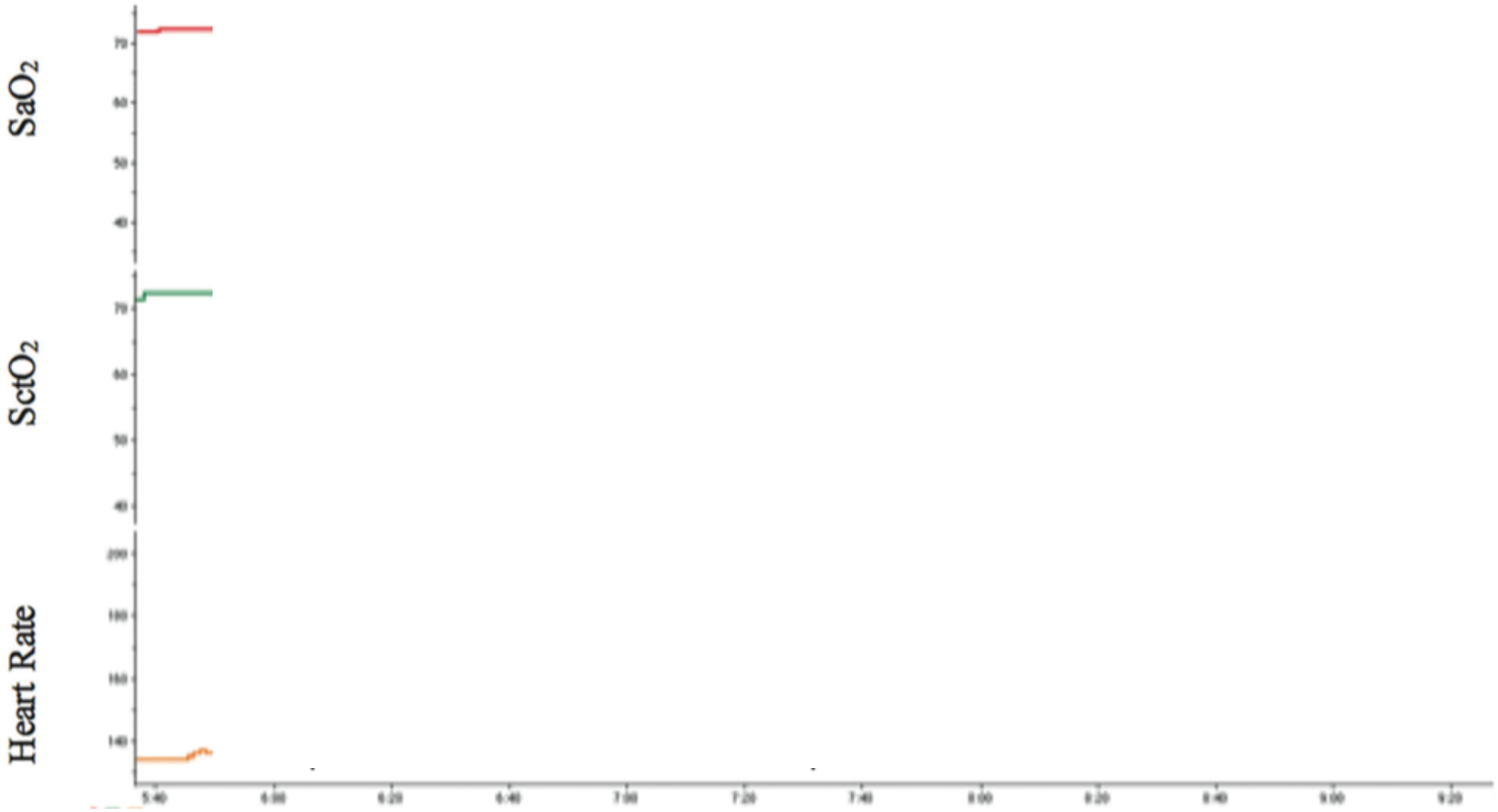
Delaying cord clamping (DCC):

Time based

versus

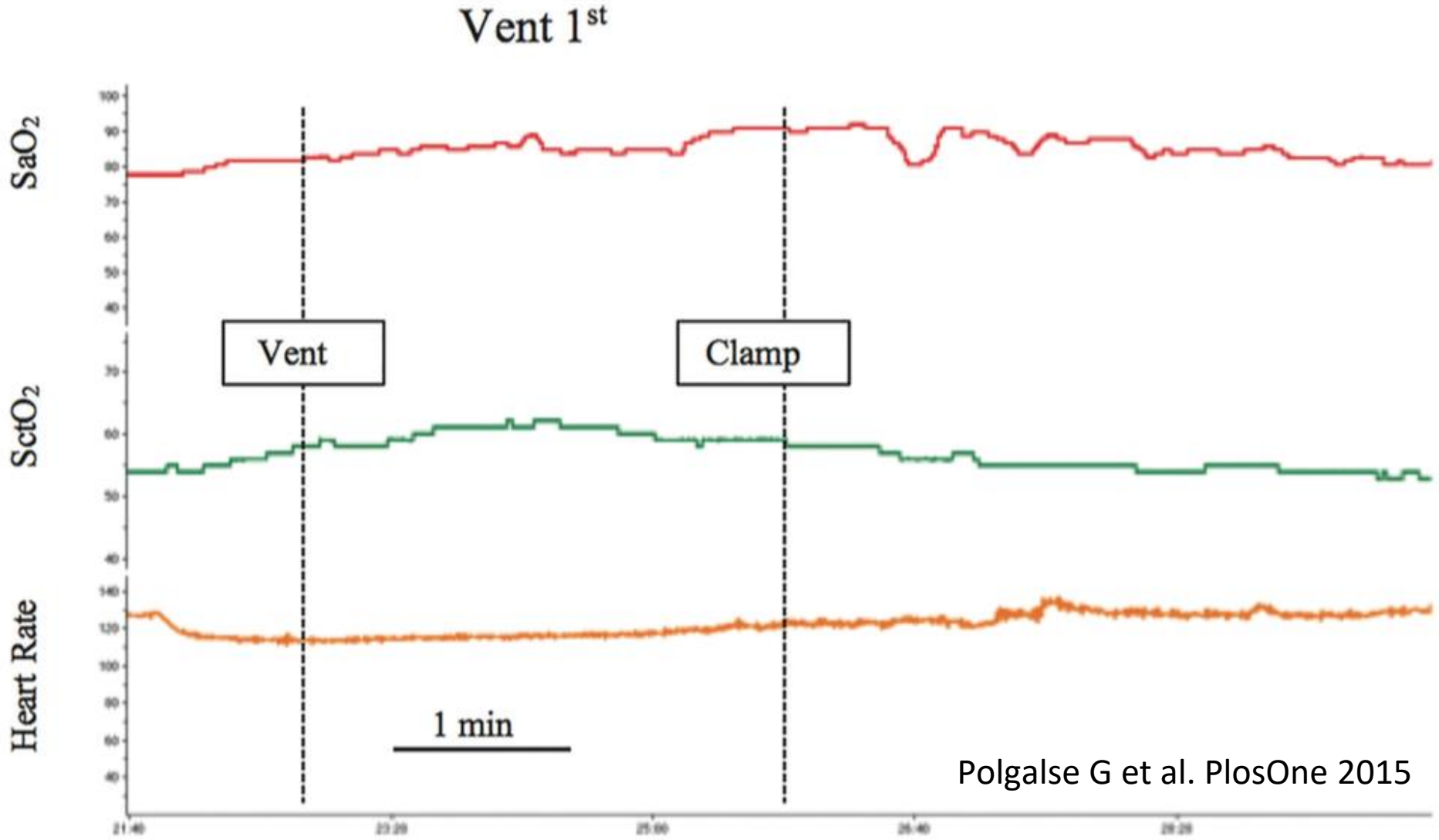
Physiology Based Cord Clamping (PB-CC)?

Background of Immediate Cord Clamping (ICC) – effect on HR and SpO2 - lamb model



Polgalse G et al. PlosOne 2015

Physiology DCC until breathing commences = Physiology-based Cord Clamping (PB-CC)



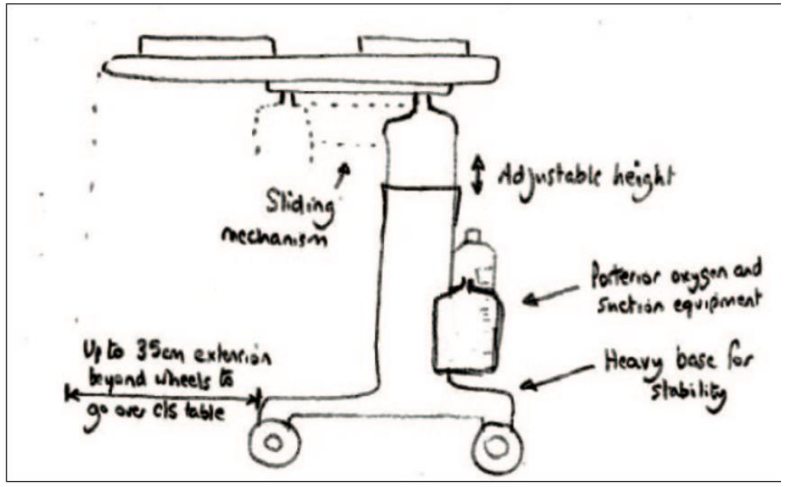
Polgalse G et al. PlosOne 2015

PB-CC – open questions

- Time frame 60s - ?
- Respiratory support during PB-CC?
- Temperature management!
- Maternal reassurance
- Should we encourage mother-child interaction
- Should we resuscitate on the intact cord?
- If so, when, how and with which devices?
- Technical and team aspects?

Facilitating delayed cord clamping

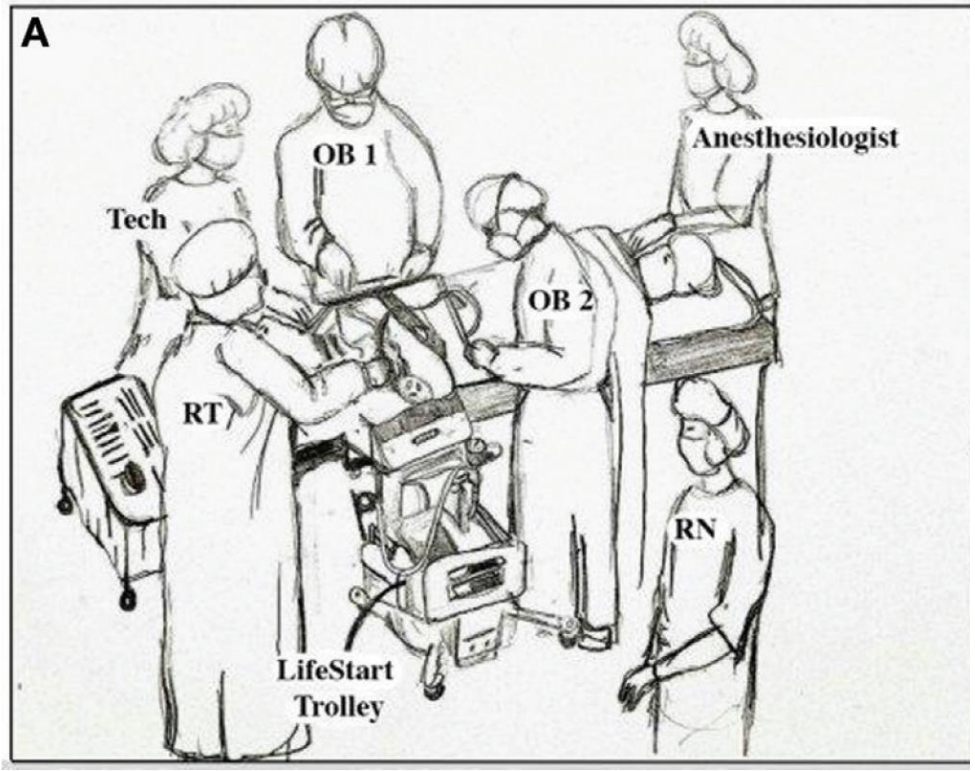
From theory to practice ..



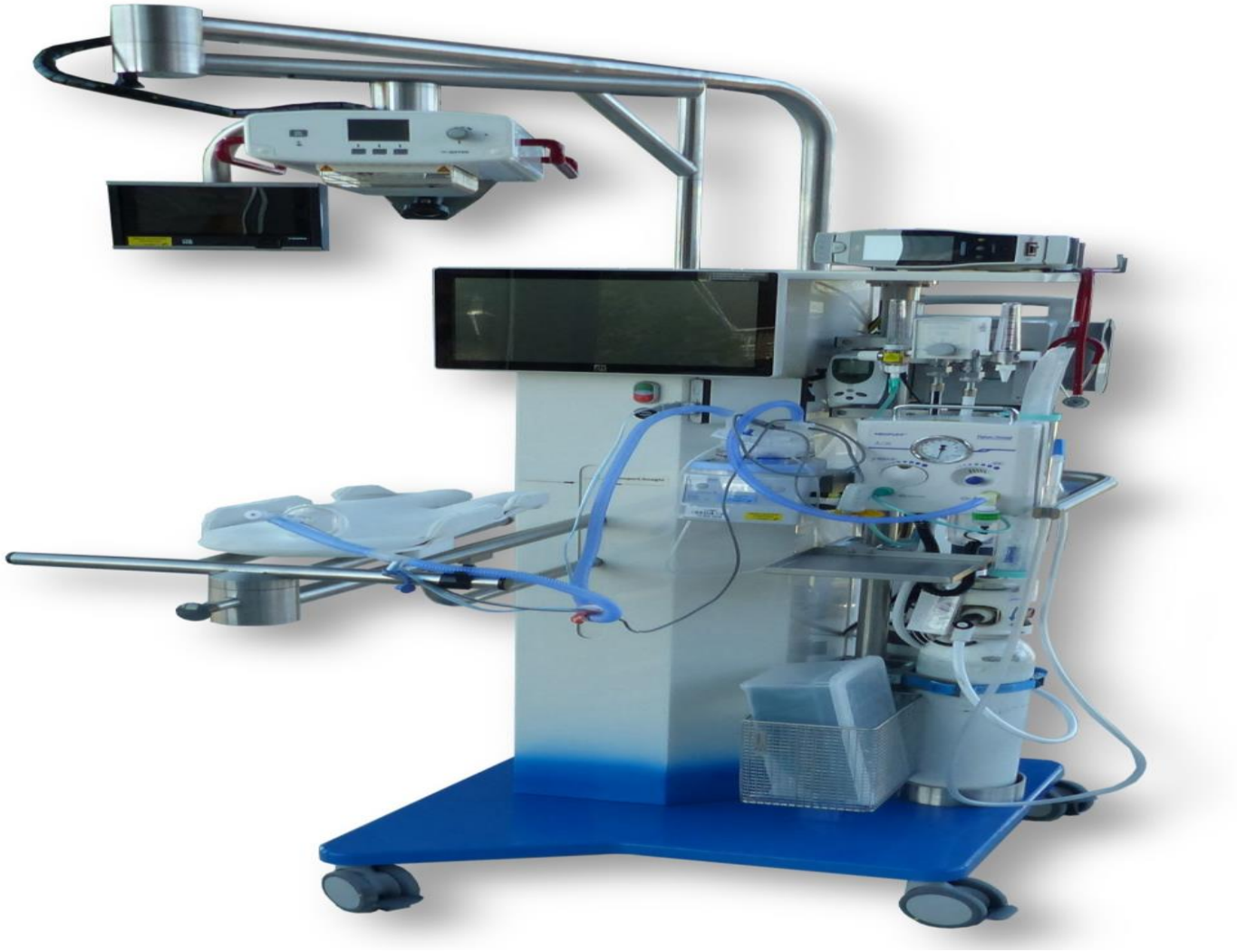
Lifestart® trolley for DCC
in the DR and theatres

Hutchon D. Infant 2014; 10: 58 - 61

Facilitating delayed cord clamping



Facilitating delayed cord clamping



https://concordneonatal.com

DCC – practice example

Collaborate with Obstetrics / Midwife teams – so that the most senior Paediatrician / Neonatologist assesses baby and decides clamp time

Preterm infant: Neonatal team applies

- stimulation
- polyethylene wraps
- SpO_2 probe
- Parent guidance to touching baby

PHYSIOLOGY BASED CORD CLAMPING AND SUPPORT OF VENTILATION – SELECTED CURRENT STUDIES

PB-CC & ventilation on cord LMI setting (Nepal)

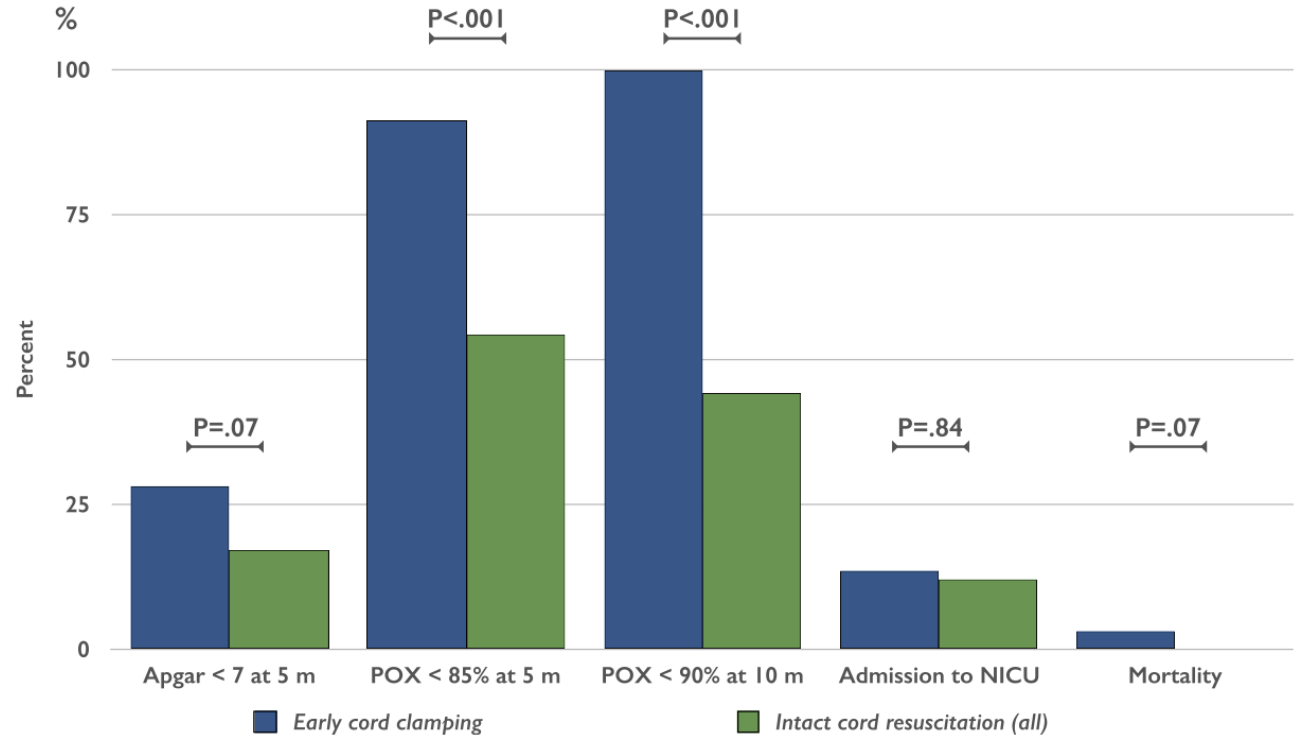


Fig. 4 Outcome on categorical variables after resuscitation with an intact cord versus early cord clamping. *P*-value calculated using Fischer's exact test

