Liverpool Women's Hospital: driving forward bedside neonatal resuscitation and delayed cord clamping (DCC) nationally and internationally

Professor Andrew Weeks

Consultant Obstetrician

Dr CW Yoxall

Consultant Neonatologist

Liverpool Women's Hospital

Liverpool, UK

Resuscitation at the maternal bedside

* Why would we want to do this?
  * Facilitating deferred cord clamping
  * Improving family experience

Witnessed resuscitation

- Conventional resuscitation at birth prevents parents from witnessing their child's first minutes of life.
- This is a cause of considerable parental anxiety.
- Studies in other patient groups show that allowing relatives to witness resuscitation is beneficial for relatives and staff.
- This is now standard practise in adult and paediatric resuscitation in UK.

Convincing the clinicians

* Develop a method.
* Demonstrate it works.
* Demonstrate it is better than what they are doing now.

DEVELOPMENT OF THE BEDSIDE ASSESSMENT, STABILISATION AND INITIAL CARDIORESPIRATORY SUPPORT (BASICS) TROLLEY

A.D. Weeks, P. Watt, D.J.R. Hutchon, C.W. Yoxall, D Odd, A Burleigh, AM Heuchan, A Gallagher, S Bewley, L. Duley.

University of Liverpool

Worcestershire NHS Acute Hospitals NHS Trust

NHS Greater Glasgow and Clyde

Southern General Hospital

Nottingham Clinical Trials Unit

St James's University Hospital

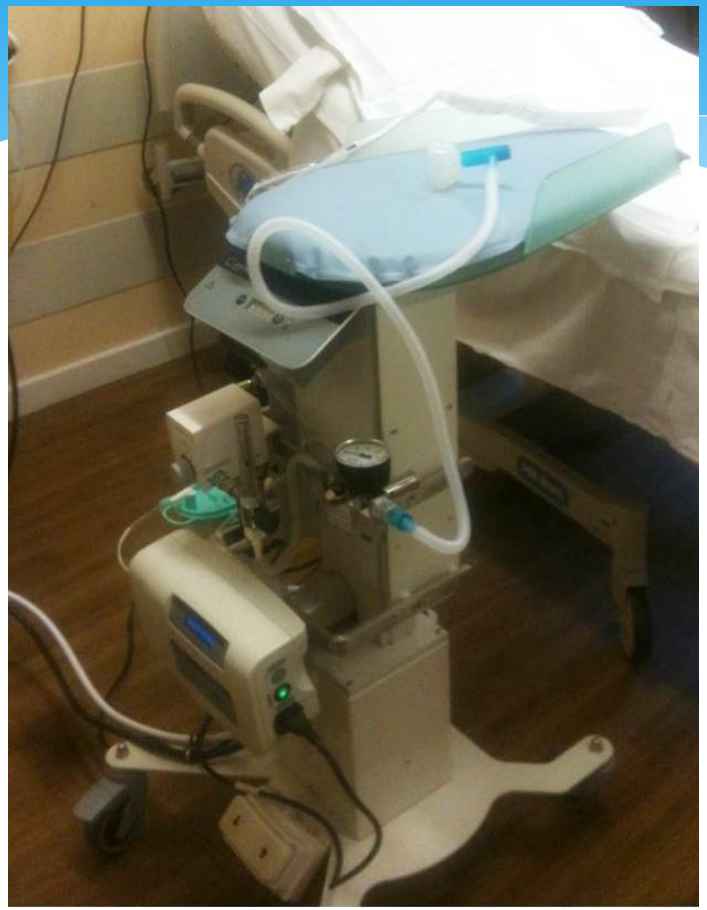
Darlington Memorial Hospital

Liverpool Women's NHS Foundation Trust

King's College London

University of Bristol

The Lifestart Trolley



Height adjustable,
Rotatable
Stable
"Cosy Therm" warmer
2 Medirails for mounting accessory equipment

- gas supply
- Air/oxygen blender and flow meter
- "Tom Thumb" infant resuscitator
- Gas driven suction

CE Mark awarded October 2012

Testing the trolley

Testing the trolley

* Research fellow in post
* Multi-disciplinary agreement
  * Neonatologists, nurses, midwives, obstetricians
* Operating policy agreed

Testing the trolley

* Research fellow in post
* Multi-disciplinary agreement
  * Neonatologists, nurses, midwives, obstetricians
* Operating policy agreed
* Teaching package developed
* Training of all staff
* Introduced into service
  * Approved by Hospital Trust
  * Prospective Service Evaluation

Testing the trolley

* Is it safe?
* Can we provide all of our normal interventions?
* Do the babies get cold?
* How does it compare to standard equipment?

Thomas *et al. BMC Pediatrics* 2014, **14**:135
http://www.biomedcentral.com/1471-2431/14/135

BMC Pediatrics

RESEARCH ARTICLE Open Access

Providing newborn resuscitation at the mother's bedside: assessing the safety, usability and acceptability of a mobile trolley

Margaret R Thomas[1], Charles W Yoxall[1*], Andrew D Weeks[2] and Lelia Duley[3]

- 78 babies
- Median (range) gestation 34(24 to 41)
- Median (range) BWt 2470 (520 to 4080) grams.
- All resuscitation procedures successfully provided including intubation and Cardiac compressions.
- No Hypothermia.
- No adverse events
- Most clinicians rated the trolley as 'the same', 'better' or 'much better' than conventional resuscitation equipment.

Convincing the clinicians

* Develop a method. √
* Demonstrate it works. √
* Demonstrate it is better than what they are doing now.