Ashish & Andersson Maternal Health, Neonatology, and Perinatology 2019: 5; 15

Effect of DCC and PB-CC on HR

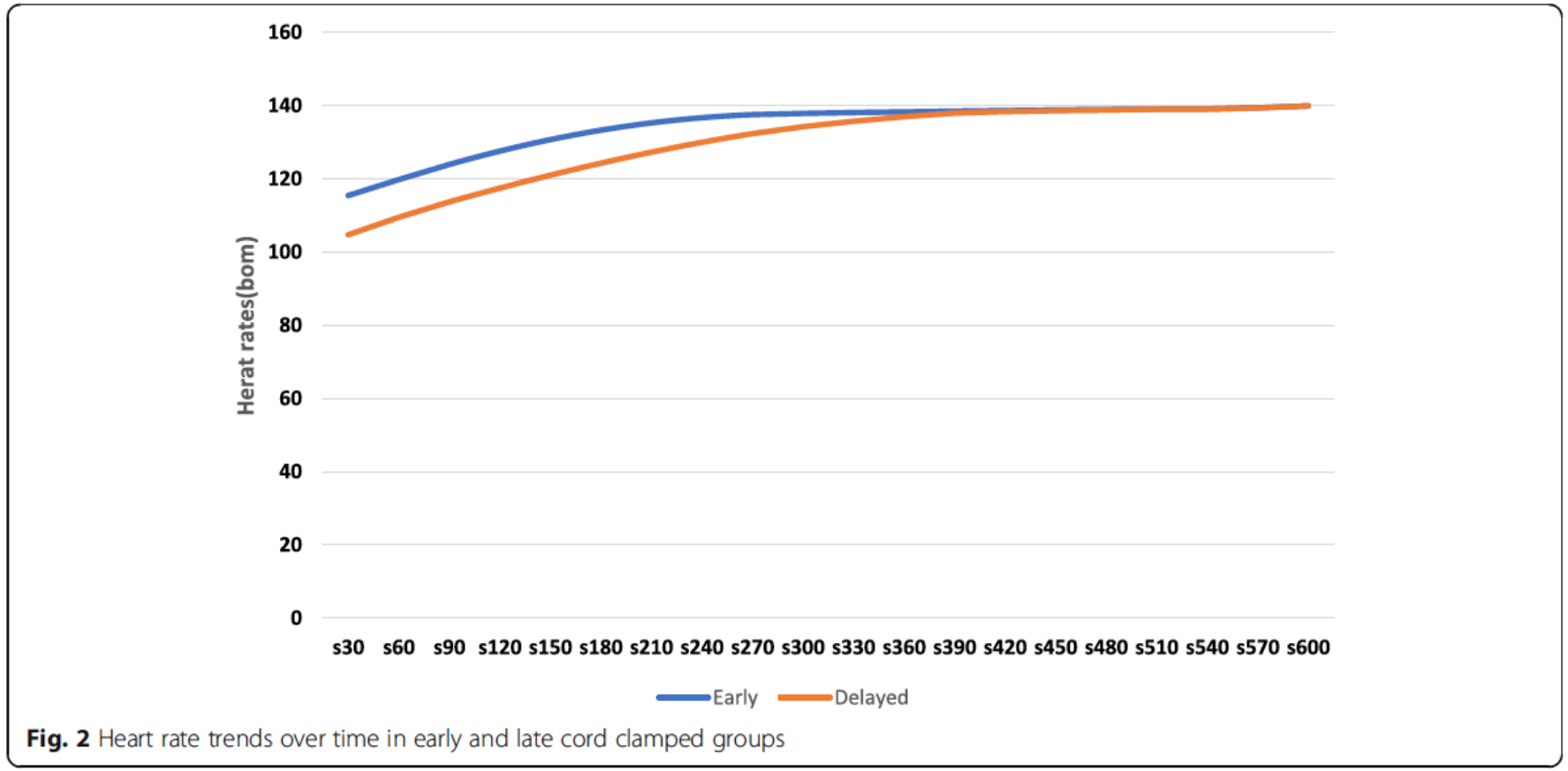


Fig. 2 Heart rate trends over time in early and late cord clamped groups

Katheria A et al. Frontiers 2017

Ashish & Andersson Maternal Health, Neonatology, and Perinatology 2019: 5; 7

Physiological-based cord clamping in very preterm infants — Randomised controlled trial on effectiveness of stabilisation

Ronny Knol[a,b,,1], Emma Brouwer[b,1], Thomas van den Akker[c], Philip DeKoninck[d,]*
Nan van Geloven[f], Graeme R. Polglase[e], Enrico Lopriore[b], Ellen Herkert[a],
Irwin K.M. Reiss[a], Stuart B. Hooper[e], Arjan B. Te Pas[b]

- Noninferiority RCT
- Very preterm infants
- Stabilisation of very preterm infants with physiological-based cord clamping is at least as effective as with standard DCC

Knol R et al. Resuscitation. 2020

Initiating resuscitation before umbilical cord clamping in infants with congenital diaphragmatic hernia: a

Table 2 Maternal and infant safety outcomes

Neonatal outcomes	Trial participants (n=20)	Historical controls* (n=19)	P value
Cord avulsion	0	0	N/A
Chest compressions	0	0	N/A
Hypothermia on first temperature (<36°C), n (%)	3 (15)	2 (11)	>0.99
First temperature (°C), mean (SD)	36.7 (0.9)	36.8 (0.6)	0.56
Maternal outcomes			
Estimated blood loss, mL; mean (SD)	583 (230)	528 (210) (n=18)	0.45
Estimated blood loss >500 mL, n (%)	11 (55)	8/18 (44)	
Estimated blood loss >1000 mL	0	0	
Therapeutic uterotonics, n (%)	1 (5)	2 (11)	
Wound infection (C/S)	0	0	

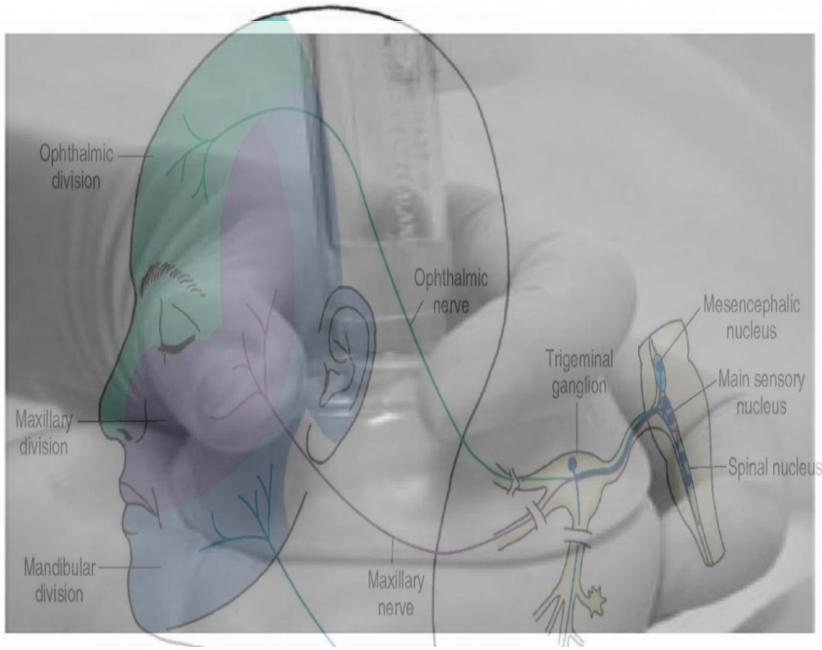
Table 3 Physiological outcomes

	Trial participants (n=19)	Historical controls (n=19)	P value
Apgar score at 1 min, median (IQR)	5 (3–7)	7 (3–8)	0.51
Apgar score at 5 min, median (IQR)	8 (5–8)	8 (5–9)	0.72
First Haemoglobin, g/dL; mean (SD)	17.6 (1.3)	16.3 (1.9)	0.02
Mean blood pressure 1 hour after birth; mean (SD)*	51.1 (8.5)	44.3 (6.3)	0.008
First blood gas after birth*			
pH, mean (SD)	7.02 (0.15)	7.03 (0.13)	0.74
CO_2, mean (SD)	90 (26)	88 (25)	0.82
Base deficit, mean (SD)	8.9 (3.3)	9.8 (3.8)	0.51
Oxygenation index with first blood gas, median (IQR)	17.5 (12.8–25.5)	16.3 (12.2–22.8)	0.74
Vasopressors (first 48 hours), n (%)	13 (68)	16 (84)	0.45
iNO (first 48 hours), n (%)	9 (47)	11 (58)	0.52
ECMO (first 7 days), n (%)	7 (37)	4 (21)	0.48
Mortality (first 7 days), n (%)	0	1 (5)	>0.99

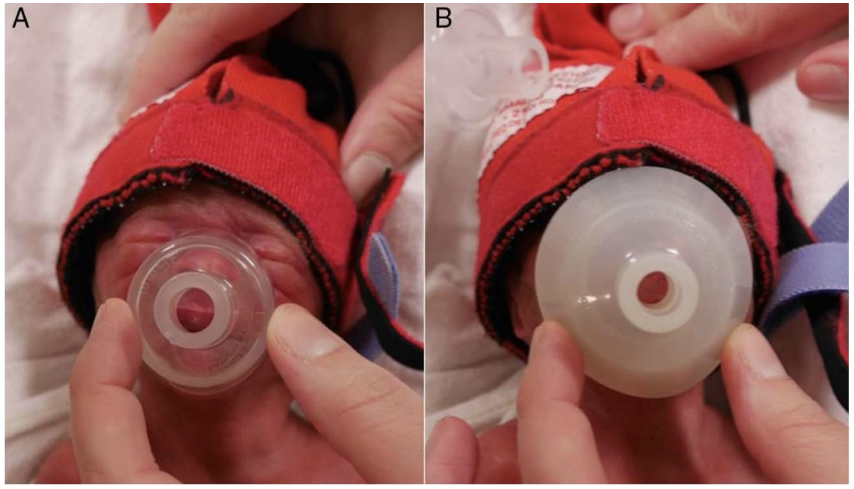
Foglia EE, *et al*.
ADC F&N Ed 2019;**0**:F1–F5

SUPPORTING BREATHING DURING IMMEDIATE TRANSITION – A WORD OF CAUTION

Physiological and technical caveats to establishing successful spontaneous breathing



Face mask ventilation may elecit Trigeminocardiac Reflex
-> inducing to apnea/ bradycardia

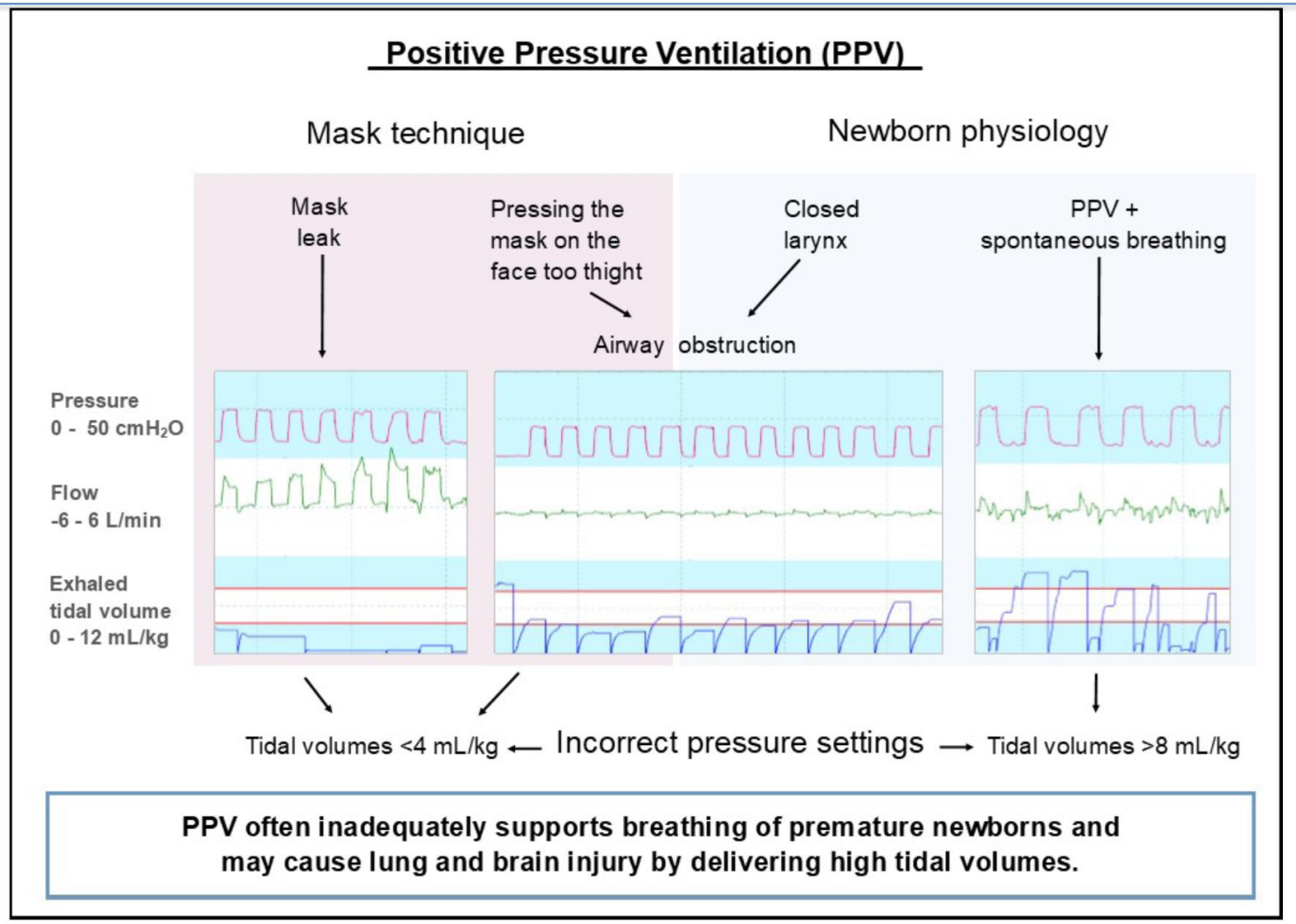


Correct versus incorrect mask size

Kuypers K. Resuscitation. 2019;144:178-184.

O'Shea JE. ADC F&N Ed. 2016;101:F294–F298.

Medics poorly coordinate with babies - Adverse Patient - Device interaction during manual PPV



Marthernus T et al. ADC F&N 2018; 0: F1-6

Summary

- DCC – feasible and life saving for all infants!
- DCC – Implementation = good Quality improvement project (QI)!
- Time based DCC may be inferior to PB-CC

- PB-CC – ensures greater physiological stability
- PB-CC with resuscitation on cord feasible and safe

BUT superiority to PB-CC alone - trials pending!

Guidelines will be updated when good quality evidence


Thank you!

Anda Bowring

- Anda was born and raised in Latvia, and trained there as an adult/general nurse in a neonatal unit (equivalent to UK level 2 NICU)

- Anda worked in Cyprus in a Russia travel clinic before moving to the UK in 2005 where she joined the JR NICU (Level 3) and qualified as an ANNP in 2015.

> Anda is currently working as a registrar rota and is the Clinical audit lead at the John Radcliffe Hospital, Oxford and is the
> Mat/Neo SIP Neonatal Clinical Improvement Lead, Oxford AHSN/PSC

National Patient Safety
Improvement Programmes

Maternity
and Neonatal

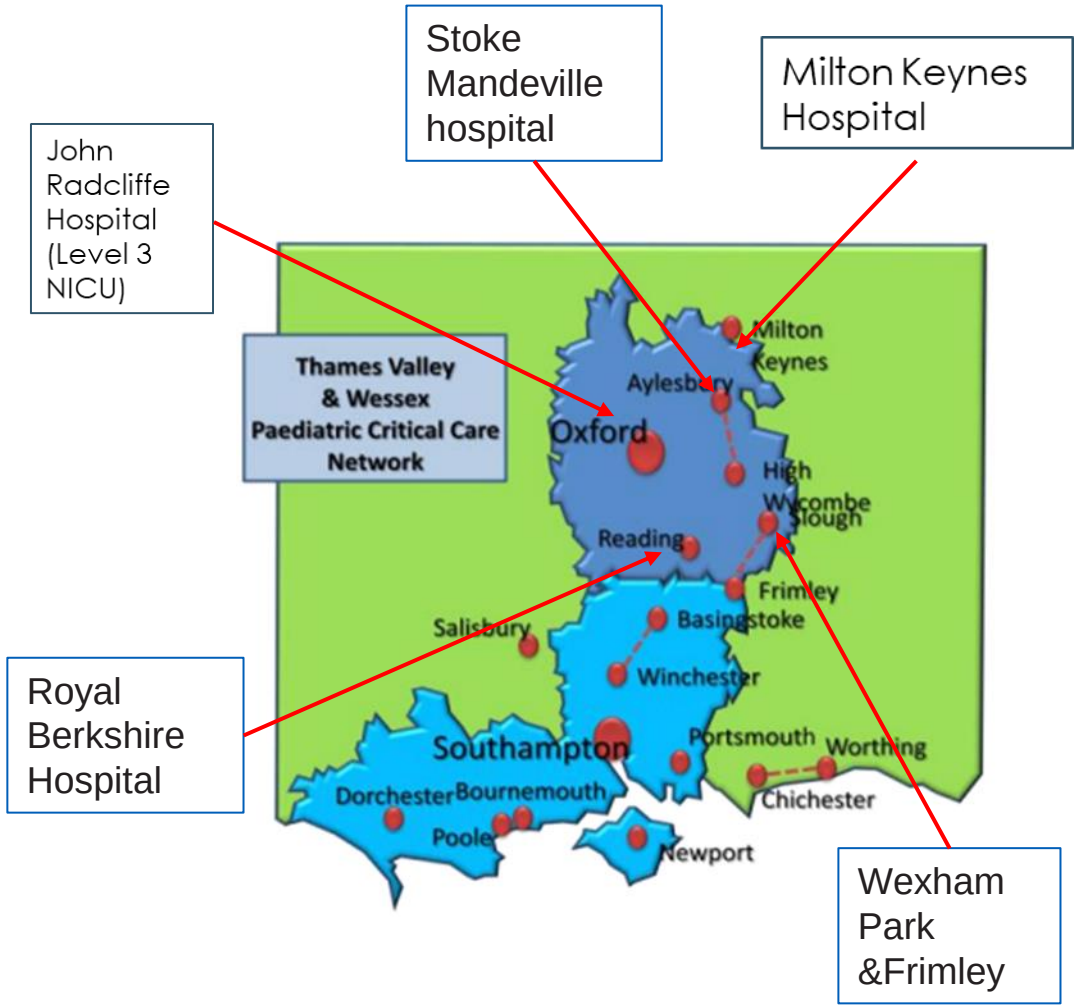
Optimal Cord management: Integrating evidence into clinical practice; a regional quality improvement project.

Anda Bowring (Anda.Bowring@ouh.nhs.uk)

Advanced Neonatal Nurse Practitioner
John Radcliffe Hospital Newborn Care Unit

Mat/Neo SIP Neonatal Clinical Improvement Lead, Oxford AHSN/PSC

Thames Valley Network



Why?

How?

Where are we now?

Where are we going ?

Why?

Evidence:

- In preterm infants, Optimal cord management (OCM) reduces death by nearly 30% (BAPM 2020, NNAP 2020, Optimal cord management in preterm babies; A quality improvement toolkit).
- In preterm infants, delayed cord clamping (DCC)reduces the need for blood transfusion, and may reduce the incidence of IVH, PVL & late onset sepsis (Rabe H Cochrane Review 2019).

Meta-analysis by Jasani *et al* March 2021 showed that:

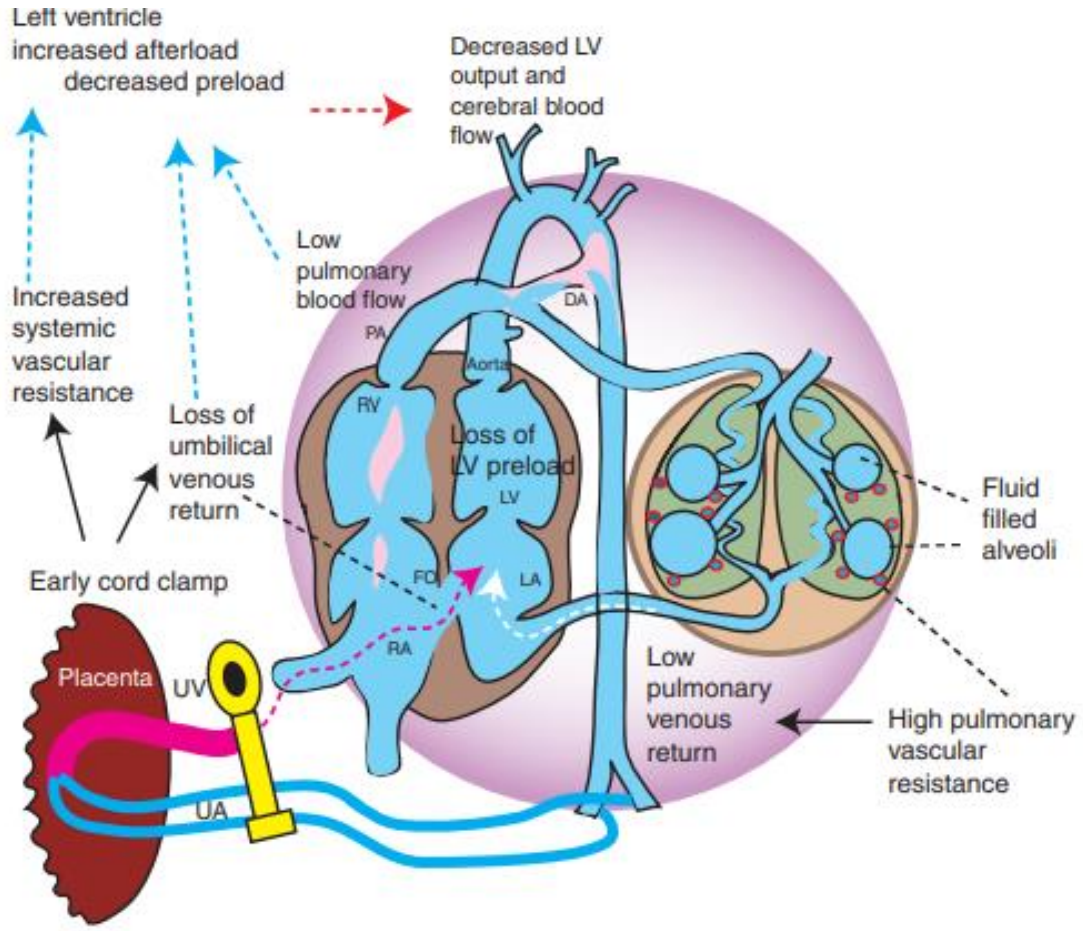
- when compared with ICC, DCC was associated with the lower odds of mortality in preterm infants.
- when compared with ICC, DCC and UCM were associated with reductions in intraventricular hemorrhage and need for packed red cell transfusion.
- there was no significant difference between UCM and DCC for any outcome.

Similar findings were presented by Seidler *et al* 2021 meta-analysis:

> Compared to early cord clamping, delayed cord clamping (DCC) and intact-cord milking (ICM) may slightly improve survival

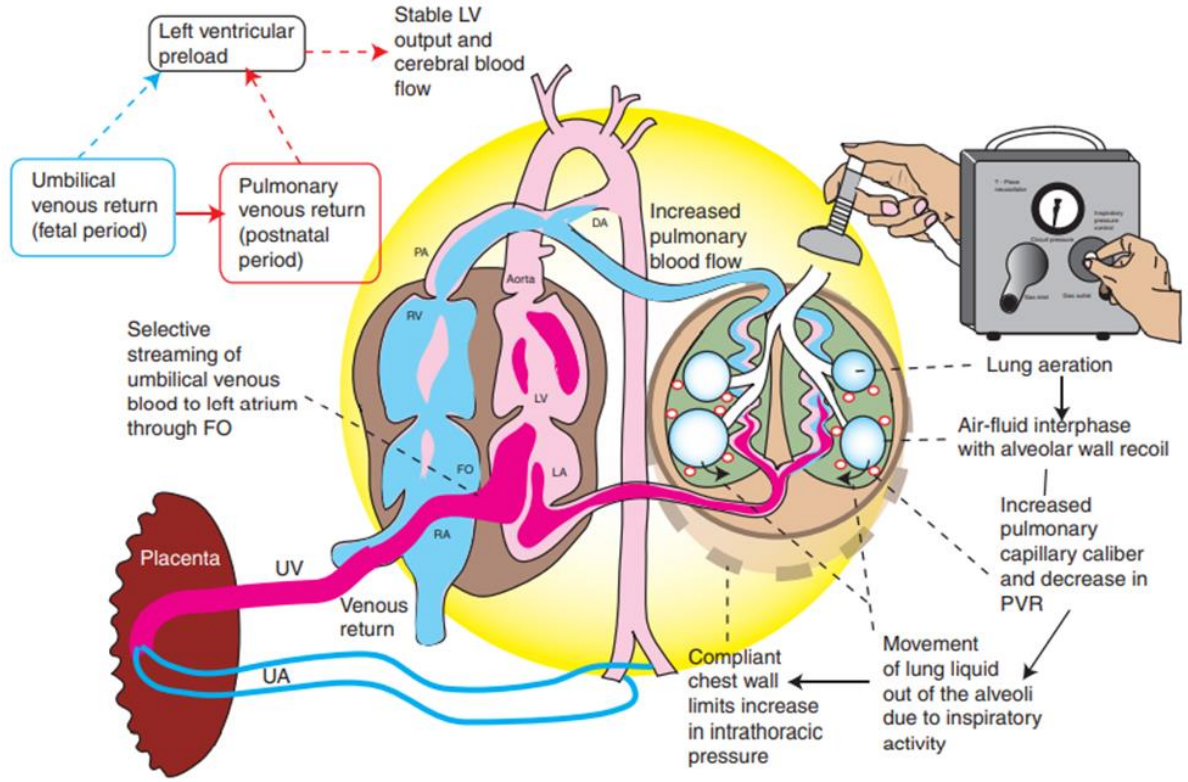
> DCC and ICM both probably improve hematologic measures but may not affect major neonatal morbidities.

Cardiovascular adaptation with ICC before aeration of lungs:



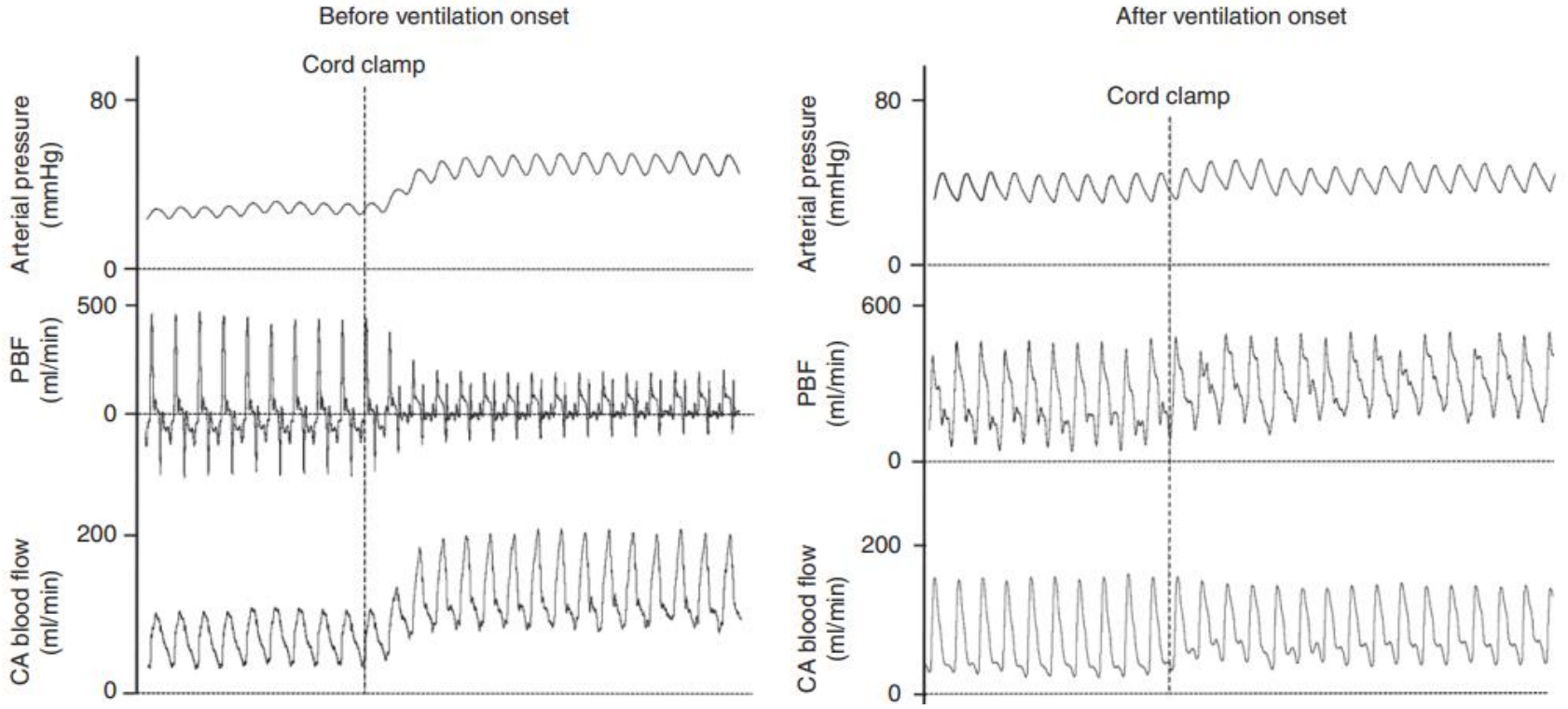
- **Immediate cord clamping** prior to lung aeration **restricts flow to the ventricles.**
- With **failure to establish ventilation**, **pulmonary vascular resistance** (PVR) remains **high** and **compromises pulmonary blood flow** (increased right to left DA shunt) and **venous return to the left ventricle.**
- **Decreased filling of the left ventricle** (preload) and **increased afterload** (due to removal of low-resistance placenta) **compromise cardiac output.**

Cardiovascular adaptation with physiological based cord clamping :



- Cord clamping should be performed after establishing effective ventilation so that pulmonary venous return can replace umbilical venous return as the source of left ventricular preload.
- In physiological based cord clamping -***after onset of lung aeration.*** The **left ventricular preload occurs** from two sources:
  - ***umbilical venous return through the FO shunt*** (predominant source during fetal life) and
  - ***pulmonary venous return*** (main source after birth).

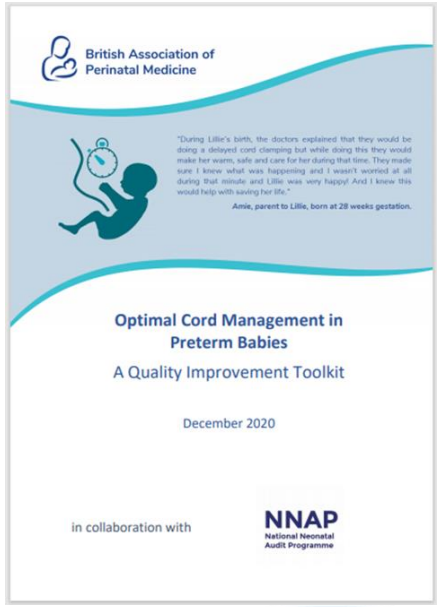
- An intact umbilical cord allows continuous umbilical venous flow to the ventricles while respirations are being established. With the concomitant initiation of breathing through crying or positive pressure ventilation/ HFT, pulmonary vascular resistance (PVR) decreases allowing increased blood flow to the lungs (decreased right to left shunt through the ductus arteriosus (DA)) as well as increased venous return to the LV.
- The unclamped UA prevents a sudden increase in left ventricular afterload. These factors ***result in stable cardiac output.*** Clearance of lung liquid and an increase in resting air volume leads to thoracic expansion in the presence of a compliant chest wall limiting the increase in intrathoracic pressure.

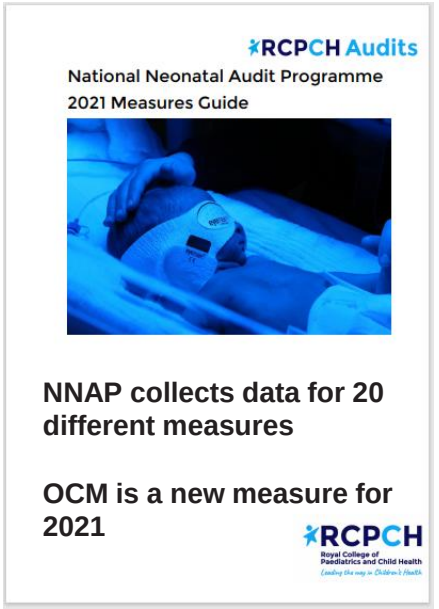


Effect of umbilical cord clamping (cord clamping) on systemic arterial pressure (carotid artery), pulmonary blood flow (PBF), and carotid arterial (CA) blood flow measured in newborn lambs before or after ventilation onset.
Note that if cord clamping occurs after ventilation onset, the increases in CA pressure and blood flow are greatly mitigated as is the decrease in right ventricular stroke volume, indicated by maintained amplitude in PBF waveform. The reduced increase in CA pressure is because the pulmonary circulation, due to left-to-right shunting through the ductus arteriosus (DA), can immediately act as an alternate low-resistance pathway for blood flow emanating from the left ventricle.

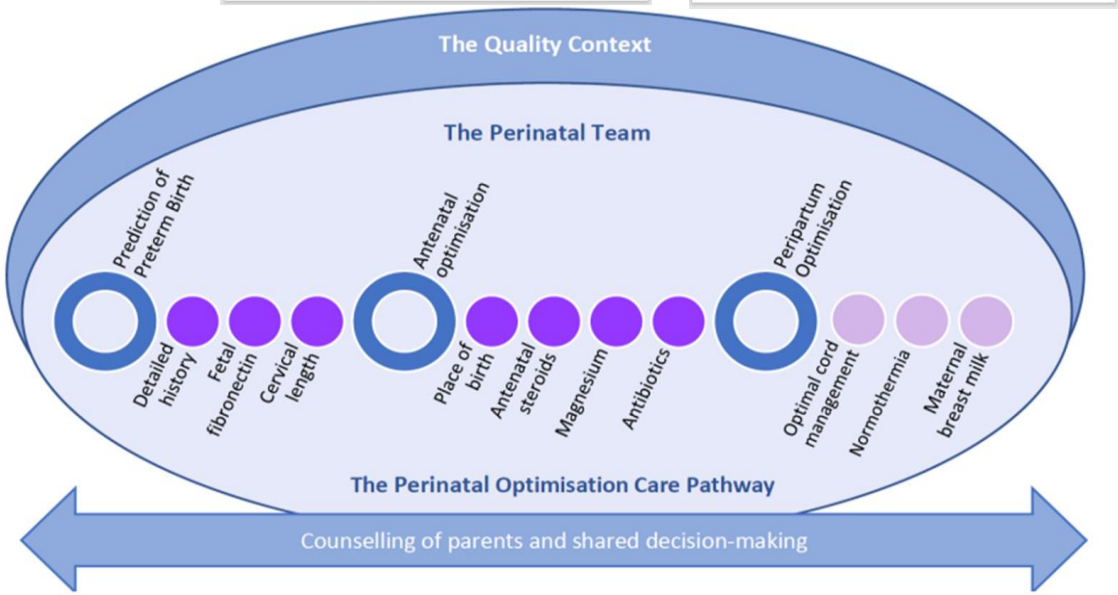
Organizational drivers:

- BAPM
- NNAP 2020
- National Patient Safety Improvement Program





Mat/Neo SIP Aim:
To support an **increase in the number of eligible preterm babies** (**up to 33+6**) who **receive optimal management of the cord (waiting 60 seconds before clamping the umbilical cord after delivery where feasible) to 95% or greater by 2025.**



NNAP 2020 Data on DCC:

Hospital	Percentage of babies received DCC >60 sec
Oxford	54%
WPH/Frimley	47%/44%
SMH	14%
RBH	11%
MK	21%
Total for the whole network	26%

Based on the data above the improvement is needed.

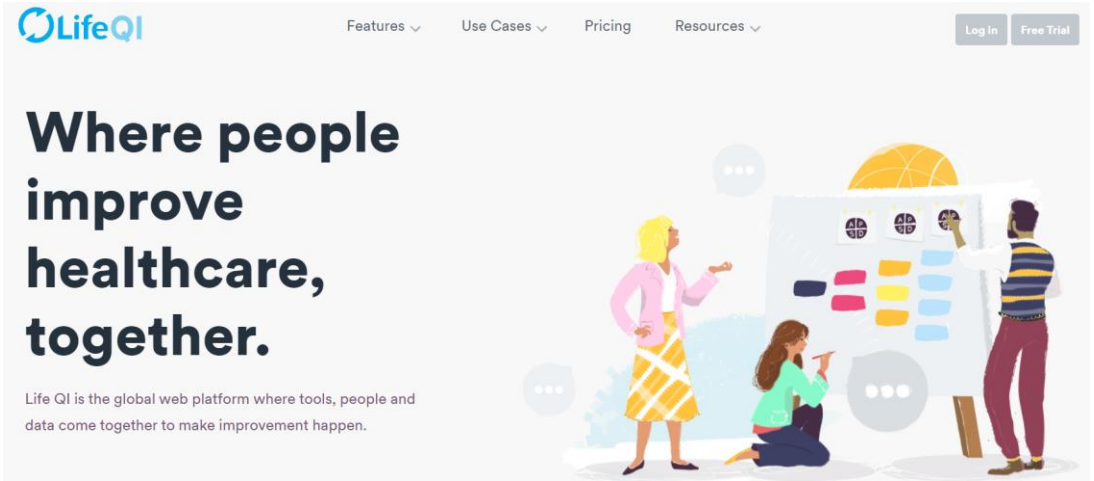
How?

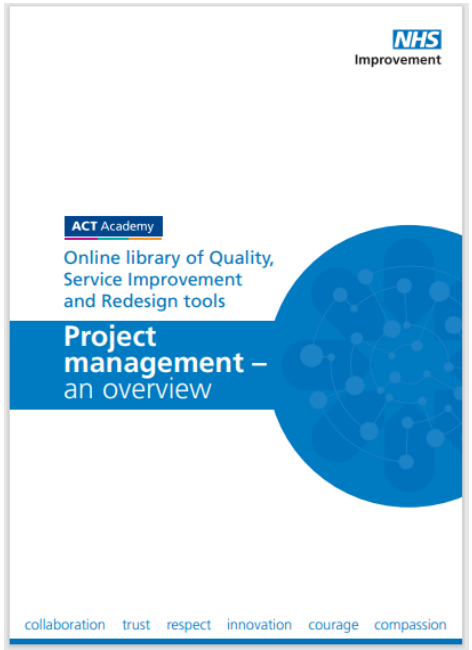
Task and Finish groups:

- Each hospital within the network identified a lead for the project that consists of neonatal, midwifery and obstetric representative, and they are the one that drive the project.
- Task & finish group meet monthly for catch up, updates, support and general Q&A session.
- Each team select/ recruit OCM champions that are helping and driving project on day-to-day bases.
- Really hard work.

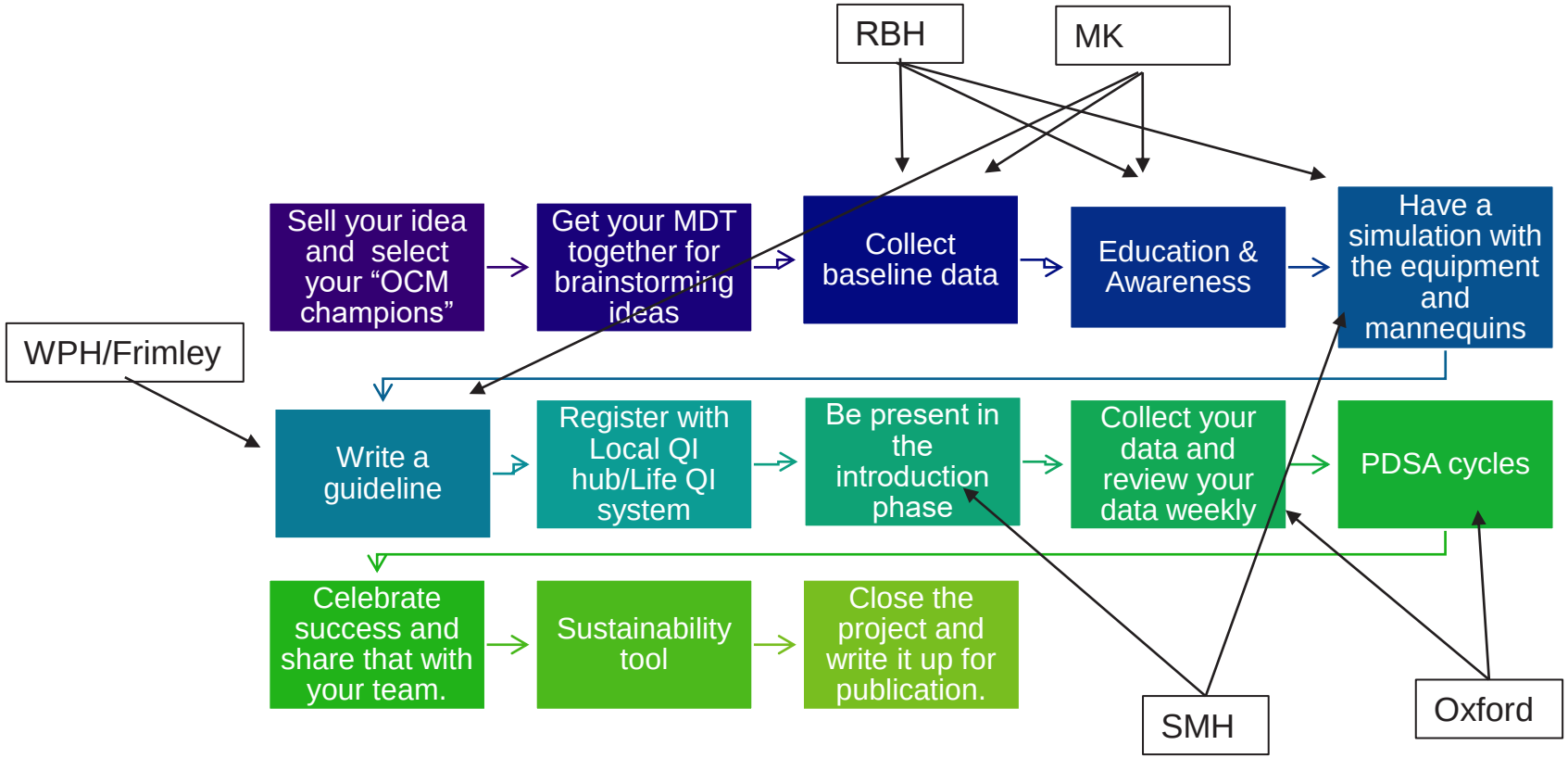
Tools to use to support your QI:

- Teaching session provided by myself/ Eileen and Michelle
- NHS Improvements online resources about QI methodology
- Life QI platform



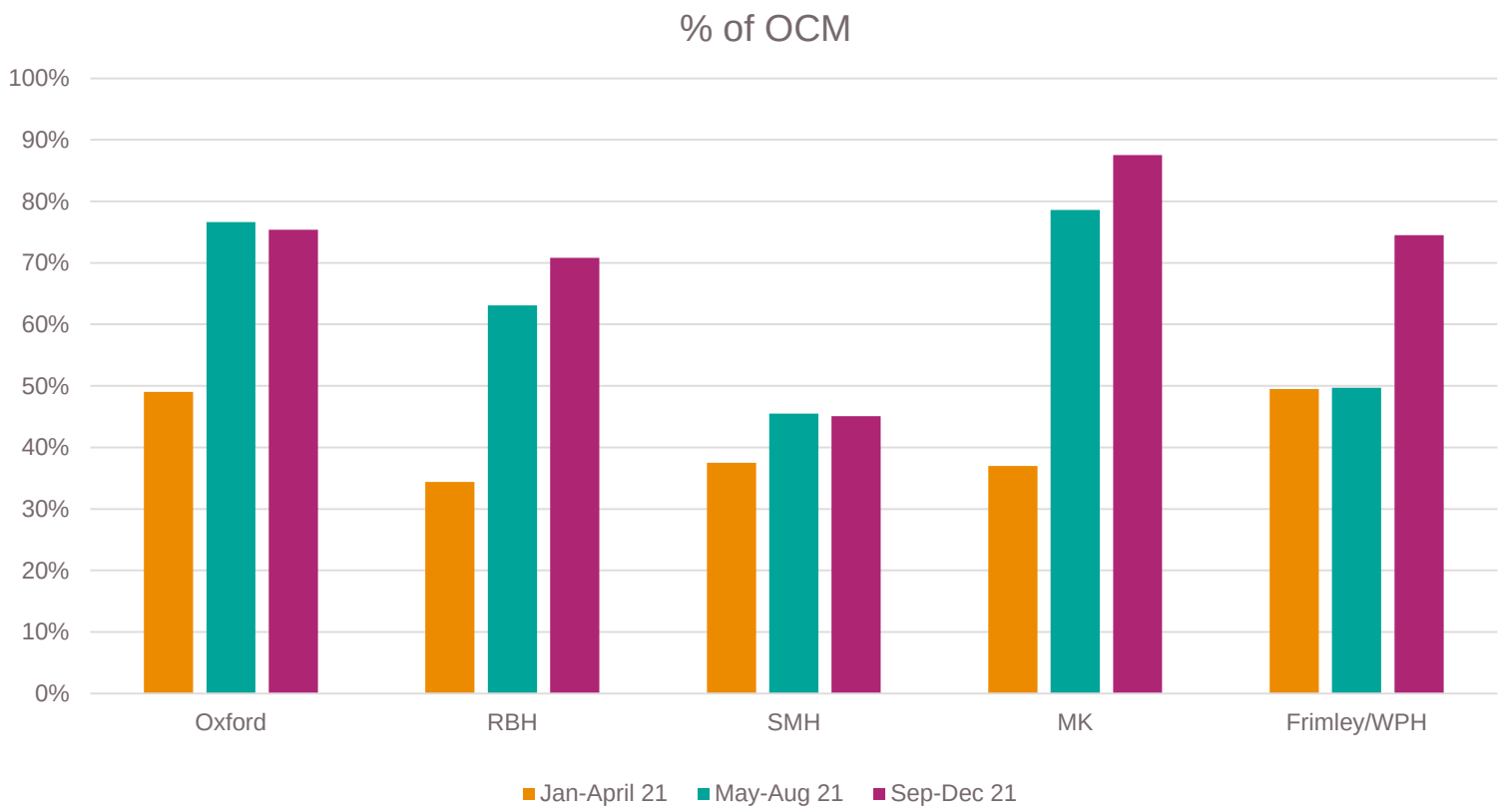


Roadmap to OCM (June 2021)

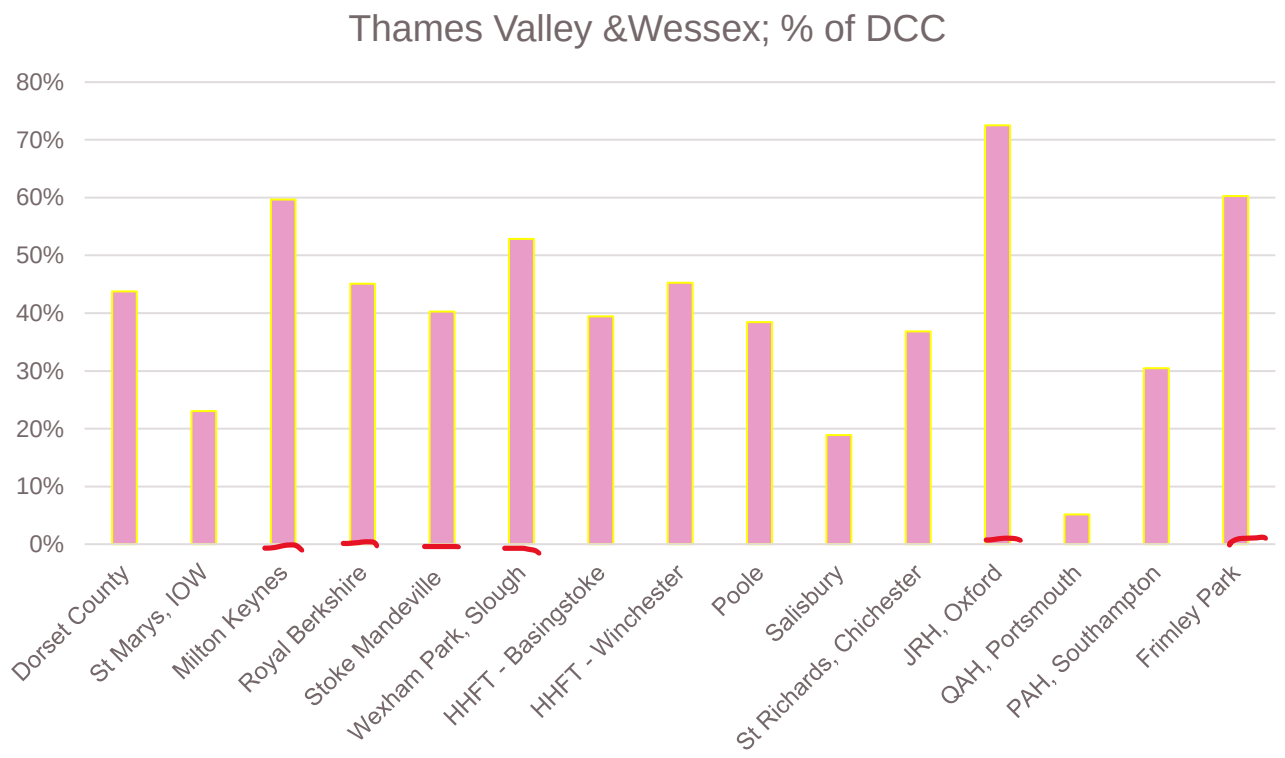


RBH- Royal Berkshire Hospital
SMH- Stoke Mandeville Hospital
WPH/Frimley- Wexham Park and Frimley Hospital
MK- Milton Keynes
Oxford

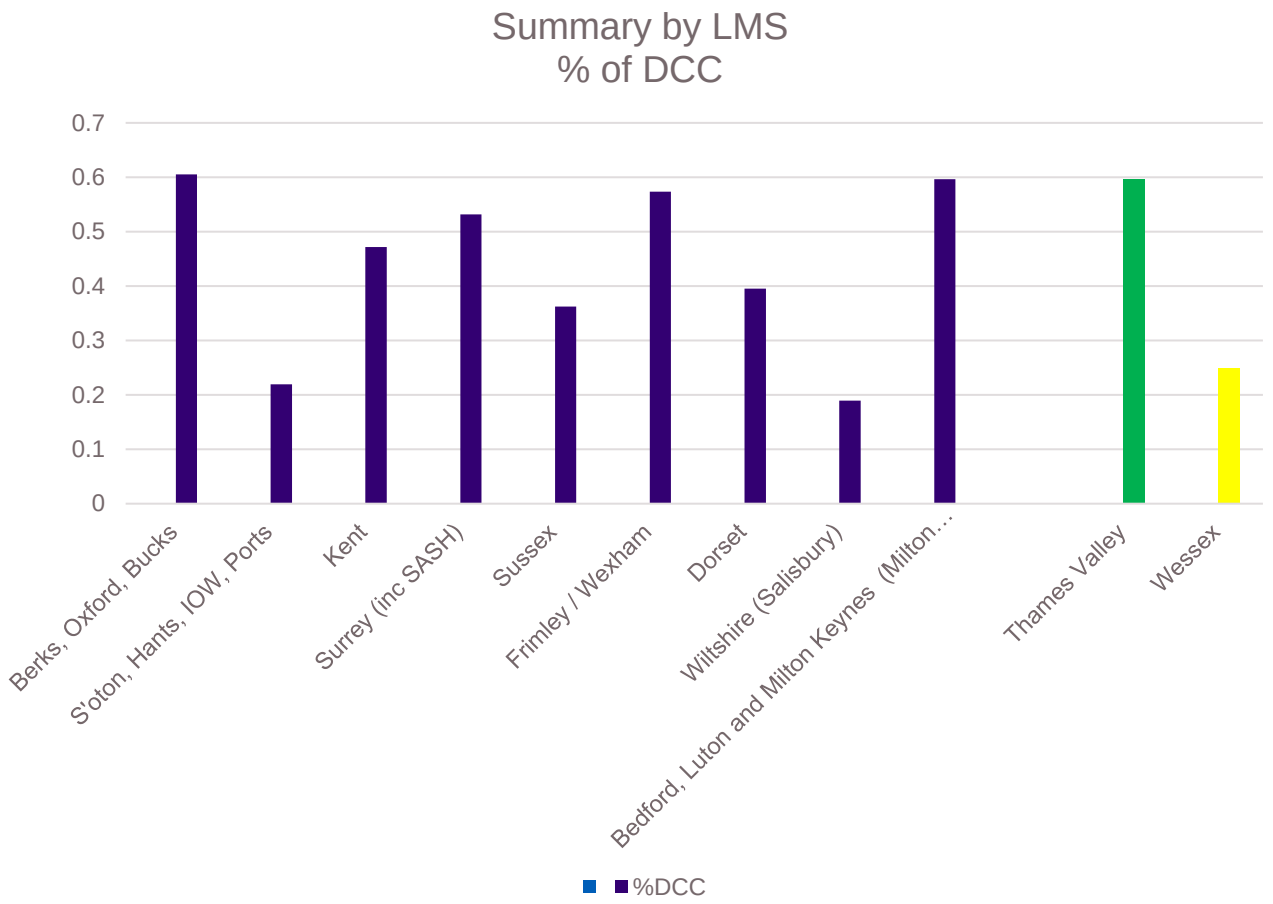
Where are we now?



	Oxford	RBH	SMH	MK	Frimley/WPH
Jan-April21	49%	34.40%	37.50%	37%	49.50%
May- Aug21	76.60%	63.10%	45.50%	78.6%	49.70%
Sept-Dec21	75.40%	70.80%	45.10%	87.5%	74.50%



Units	% of DCC
Dorset County	44%
St Marys, IOW	23%
Milton Keynes	60%
Royal Berkshire	45%
Stoke Mandeville	40%
Wexham Park, Slough	53%
HHFT - Basingstoke	39%
HHFT - Winchester	45%
Poole	38%
Salisbury	19%
St Richards, Chichester	37%
JRH, Oxford	73%
QAH, Portsmouth	5%
PAH, Southampton	30%
Frimley Park	60%



Our network has improved OCM data from **26% to ↑60%.**

Summary by LMS		%DCC
Berks, Oxford, Bucks	BOB	61%
S'oton, Hants, IOW, Ports	SHIP	22%
Kent	KENT	47%
Surrey (inc SASH)	SURR	53%
Sussex	SUSX	36%
Frimley / Wexham	FRIM	57%
Dorset	DOR	40%
Wiltshire (Salisbury)	WILT	19%
Bedford, Luton and Milton Keynes (Milton Keynes)	BLM	60%
Thames Valley		60%
Wessex		25%

Where are we going ?

- All the way to the 95% of babies receiving OCM by 2022- 2023 and then sustaining it by 2025……

- Portable nasal high flow therapy in delivery suite to facilitate physiological based cord clamping (Started in Oxford September 2021.To be disseminated across network)

- “Birthday Cuddles” during or after DCC (Guideline in place in Oxford, to be disseminated and practiced in Oxford and across network).

- More education & SIMs- particularly joint midwifery/ obstetrics and neonates- in room and theatre setting

Thank you!

BREAK- Coffee/Tea

Marie Lyndsay-Sutherland

- Marie is a Senior Advanced Neonatal Nurse Practitioner at Poole Hospital, UHD and has been since 2005
- Marie has developed a special interest in caring for neonates born to women with mental health problems and Quality Improvement
- Marie has completed a Doctorate in Advanced Clinical Practice, as well as postgraduate programmes in neonatal studies and advanced clinical practice. She is currently working on QI projects related to the optimisation of the preterm infant.

National Patient Safety
Improvement Programmes

Maternity
and Neonatal

Preterm Perinatal Optimisation Care Pathway

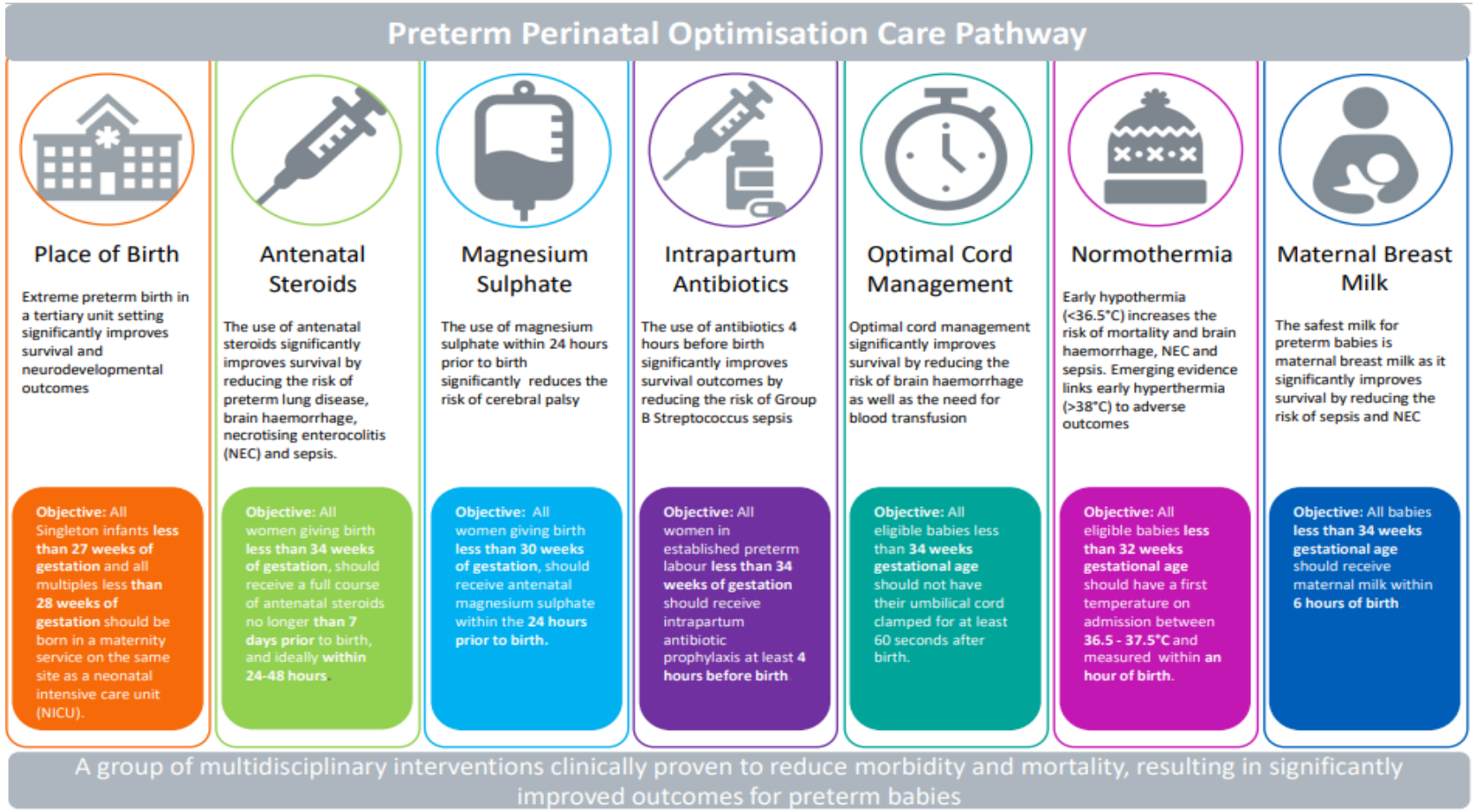
Marie-Lyndsay Sutherland (Marie.Lindsay-Sutherland@uhd.nhs.uk)

Senior Advanced Neonatal Nurse Practitioner
Dorset University Hospitals, Poole Hospital

Delivered by:
TheAHSNNetwork

Led by:
NHS England
NHS Improvement

Wessex AHSN/ MatNeoSIP workstream for 2022
BAPM / NNAP Pathway (Oct 2020)



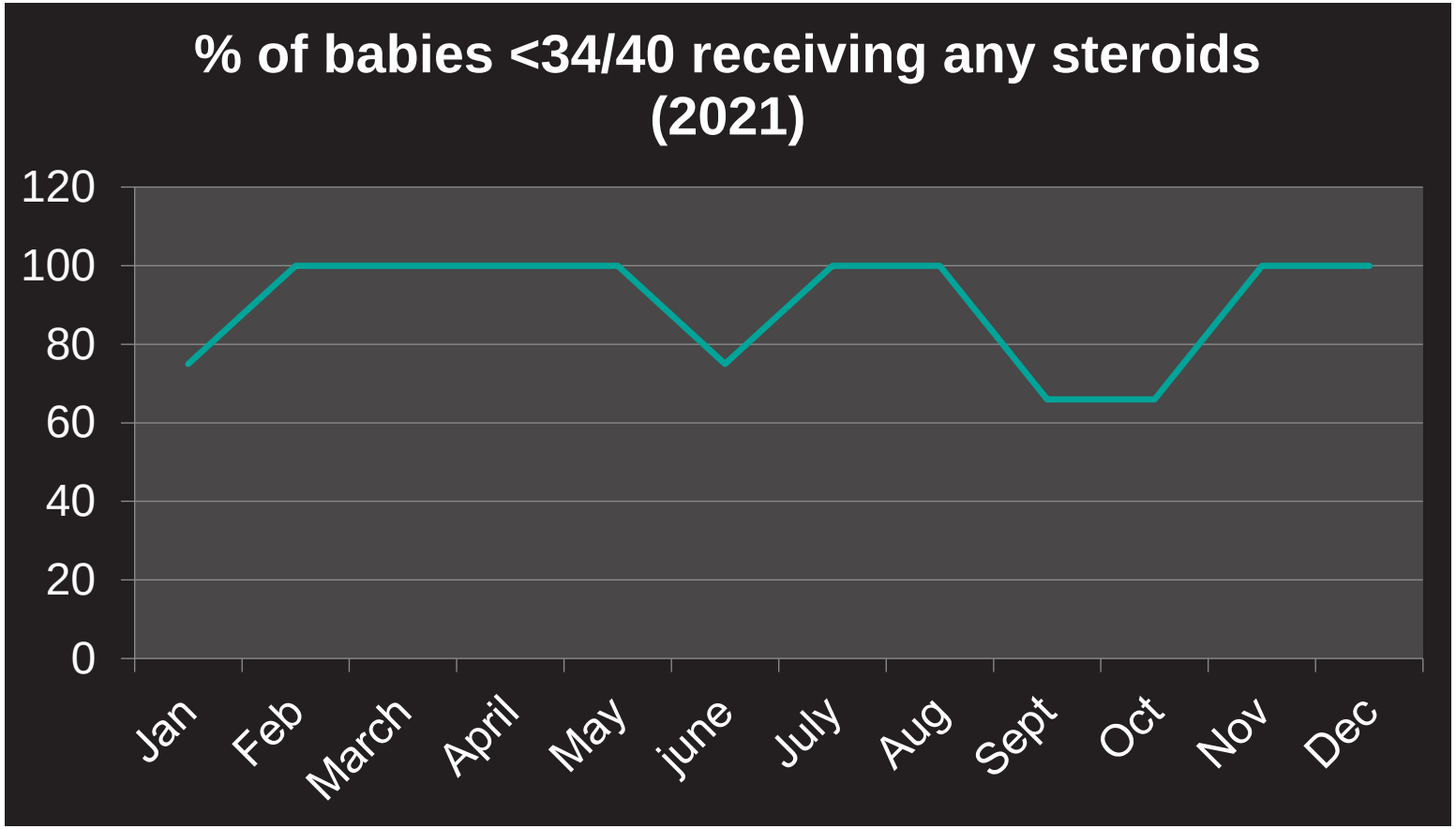
How are Poole doing? (2021)

- **Right place of birth for gestation**
- Reduction of mortality by 50%/ NEC/ PVL/ Severe brain injury
- **<27/40; <28/ 40 twins; <800g-** > L3
- Target 85%
- Network system – pilot Cotline-> rolled out summer 2021
- 2 babies born in Poole <27/40, however 1 x concealed/ ED @8cms. Previously 1 per year.
- Using precept data- central data?

AN Steroids (<34/40)

- Reduces risk of death/ major morbidity in less than 34/40. Reduce mortality / severe IVH/ PVL in <25/40 by 50%.
- Ideally within 7 days of birth
- NNAP Target is 85% 23-33+6/40 at least one dose
- UHD achieved 91% at least 1 dose, but 1 baby who didn't get any was <30/40 (2021)

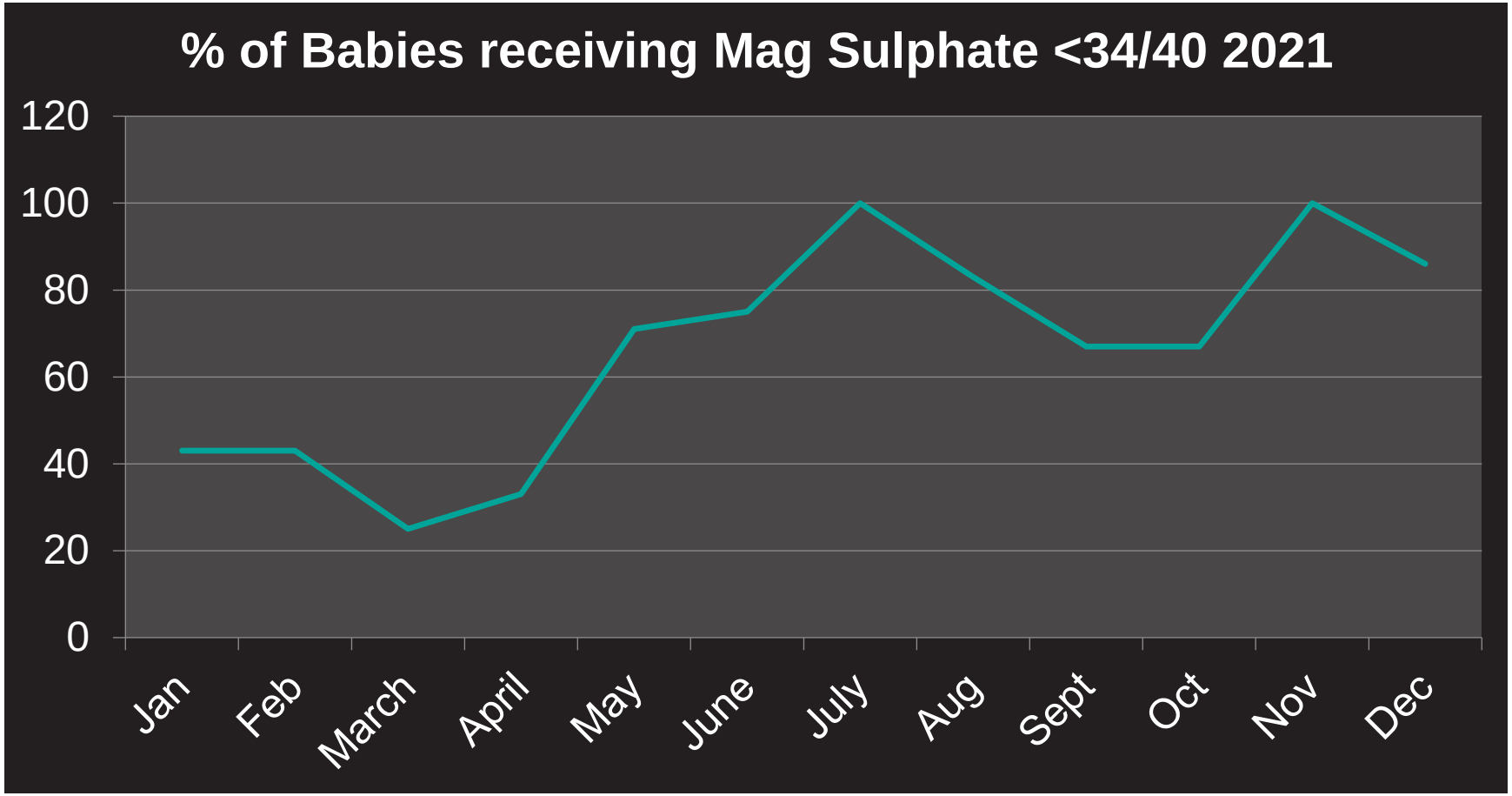
AN Steroids (<34/40) cont.



Magnesium Sulphate (PReCePT)

- **<30/40 <24 hours old** – Reduces risk of CP by 30%. NNT 1:40
- NNAP target 85%
- Some benefit for 30-33+6/40 NNT 1:55
- UHD do up to 33+6/40- since Jan 2019
- 76.5% of those admitted to NICU and <30/40 got Mag Sulphate (2021)
- 64% of <34/40 got Mag Sulphate (delivery imminent/ not offered) (2021)

Mag Sulphate (<34/40)cont.



Intrapartum Antibiotics

> All women <34/40 in prem labour should have intrapartum Abx.

> Abx given <4 hrs before birth ↓GBS sepsis 11.1%-> 1.6%

> PROM/ PREM get Erythromycin

> LSCS get IVABx around delivery

> 73% got some Abx as above

> Difficult to extract data- hidden in narrative/ not noted/ timings

> Maternity BN ? Better Requested to add via ASHN

Deferred Cord Clamping

> Leaving the cord intact for at least 1 minute

> Improves cardiovascular stabilisation; ↓IVH; ↑HB/ iron stores; ↓NEC

> Supported by NLS Guideline

> UHD Guideline since Feb 2020

DCC cont.

Gestation	DCC (2021)	No DCC (2021)
<30/40	7 (41%)	10 (59%)
30-33+6/40	21 (41%)	30 (59%)

71% of babies having DCC did so at LSCS
69% of babies **not** having DCC did so at LSCS

Most common reason for no DCC was baby needed resus

Normothermia

> All babies **below 32/40** have a temperature 36.5-37.5 within 1 hour of birth (NNAP target)

> N=36 (<32/40)

> Temp <36.5-> 5 babies including 3 x <30/40

> (1 in corridor @ 31+6)

> Temp >37.5 -> 2 babies including 1 <30/40

> Temperature champion / Journal club

Normothermia during DCC (<34/40)

DCC	Temp 36.5-37.5	Abnormal temp
Yes	86%	14%
No	83%	17%

Maternal Breastmilk (<34/40)

> MBM reduces NEC and other infections; supports growth and development

> Target of <34/40 should have EBM by 6 hours

> BFI Update – mum should express by 2 hours of age as most successful timeframe to establish lactation

> 97% had MBM at some stage in NICU stay (2021)

> 71% within first 24 hours

> 13% in first 6 hours

Workstream QI 2022- DCC

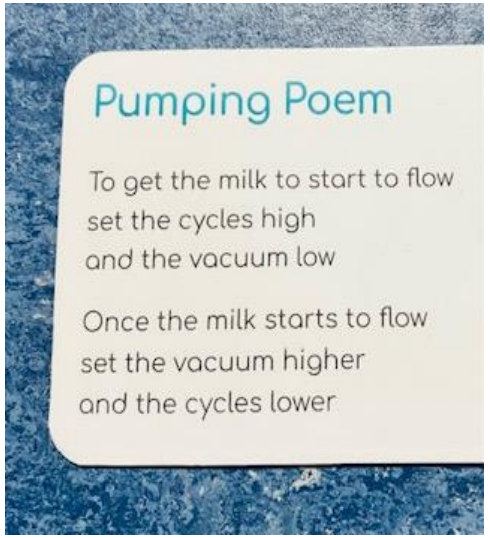
> Baseline data- deep dive
> Trial of Lifestart- need for resus addressed
> Training
> Process Mapping/ SIM- MDT- start in theatres (70%)
> Data collection- PDSA-> ?purchase / ?alternative
> Balancing measures
> Feedback to maternity staff/ Trust/ network (monthly AHSN)
> Update UHD guideline

Workstream QI 2022- Early MBM

- Baseline data- deep dive- had to pull notes- not on BN easily- audit form
- Infant feeding champions- team with QI idea- Colostrum bags (contents reviewed/ supply/parent views)/ early hand expressing convo
- Process mapping – with maternity IF lead- opportunities
- Training- e-lhr module for IF champs. 5 min nugget video for staff
- Launch in April
- Data collection- PDSA-> audit form mapped to BFI
- Highlight again on key BF days/ weeks
- Balancing measures?
- Feedback to maternity staff/ Trust/ network (monthly AHSN)- scale up?
- Importance of early contact-? Delivery room cuddles

Thank You


NHS
Off to the best start
A guide to breastfeeding
For lots more helpful tips and information visit: www.nhs.uk/start4life
start 4 life


Pumping Poem
To get the milk to start to flow
set the cycles high
and the vacuum low
Once the milk starts to flow
set the vacuum higher
and the cycles lower

Lambri Yianni

- Lambri is a neonatal acting consultant at UHS and has a special interest in education.

- Lambri is the Neonatal Transformation Fellow for Thames Valley and Wessex Neonatal ODN and is leading the implementation of several projects in our network (Pulse Oximetry Screening, CFM in Wessex, and the BAPM framework on extreme preterm birth).

- Lambri is faculty of the MatNeo SIP working with maternity and neonatal leads in Wessex to promote and support the optimisation of the preterm infant, working with Eileen to produce SIM material for preterm birth.

National Patient Safety
Improvement Programmes

Maternity
and Neonatal

Neonatal Elements of the optimisation of the Preterm Infant – the benefits?

Lambri Yianni

Neonatal Transformation Fellow for Thames Valley and Wessex
Acting Consultant University Hospitals Southampton

Delivered by:
TheAHSNNetwork

Led by:
NHS England
NHS Improvement

The NHS Long Term Plan

To reduce newborn brain injury and death by 50% by 2025

Prematurity is the leading cause of CP and child mortality

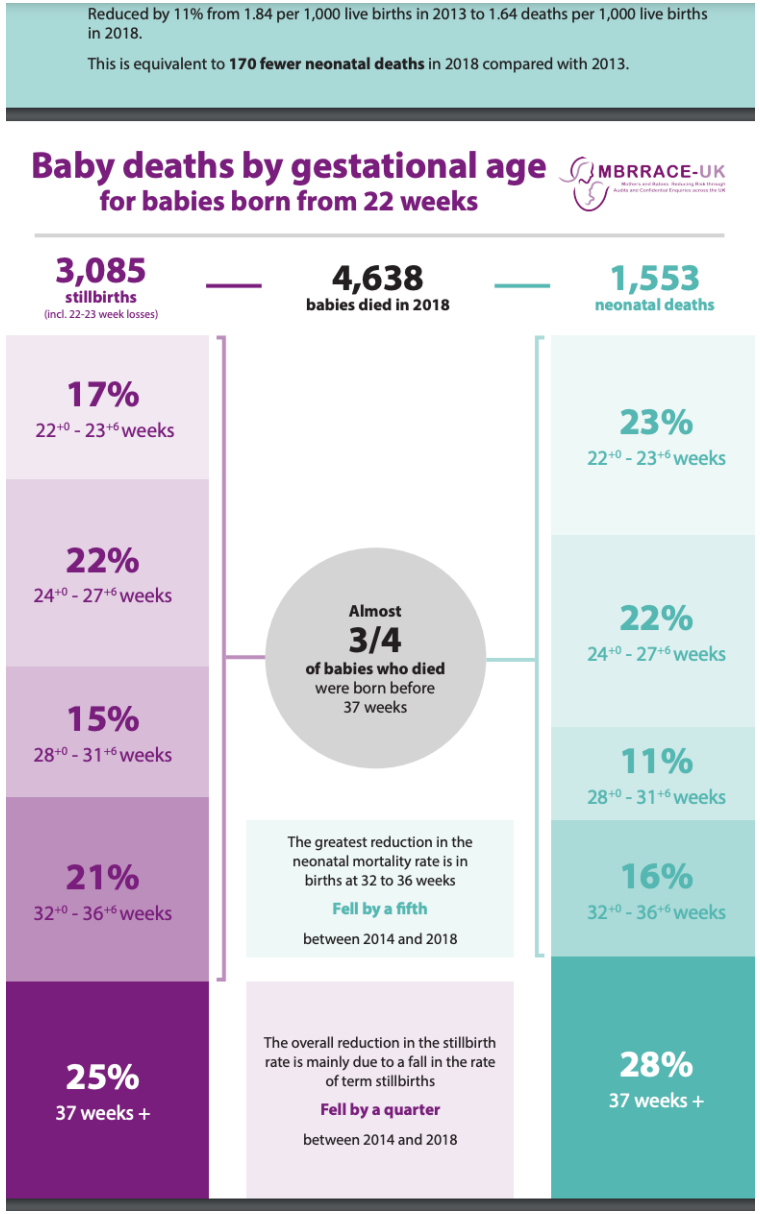
Question!

Is your unit implementing or thinking of implementing the elements of PERIPREM for the optimisation of the preterm infant?

Yes

No

Unsure


Reduced by 11% from 1.84 per 1,000 live births in 2013 to 1.64 deaths per 1,000 live births in 2018.
This is equivalent to 170 fewer neonatal deaths in 2018 compared with 2013.
Baby deaths by gestational age
for babies born from 22 weeks
MBRRACE-UK
3,085
stillbirths
(incl. 22-23 week losses)
4,638
babies died in 2018
1,553
neonatal deaths
17%
22+0 - 23+6 weeks
22%
24+0 - 27+6 weeks
15%
28+0 - 31+6 weeks
21%
32+0 - 36+6 weeks
25%
37 weeks +
Almost
3/4
of babies who died
were born before
37 weeks
The greatest reduction in the neonatal mortality rate is in births at 32 to 36 weeks
Fell by a fifth
between 2014 and 2018
The overall reduction in the stillbirth rate is mainly due to a fall in the rate of term stillbirths
Fell by a quarter
between 2014 and 2018
23%
22+0 - 23+6 weeks
22%
24+0 - 27+6 weeks
11%
28+0 - 31+6 weeks
16%
32+0 - 36+6 weeks
28%
37 weeks +

Preterm Optimisation

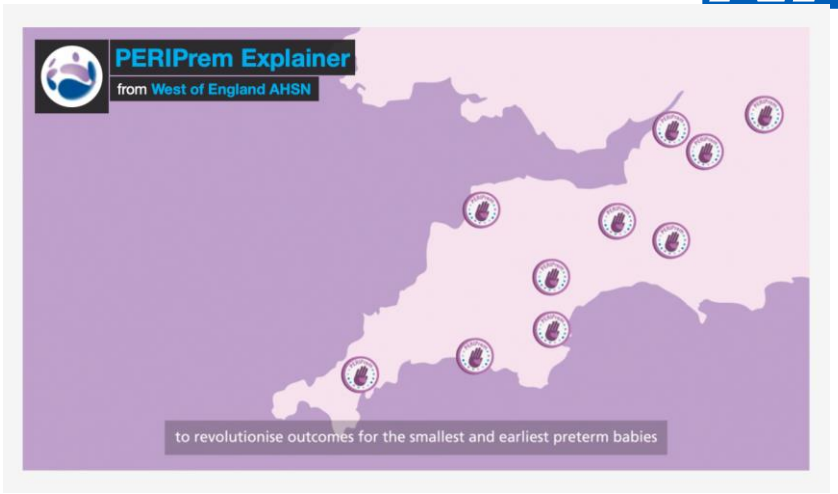
- We know this is important
- Getting things right for preterm babies has lasting impacts on their future outcomes.
- We have been working on this for years!

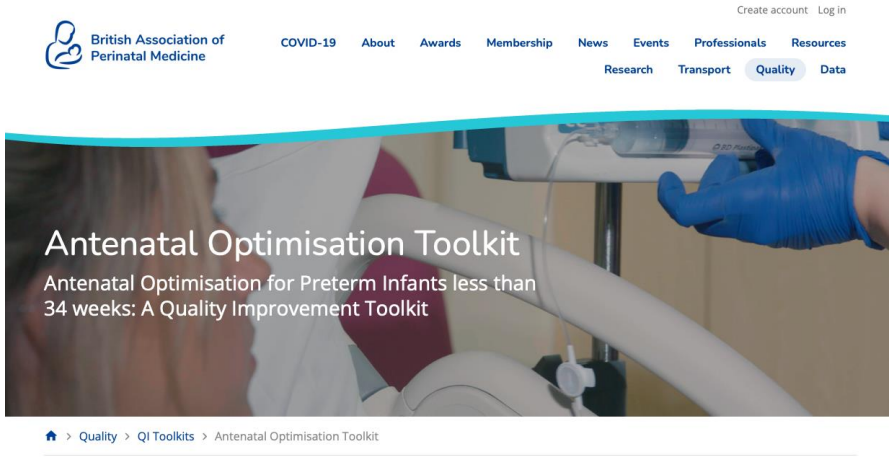
What toolkits are available to us?

> The BAPM optimisation toolkit

> PERIPrem (Perinatal Excellence to Reduce Injury in Premature Birth)

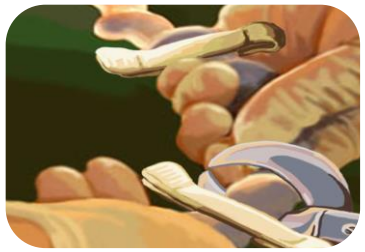
- A care bundle to improve outcomes for premature babies implemented across the West and South West regions





The BAPM approach

> 5 “Toolkits” developed to support improvement work….

Antenatal Optimisation	Normothermia	Optimum Cord Management	Early Breast milk	QIPP app
				QUiPP

Periprem Approach:

Place of Birth

Babies delivered at less than 27 weeks or with an expected birth weight of under 800 grams (less than 28 weeks for multiple births) should be born in a maternity service on the same site as a designated NICU.

[Ref: 1,2,3,4,]

Antenatal Steroids

Mothers who give birth at less than 34 weeks gestational age should receive the correctly timed, full course of antenatal steroids.

[Ref: 2,4,5,6]

Antenatal Magnesium Sulphate

PReCePT $MgSO_4$

Mothers who give birth at less than 30 weeks gestational age should receive antenatal Magnesium Sulphate.

[Ref: 2,4,5,6]

Intrapartum Antibiotic Prophylaxis

95% of women in established preterm labour (less than 34 weeks gestation) to receive Intrapartum Antibiotic Prophylaxis at least 4 hours prior to birth.

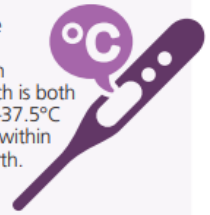
[Ref: 12]

Optimal Cord Management

Babies born at less than 34 weeks gestational age should have their cord clamped at or after one minute.

[Ref: 2,4,7]

Normothermia



Babies born at less than 34 weeks gestational age should have a temperature on admission which is both between 36.5–37.5°C and measured within one hour of birth.

[Ref: 2,4]

Early Maternal Breast Milk (MBM)

Babies born at less than 34 weeks gestational age should receive MBM within 6 hours of birth.

Units should monitor (and aim to increase) rates of first MBM within 6 hours of birth for babies born at less than 34 weeks gestational age.

MBM feeding at 14 days - Units should monitor (and aim to increase) rates of babies born at less than 34 weeks gestational age receiving MBM at 14 days of age.

[Ref: 2,8]

Caffeine

Babies should be started on caffeine as soon as possible (aim within the first 6 hours… NICE says: "starting it as early as possible and ideally before 3 days of age") in all babies:

- Less than 30 weeks gestation (consider 32 - 34 weeks)
- Birth weight less than 1500g

[Ref 9,10]

Probiotics

Babies (less than 32 weeks, less than 1500g birth weight) should be commenced on a multi strain probiotic of choice on the first day of life.

[Ref 11]

Volume Guarantee (VG) or Volume Targeted Ventilation (VTV)

For babies who need invasive ventilation, use volume-targeted ventilation (VTV) in combination with synchronised ventilation as the primary mode of respiratory support.

[Ref 10]

Prophylactic Hydrocortisone

Babies born <28 weeks gestation should receive prophylactic hydrocortisone from day 0 of life.

[Ref 10]

And the differences…

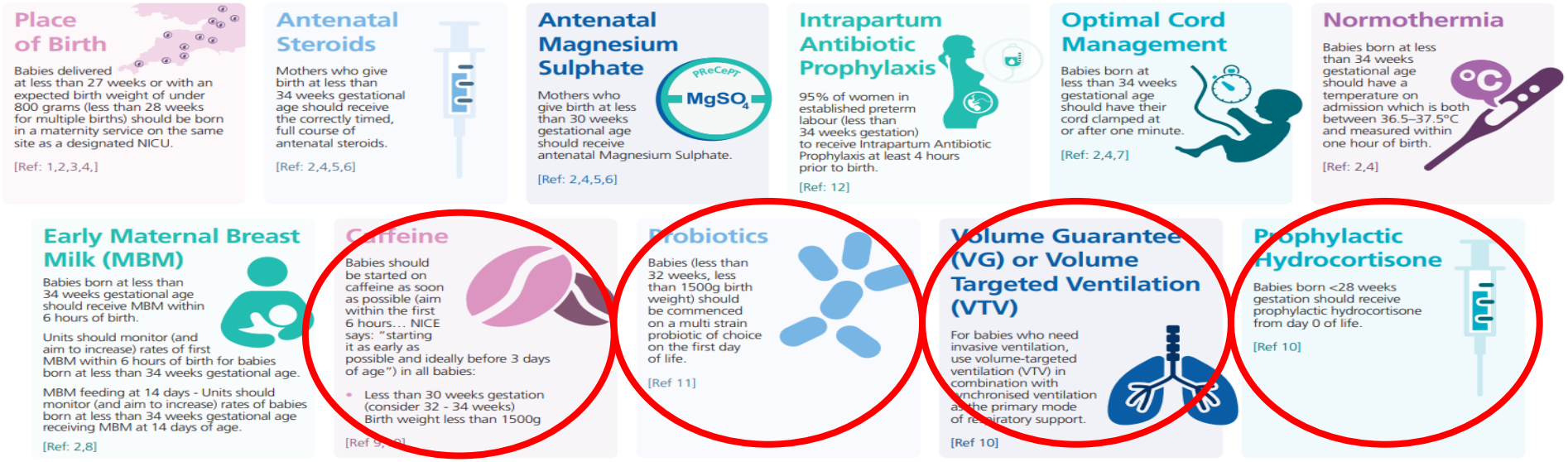
Antenatal Optimisation

Normothermia

Optimum Cord Management

Early Breast milk

QIPP app



Interventions for optimisation of the preterm baby

Antenatal

- Steroids
- Magnesium Sulphate
- Intrapartum antibiotics
- Place of birth

Immediate Perinatal period

- Optimal cord management
- Normothermia

Postnatal period

- Early breast milk
- Caffeine
- VG Ventilation
- Probiotics
- Prophylactic hydrocortisone

Early maternal breastmilk

> **UNISEF UK BFI standard**

> **NNAP standards**

- '*Does a baby born at less than 32 weeks gestational age receive any of their own mother's milk at day 14 of life?'*

- *'Does a baby born at less than 32 weeks gestational age receive any of their own mother's milk at discharge to home from a neonatal unit?* Standard – 80% of babies born <32 weeks should receive at least some of their mother's breast milk at discharge'

Benefits:

> Shown to reduce the risk of NEC

> Decreased rate of ROP and late onset sepsis

> Fewer re- hospitalisations in the first year of life

> Shown to increase IQ by 5.9 points

> Expressed BM for mouth care in very low birth babies shown to decrease the risk of ventilator associated pneumonia

> Maternal breast milk is superior to DBM, but DBM is superior to any formula

References

- Schanler RJ, Shulman RJ, Lau C. **Feeding strategies for premature infants: beneficial outcomes of feeding fortified human milk versus preterm formula.** Pediatrics. 1999 Jun; 103(6 Pt 1):1150– 1157.
- Sisk PM, Lovelady CA, Dillard RG, Gruber KJ, O'Shea TM. **Early human milk feeding is associated with a lower risk of necrotizing enterocolitis in very low birth weight infants**. J Perinatol. 2007 Jul; 27(7):428–433.
- Meinzen-Derr J, Poindexter B, Wrage L, Morrow AL, Stoll B, Donovan EF. **Role of human milk in extremely low birth weight infants' risk of necrotizing enterocolitis or death.** J Perinatol. 2009 Jan; 29(1):57–62.
- Okamoto T, Shirai M, Kokubo M, et al. **Human milk reduces the risk of retinal detachment in extremely low-birthweight infants**. Pediatr Int. 2007 Dec; 49(6):894–897.
- Maayan-Metzger A, Avivi S, Schushan-Eisen I, Kuint J. **Human milk versus formula feeding among preterm infants: short-term outcomes.** Am J Perinatol. 2012 Feb; 29(2):121–126.
- Vohr BR, Poindexter BB, Dusick AM, et al. **Beneficial effects of breast milk in the neonatal intensive care unit on the developmental outcome of extremely low birth weight infants at 18 months of age.** Pediatrics. 2006 Jul; 118(1):e115–e123.
- Isaacs EB, Fischl BR, Quinn BT, Chong WK, Gadian DG, Lucas A. **Impact of breast milk on intelligence quotient, brain size, and white matter development.** Pediatr Res. 2010 Apr; 67(4):357– 362.
- Vohr BR, Poindexter BB, Dusick AM, et al. **Persistent beneficial effects of breast milk ingested in the neonatal intensive care unit on outcomes of extremely low birth weight infants at 30 months of age.** Pediatrics. 2007 Oct; 120(4):e953–e959.
- Singhal A, Cole TJ, Lucas A. **Early nutrition in preterm infants and later blood pressure: two cohorts after randomised trials.** Lancet. 2001 Feb 10; 357(9254):413–419.
- Singhal A, Cole TJ, Fewtrell M, Lucas A. **Breastmilk feeding and lipoprotein profile in adolescents born preterm: follow-up of a prospective randomised study.** Lancet. 2004 May 15; 363(9421): 1571–1578.
- Singhal A, Farooqi IS, O'Rahilly S, Cole TJ, Fewtrell M, Lucas A. **Early nutrition and leptin concentrations in later life.** Am J

Mechanical ventilation in preterm babies

Volume guarantee Vs Pressure control ventilation

- Non invasive ventilation should be the preferred option - CPAP
- Mechanical ventilation may be required to manage neonates with severe RDS
- Pressure limited ventilation delivers a fixed Peak Insiratory Pressure (PIP)
- Major disadvantage of delivering variable tidal volume as the lung complicance and resistance changes
- Volume Guarantee ventilation (VGV) allows effective control of tidal volumes
- Ventilator adjusts the inspiratory pressure based on the exhaled Tidal Volume of the previous breath, to deliver the tidal volume that has been set)
- Large volumes result in volume trauma causing BPD
- Flow sensors assist in overexpansion (volutrauma) of the lungs under expansion

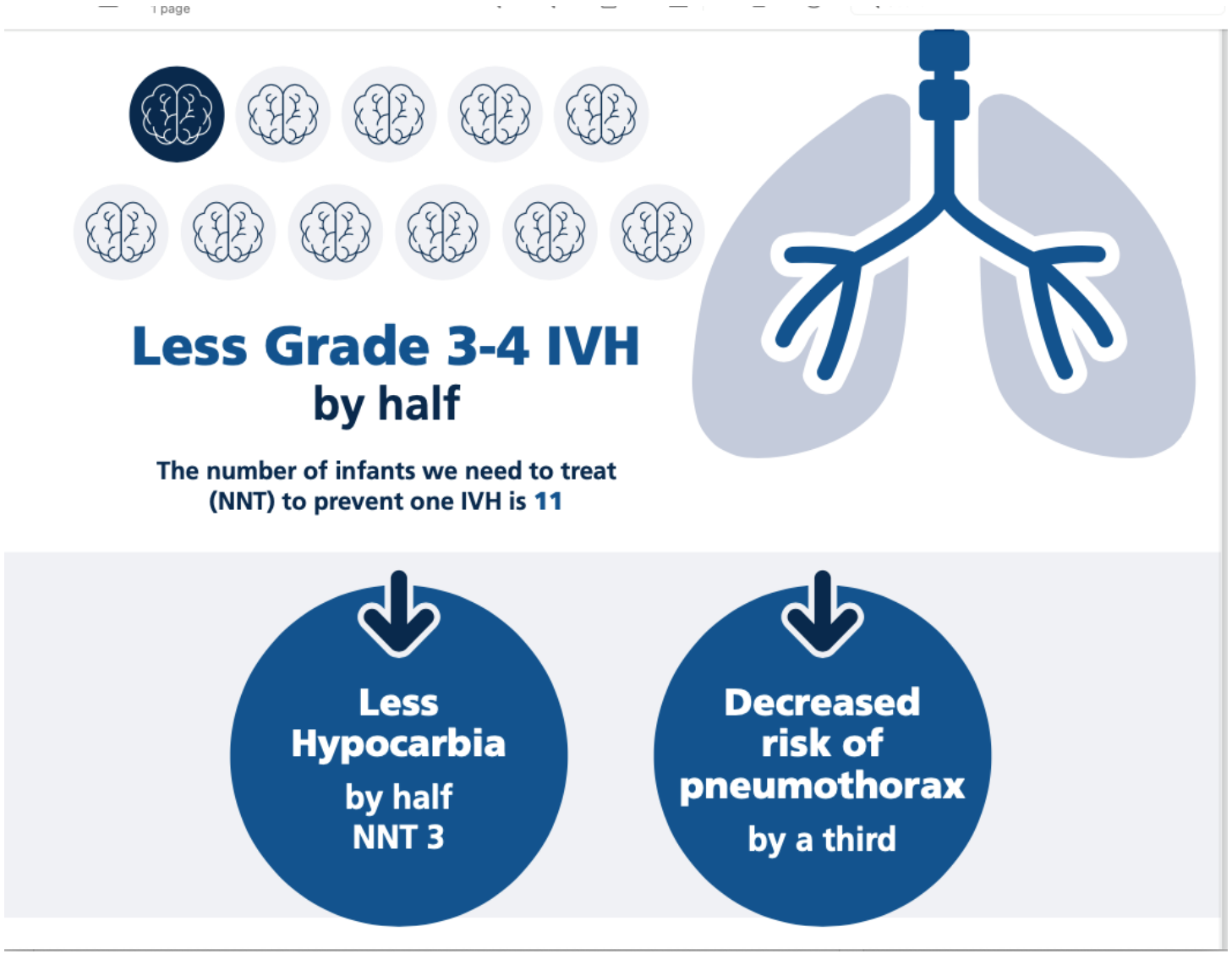
RDS and BPD

Infant RDS occurs in approximately 7% of all preterm babies

More than 60% of ELBW babies (<1000g) develop Bronchopulmonary Dysplasia (BPD) with an oxygen dependency

There is high risk (25%) of poor long-term outcome for babies with BPD resulting in mortality rates as high as 14-38% at 2-3 years of age

As more extreme preterm babies survive, the long-term manifestations of BPD is likely to represent a greater burden to the health care system


1 page
Less Grade 3-4 IVH
by half
The number of infants we need to treat
(NNT) to prevent one IVH is 11
Less
Hypocarbia
by half
NNT 3
Decreased
risk of
pneumothorax
by a third

References

UNICEF: Child survival and the SDGs. 2017: https://data.unicef.org/topic/child-survival/child-survival-sdgs/

Hermansen CL, Lorah KN. Respiratory distress in the newborn. Am Fam Physician 2007;76:987-94.

Klingenberg C, Wheeler KI, McCallion N, Morley CJ, Davis PG: Volume-targeted versus pressure-limited ventilation in Neonates. Cochrane Database of Systematic Reviews 2017, Issue 10. Art. No.: CD003666.4.

An HS, Bae EJ, et al: Pulmonary hypertension in preterm infants with bronchopulmonary dysplasia. Korean Circ J. 2010; 40(3):131-6 5

Kim DH, Kim HS, et al: Risk factors for pulmonary artery hypertension in preterm infants with moderate or severe bronchopulmonary dysplasia. Neonatology. 2012; 101(1):40-6.

Slaughter JL, Pakrashi T, et al: Echocardiographic detection of pulmonary hypertension in extremely low birth weight infants with bronchopulmonary dysplasia requiring prolonged positive pressure ventilation. J Perinatol. 2011; 31(19):635-40.

Khermani E, McElhinney DB, et al: Pulmonary artery hypertension in formerly premature infants with bronchopulmonary dysplasia: clinical features and outcomes in the surfactant era. Pediatrics. 2007; 120(6):1260-9.

Davidson LM, Berkelhamer SK: Bronchopulmonary Dysplasia: Chronic Lung Disease of Infancy and Long-Term Pulmonary Outcomes. J Clin Med. 2017; 6(1):4. 10.3390/jcm6010004.

Caffeine

- Babies <30 weeks of gestation, or <1500g
- One of the top 5 meds used in neonatal intensive care
- It has numerous positive effects on immature organs
- Helps them establish regular breathing and prevents apnoeas
- Protects the immature brain
- Reduces death, disability and cerebral palsy (CAP trial, 2007)
- Improves cardiac function

EFFECTS

Less neurodevelopmental impairment at 18-21 months
(Schmidt et al 2007)

Less Cerebral Palsy when used at extubation
(Shepherd et al 2018)

Less Chronic Lung Disease
(Schmidt et al 2006, Gary et al 2011)

Reduced extubation failure within 7 days
(Henderson-Smart at al 2010)

Improved white matter structure
(Doyle et al 2010)

START ON FIRST DAY OF LIFE

for fewer days on repiratory support
(Davis et al 2010)

DOSE

20mg/kg bolus IV → 5-10mg/kg daily

Caffeine in preterm infants: where are we in 2020?

Laura Moschino, Sanja Zivanovic, Caroline Hartley, Daniele Trevisanuto, Eugenio Baraldi, Charles ChristophRoehr

ERJ Open Research Jan 2020, 6 (1) 00330-2019; DOI: 10.1183/23120541.00330-2019

Caffeine is the current drug of choice to prevent and treat apnoeas of prematurity, reducing the need for mechanical ventilation

Enhances success of extubation

Babies treated with caffeine have lower rates of BPD, IVH, PDA

Has a positive long-term outcome on pulmonary function and neurodevelopment

Highlighted that there is no commonly agreed standardized protocol for dosing and timing – but that the current standard dosing regime of loading at 20mg/kg, plus 5-10mg/kg daily maintenance is considered effective and safe

Timing of caffeine – Benefits of early administration

Post hoc subgroup analysis from the CAP trial suggested higher decrease in BPD rate (52%) in those with **early treatment** (Day 1-3 life), Vs 23% if started after D3

In 2019 the European consensus guidelines for the management of neonatal RDS emphasized the role of timing of caffeine, suggesting earlier treatment is associated with increased benefit

NICE guidelines recommend the use of caffeine from after initial stabilisation

Three systematic reviews Early Vs Late caffeine summarized the results of studies so far (showed reduced rates of BPD, need for PDA treatment, brain injury)

Early Prophylactic Postnatal hydrocortisone

Background:

> BPD is a major morbidity of very preterm infants

> Associated with increased risk of adverse outcomes (resp complications, growth failure, neurodevelopmental impairment, death)

> BPD has not decreased over time

> Data reported since 1995 supports hypothesis that very preterm babies who develop BPD have adrenal insufficiency

> High doses of steroids (dex) result in short-term improvement of survival; but unacceptable long-terms effects such as CP

> Earlier studies showed **early low dose hydrocortisone for 10-15 days was associated with increased survival without BPD before discharge**, **and reduction in death**. But **increased risk of spontaneous GI perforation and increased risk of late onset sepsis**

> Despite this, no adverse effects for death or 2 yr neurodevelopmental outcomes shown

Low dose Early Prophylactic hydrocortisone

Effect of early low-dose hydrocortisone on survival without bronchopulmonary dysplasia in extremely preterm infants (PREMILOC): a double-blind, placebo-controlled, multicentre, randomised trial

*Olivier Baud, Laure Maury, Florence Lebail, Duksha Ramful, Fatima El Moussawi, Claire Nicaise, Véronique Zupan-Simunek, Anne Coursol, Alain Beuchée, Pascal Bolot, Pierre Andrini, Damir Mohamed, Corinne Alberti, for the PREMILOC trial study group**

Summary:

RCT done at 21 French tertiary NICUs in 2016

Babies <28 weeks randomly assigned to receive 10 days of iv low-dose hydrocortisone or placebo

523 babies randomised

***Primary outcome**: Survival without BPD at 36 weeks*

***Secondary outcomes**: BPD at 36 weeks, death, and surgical ligation of PDA. Other severe postnatal complications, adverse effects related to hydrocortisone treatment (pneumothorax, pulmonary haemorghage, insulin requirement, late onset sepsis, NEC, GI perforation, severe brain injury, death before discharge, severe ROP)*

Results: Low dose prophylactic hydrocortisone significantly improves the rate of survival without BPD at 36 weeks in extremely preterm babies and reduced need for PDA ligation

No significant difference reported in all other clinically important outcomes between groups

Association Between Early Low-Dose Hydrocortisone Therapy in Extremely Preterm Neonates and Neurodevelopmental Outcomes at 2 Years of Age

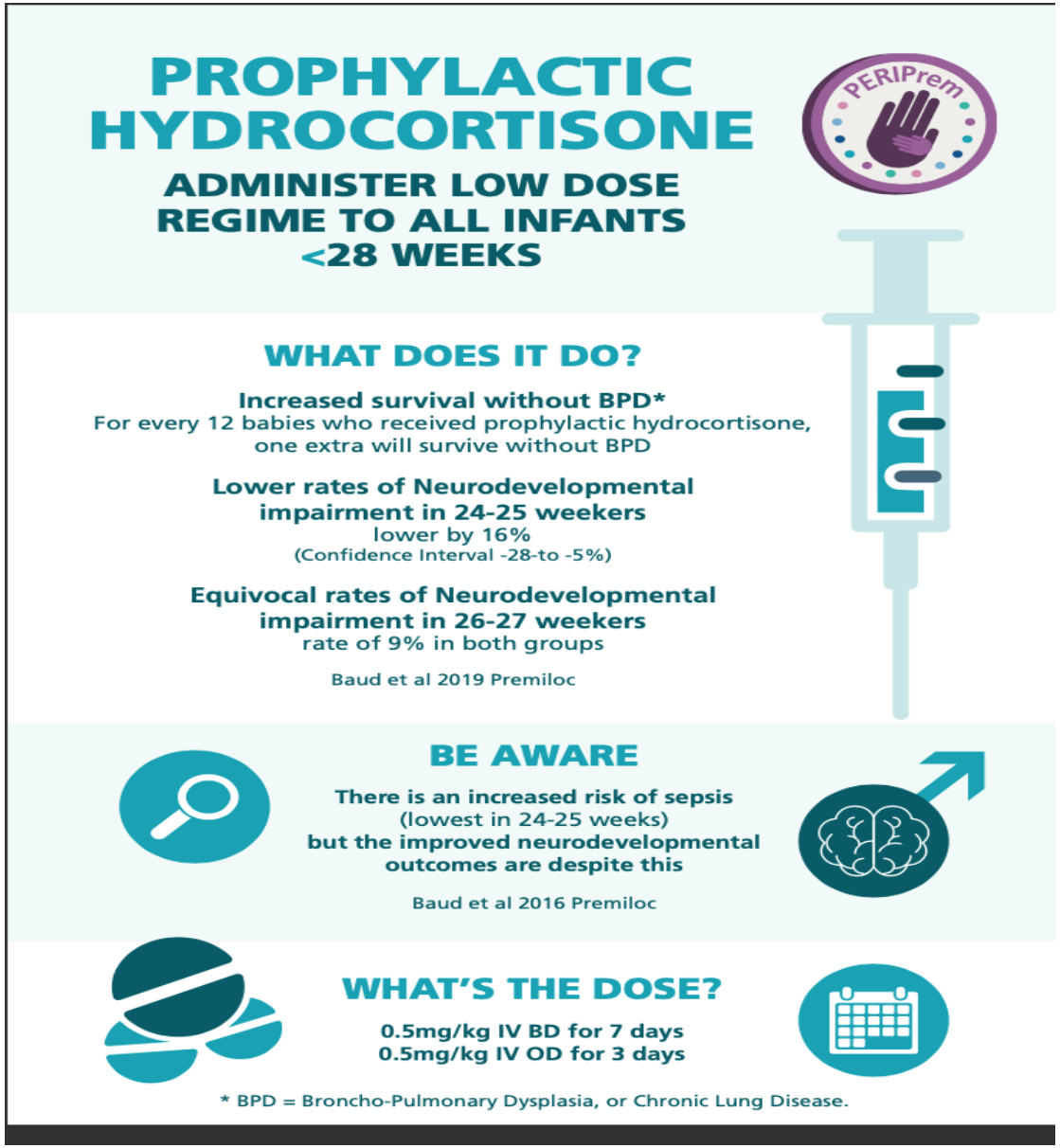
Exploratory Secondary analysis of PREMILOC

Looking at neurodevelopmental outcomes at 2 years

Early low-dose hydrocortisone was not associated with statistically significant difference in neurodevelopmental outcomes at 2 years of age

Prophylactic hydrocortisone

- Recommended by NICE
- Prevents BPD
- No evidence that it reduces mortality at discharge



Probiotics

What they are:

> Live microbial supplements that colonise the gut and provide benefit to the host

> **What do they do?**

- Influence the bacterial conolisation of the neonatal gut by giving good bacteria
- The premature gut is altered by several factors (antibiotics, born early, reduced exposure to maternal microflora)
- Abnormal gut colonisation increases the risk of NEC
- One way to encourage the gut to build good flora is by giving probiotics

Probiotics

Use is supported by BAPM and European Society for Paediatric Gastroenterology, Hepatology and Nutrition (ESPHAGAN) **to reduce cases of NEC**

PERIPREM bundle:

Infloran (lactobacillus acidophilus and Bifidobacterium infantis) To be given to infants <32 weeks, or <1500g and continued until at least 34 weeks CGA

Lack of evidence regarding the dosing and frequency of probiotics

Extensive research around which strains to use

Things we know….

Probiotics may reduce NEC

May improve feed tolerance

May reduce sepsis but may also induce probiotic sepsis in some babies

Uncertainties

Which strain, dose and when?

Immediate (,24 hr) or wait for breast milk colonisers?

Further trial needed

Currently no agreement about whether they should be used routinely

Lack of data in ELBW

> Most RTCs had small numbers <1000g or <28 weeks

> NEC is not a single disease, consider:

- NEC in 24w infant d7 after 2 days of 5ml EBM

Vs

- NEC in 28w infant d40 after 5 weeks of full feeds

ESPHAGAN position paper: Recommendations

Probiotics and Preterm Infants: A Position Paper by the European Society for Paediatric Gastroenterology Hepatology and Nutrition Committee on Nutrition and the European Society for Paediatric Gastroenterology Hepatology and Nutrition Working Group for Probiotics and Prebiotics – published in 2020

> A call for improved Quality Control data

> They provided advice which specific strains might potentially be used and which should not be used in preterm neonates

> A conditional recommendation (with low certainty of evidence) to provide either Lactobasilum or the combination of Bifidobacterium infntis, bifobacterium lactis and strep thermophilus in order to reduce rates of NEC

Probiotics evidence

Probiotics Reduce Mortality and Morbidity in Preterm, Low-Birth-Weight Infants: A Systematic Review and Network Meta-analysis of Randomized Trials – 2020

> Systematic review and network meta-analysis of studies to determine the effects of single strain and multistrain probiotic formulations on outcomes of preterm infants

> Analysed data from 63 trials involving 15, 712 preterm infants.

> Compared to placebo, a combination of 1 or more Lactobacillus species and or more Bifidovacterium species vs single and or other multiple-strain probiotic treatments **was superior.**

Probiotics to prevent necrotising enterocolitis in very preterm or very low birth weight infants – Cochrane Database Syst. Rev 2020

> Meta-analysis of 56 trials, with 10, 812 infants.

> Most trials were small

> Variable

> Trials varied by the formulation of the probiotics

> **Meta-analysis showed probably reduce mortality, but did not show effects on NEC**

> Concluded that there is low to moderate level of certainty about the effects of probiotics on the risk of NEC, therefore large, high-quality large trials are needed

What next?

- Think about your own practice and your own unit's data
- Identify areas of improvement
- Let's work together to optimise the outcomes of babies born preterm!

Thank you!

Donna Winder-Bank Scott

- Donna is a Consultant Neonatologist at Southampton General Hospital, UHS with a special interest in human factors
- Donna has a special interest in human factors and Quality Improvement
- Donna is now working on elements of the Periprem optimisation of the preterm infant bundle

National Patient Safety
Improvement Programmes

Maternity
and Neonatal

Appreciative Inquiry and Optimisation of the Preterm Infant…

Donna Winderbank-Scott
Consultant Neonatologist and Wessex PSN Clinical Leader

Delivered by:
TheAHSNNetwork

Led by:
NHS England
NHS Improvement

Session contents:

- What is Appreciative Inquiry?
- How does it work – the 5 D model
- Practical ideas and tips (in relation to optimisation of the preterm infant…)

Improvement approaches:

1. There is a problem. I must fix it.
2. There is a problem. Let's look at it carefully and work out a solution.
3. Here is a system which contains issues. How can we improve the system? **Quality Improvement**
4. Here is a system. What works well already? Can we use those solutions elsewhere? – **Appreciative Inquiry**

> Looking at the positives / things that are going well:

>**Appreciation**

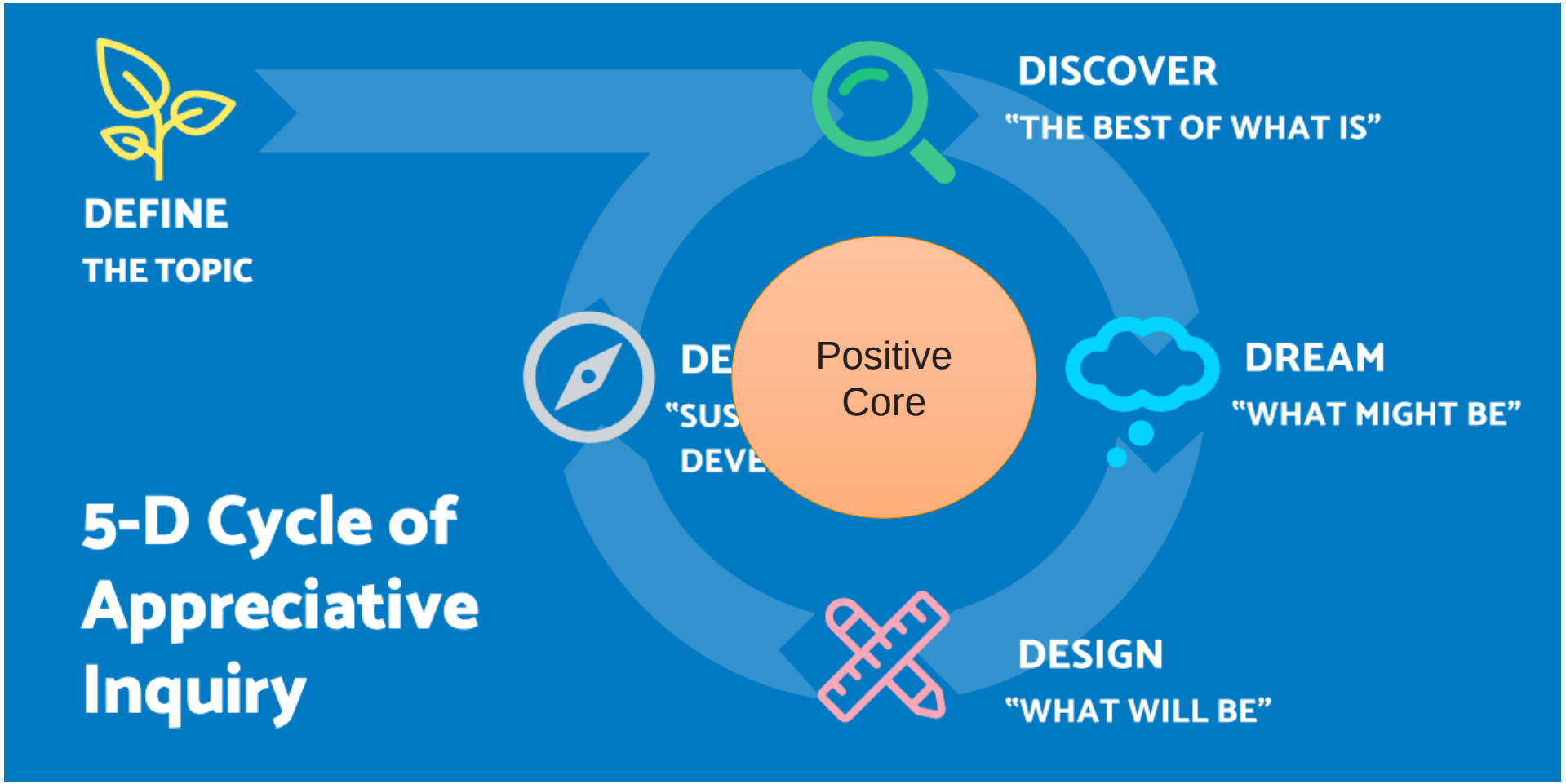
> Working out why something is going well:

> **Inquiry**

> Applying that to other situations to create positive change:

> **Improvement!**

Define → Discover → Dream → Design → Destiny/Delivery/Deploy



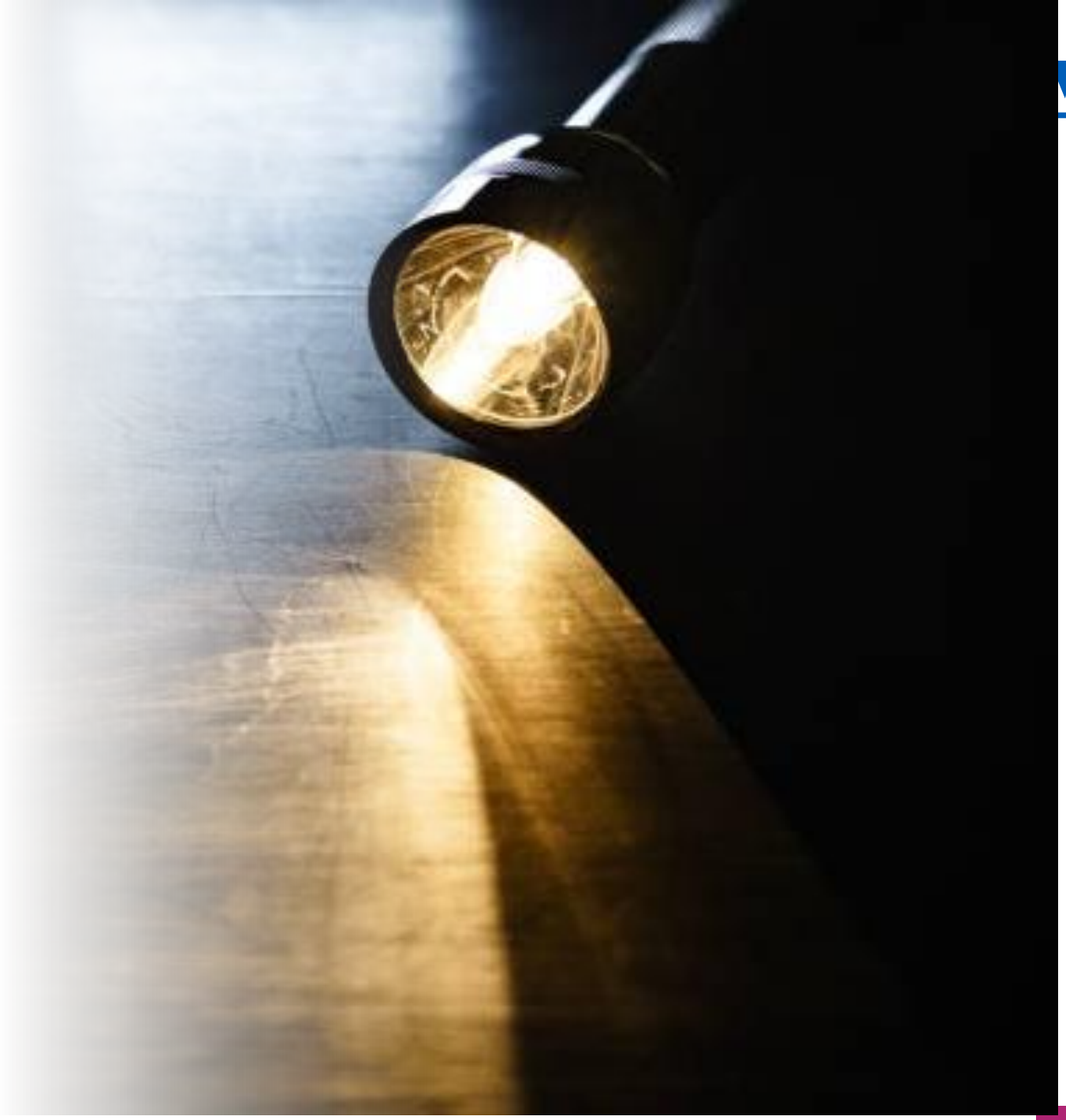
Define →Discover →Dream →Design → Destiny/Delivery/Deploy

Define…

What is the topic of inquiry? –

… recent addition – the 5Ds were originally the 4Ds!

Definition defines the project's purpose, content, and what needs to be achieved.



Appreciating the best of ‘what is’ –

Discover

“Discovery is based on a dialogue, as a way of finding ‘what works’. “

“It rediscovers and remembers successes, strengths and periods of excellence.”

…Positive Psychology
…Importance of framing questions
…Importance of language
…Importance of connection and trust

Discovery:
Q. examples

1. What has been a high-point experience in your organization/division/life when you felt most alive, successful, and effective?
2. Without being humble, what do you value most about yourself, your work, and your organization?
3. What are the core factors that make this organization function at its best, when it feels a great place to be in, and without which it would cease to exist?
4. Three wishes: if you had three wishes for this organization, what would they be?

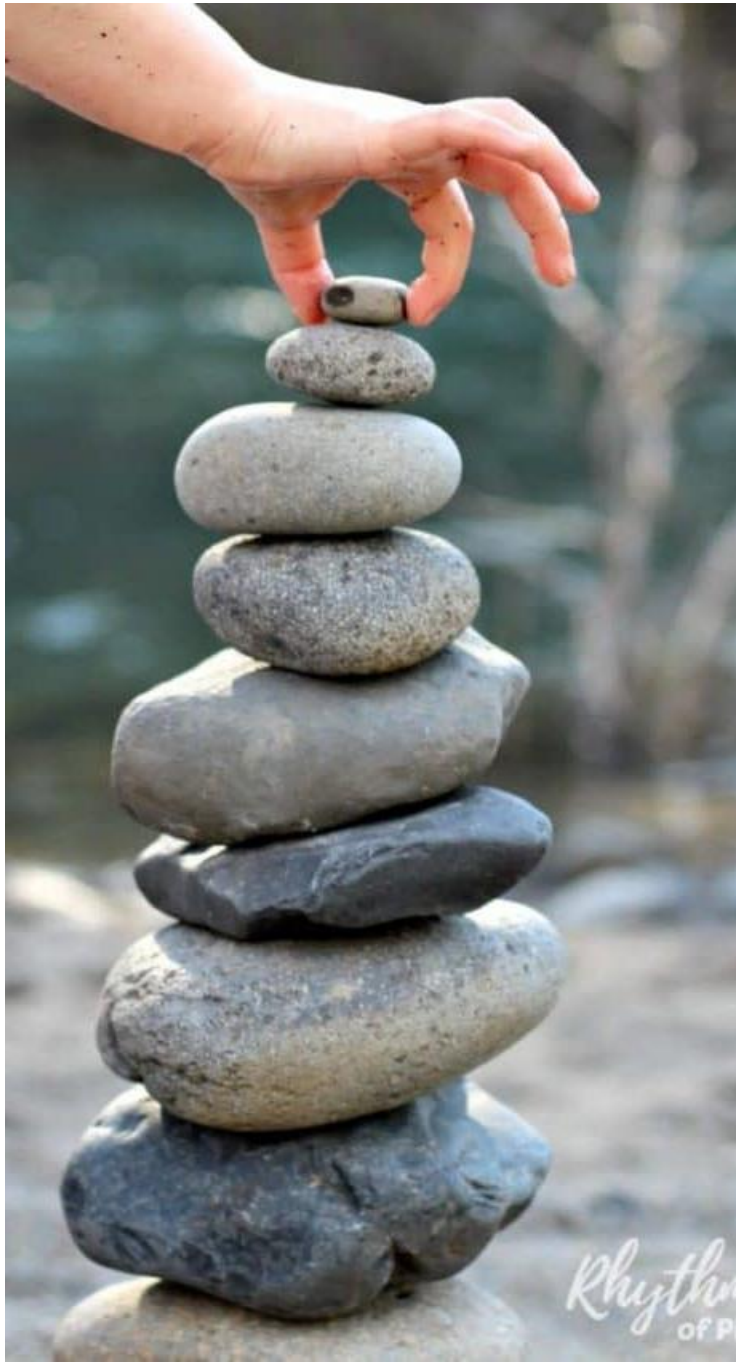
Imagining ‘what could be’ –

Dream:

“Imagining uses past achievements and successes identified in the discovery phase to imagine new possibilities and envisage a preferred future”.

It allows people to identify their dreams for a community or organization; having discovered ‘what is best’.

They have the chance to project it into their wishes, hopes and aspirations for the future



Design…

Determining ‘what should be’ –

Design brings together the stories from discovery with the imagination and creativity from dream.

“bringing the ‘best of what is’ together with ‘what might be’, to create ‘what should be – the ideal”

Deliver / Destiny / Deploy

Creating ‘what will be’ – identifies how the design is delivered, and how it’s embedded into existing practices

The “implementation” or “Do” phase of QI

Why does it work?

AI's strength as a novel healthcare approach is because it is

"evidence based (using people's experiences)" as well as being focused upon relationships. They deepen the connection drawing attention to AI practitioners' abilitiy to encourage "people to identify, engage, and strengthen the core values and ''life-giving forces'' within the (healthcare) organization".

Nancy Shendell-Falik and her colleagues at the Newark Beth Israel Medical Center

"high degree of involvement, participation, goodwill and collaboration apparently engendered by using AI"

Professor Bernie Carter

"Appreciative Inquiry is as much an attitude and a philosophy as it is a method – it aims to invigorate change by drawing out the best of an organisation and its people"

Why does it work?

AI's strength as a novel healthcare approach is because it is

"evidence
experienc
upon rela
connection
practitioners' abilitiy to
to identify, engage, ar
core values and "life-giving forces" within
the (healthcare) organ

*Nancy Shen
Beth Israel*

"high degree of involv
goodwill and collabora
engendered by using AI"

Professor Bernie Carter

*"Appreci
and a philo
to invigorate change b
best of an organisatio*

Ex-novation – identifying solutions which are already in use and working – stealing shamelessly.

Positivity – Easier to generate enthusiasm and makes people feel better!

Forget the fire-fighting – focus on aspirations and ideals rather than fixing the day to day problems.

Practical Ai: Processes

> Look at a process or system…

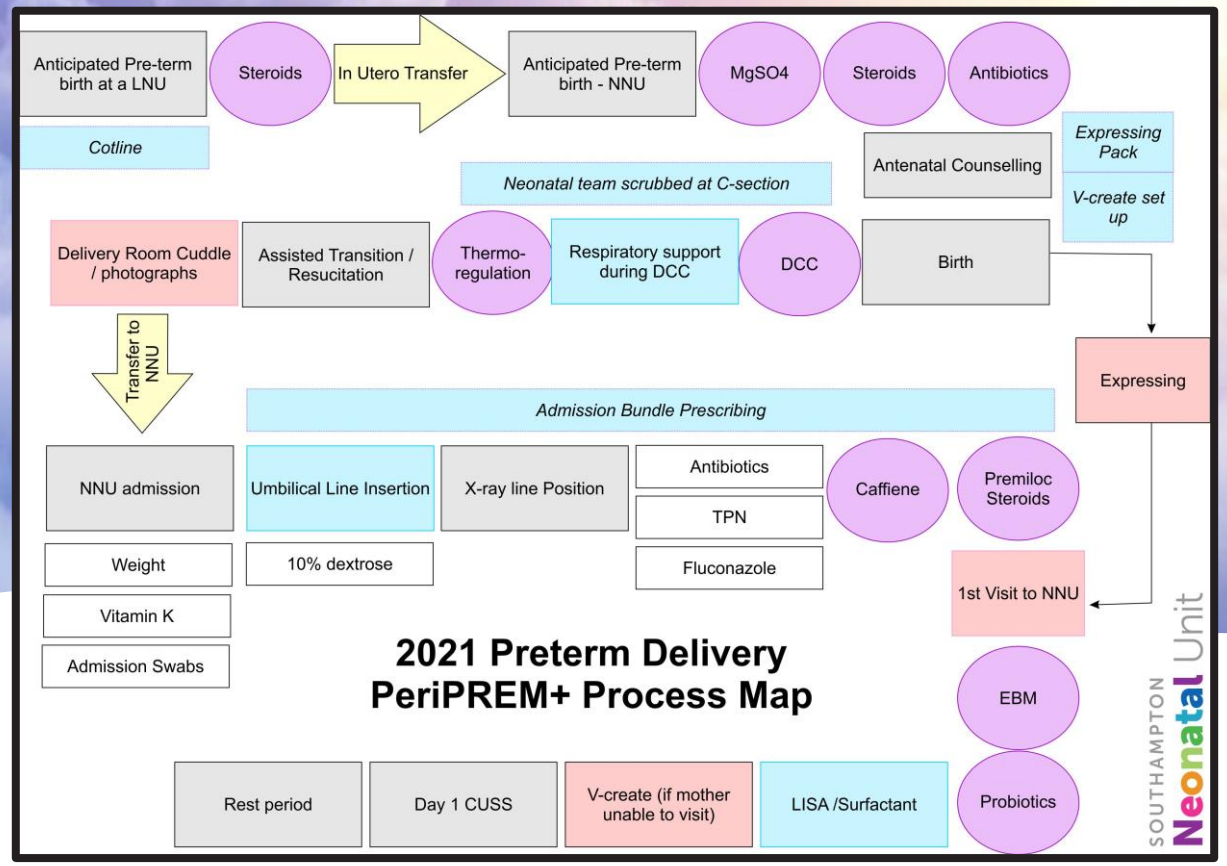
> what elements work well? Why? Can you recreate that elsewhere?

> Who makes the difference in the system – what is it that they are doing differently? What solutions have they already implemented themselves?

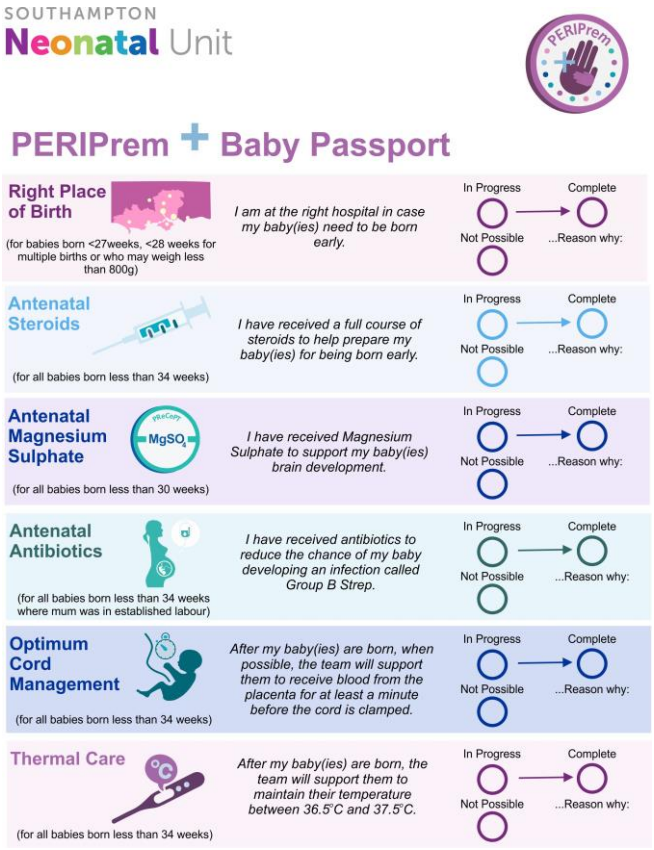
> Which processes are automated? Can you increase reliability by automating something else?

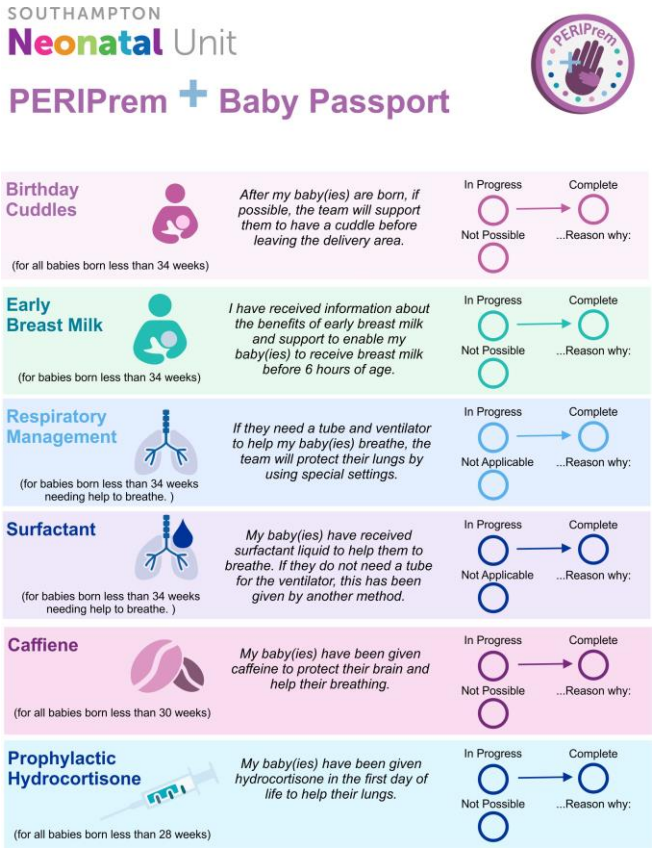
> Are there any processes dependent on 1 person – can you put in a failsafe or backup mechanism?

Create your “Dream” pathway!

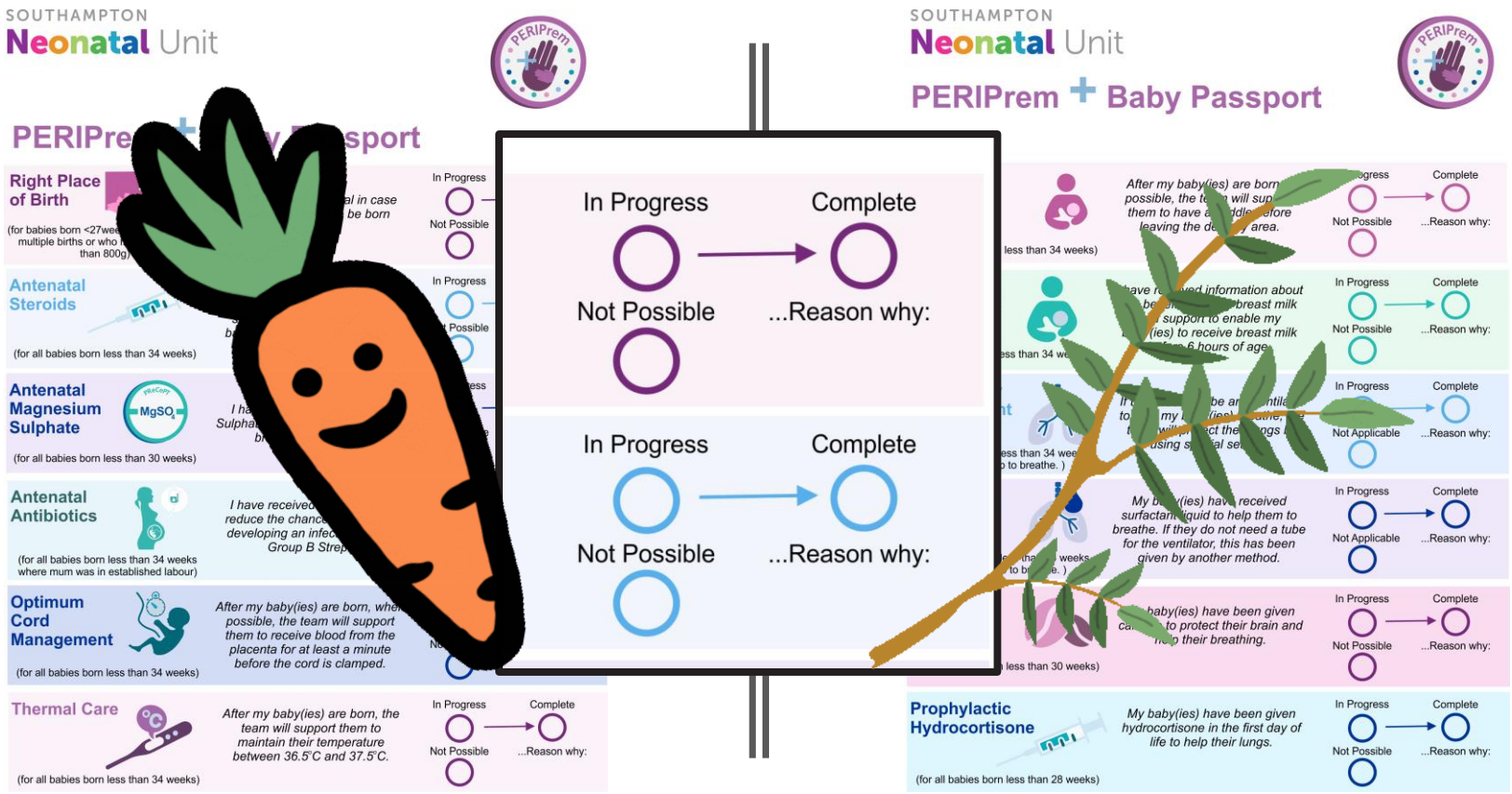


Use Bundles, carrots and sticks!





Use Bundles, carrots and sticks!



Practical Ai: TEAMS

Look at your team and individuals within it: what are their strengths?
Use these strengths in your QI work –

- *Who is your data "nerd"?*
- *Who has the most attention to detail?*
- *Who is the most patient?*
- *Who has the most social persuasiveness?*
- *Who is the most creative?*
- *Who thinks "outside the box"*
- *Who has power and influence?*
- *Who is the most scary?*

Do you need to add someone to your team? Are you missing an important strength? Are you using people to their best potential?

Practical Ai: Positive+ shift

- When asking questions in QI – try looking for the positives in a system or situation as well as the negatives
- Try an Ai approach when interviewing: ask Ai style questions or ask for stories of things which went well to get a deeper understanding.
- Understand the strengths of your team and use positivity to motivate!
- Use the idea of a “dream clinic” or “dream ward round” to work out what you need to work on to achieve that dream.

Final Thoughts…

SOUTHAMPTON Neonatal Unit

National Patient Safety
Improvement Programmes

Maternity
and Neonatal

THANK YOU!

@NatPatSIP / @MatNeoSIP

www.improvement.nhs.uk

Delivered by:
The AHSN Network

Led by:
NHS England
NHS Improvement