Open Access Research

BMJ Open

Providing immediate neonatal care and resuscitation at birth beside the mother: parents' views, a qualitative study

Alexandra Sawyer,[1] Susan Ayers,[2] Sophia Bertullies,[2] Margaret Thomas,[3] Andrew D Weeks,[4] Charles W Yoxall,[3] Lelia Duley[5]

* Semi-structured interviews with 19 mums, 10 partners and 1 grandmother.
* Families were positive about neonatal care at the bedside as this provided reassurance.
* They reported feeling involved as a family.
* They were positive about the trolley.
* Some reported concerns about the negative impact of witnessed resuscitation.

Open Access Research

BMJ Open

Providing immediate neonatal care and resuscitation at birth beside the mother: clinicians' views, a qualitative study

Charles W Yoxall,[1] Susan Ayers,[2] Alexandra Sawyer,[2,*] Sophia Bertullies,[2] Margaret Thomas,[1] Andrew D Weeks,[3] Lelia Duley[4]

* Semi-structured interviews with 20 clinicians.
* Most were positive, particularly in terms of their perception of parent experience.
* Noted improved communication.
* Some performance anxiety.
* Need for training.

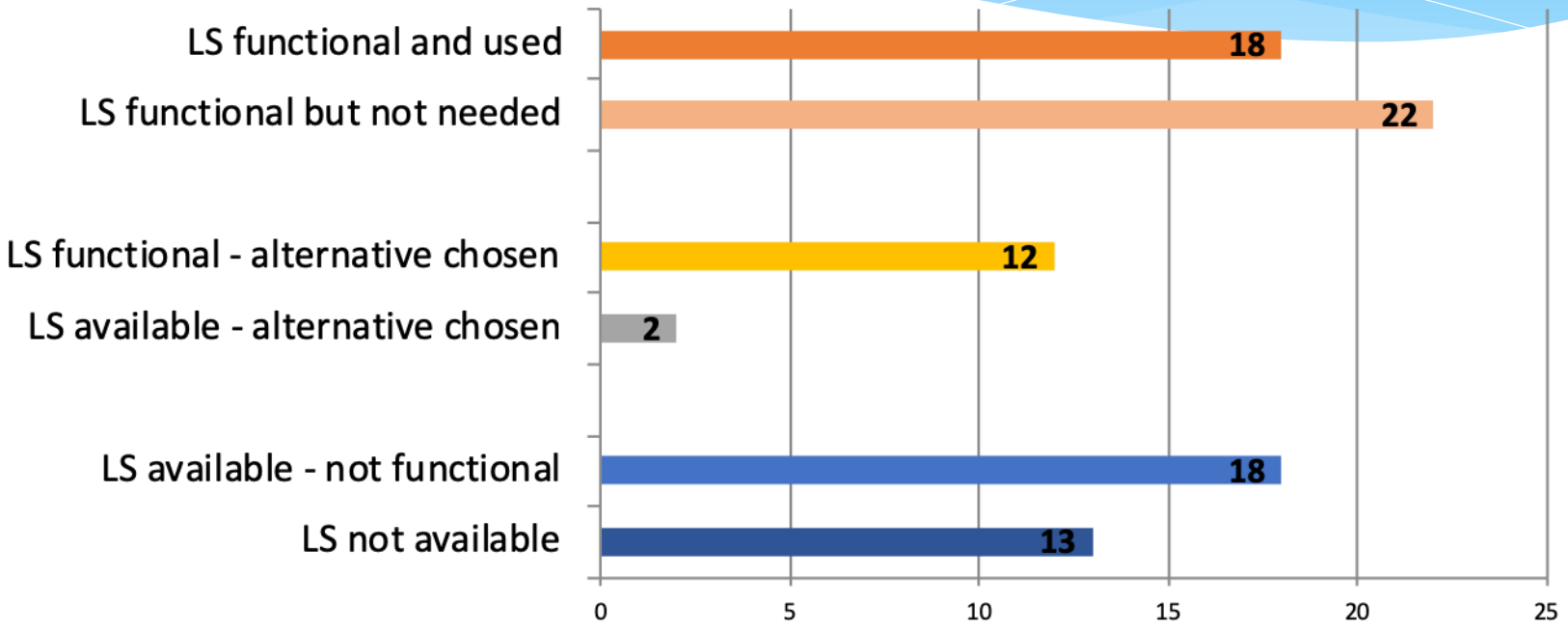
Did we do it?

* During development and evaluation
  * YES
    * Dedicated research fellow resource
* During the CORD Pilot Trial
  * YES
    * Highest recruiting centre
* Subsequently - 2015
  * Number of Lifestart trolleys increased from 2 to 6
  * Agreed hospital policy was for bedside resuscitation
  * “Relaunch” with staff training.
  * Loss of Research fellow “champion”

Clinical audit of Lifestart use - 2017

* Data was collected prospectively from 85 babies between 9/5/17-20/06/17 using a predesigned data collection proforma:
  * Demographics
  * Method of Delivery
  * Availability and functionality of Lifestart
  * Timing of Cord Clamping
  * Resus requirements
* Random convenience sample: Deliveries attended by paediatric bleep holder 105

Breakdown of LS vs. alternative n=85



Lifestart only used in 18/85 (21%)

Why have we struggled to do this? Staff Survey

* Lack of familiarity with equipment compared to standard equipment
* Lack of clarity about responsibilities for equipment.

* Changing existing clinical practise is difficult!
* Anxiety about
  * Witnessed resuscitation
  * Maintaining sterile field in theatre
  * "Crowding" of professional spaces
  * 2 minutes is a long time!

* Evidence for improved clinical outcomes was not accepted at this time

* "improving family experience" is not a compelling enough driver to overcome professional barriers

Randomised trial of cord clamping and initial stabilisation at very preterm birth

Duley L, *et al*. *Arch Dis Child Fetal Neonatal Ed* 2017;**0**:F1–F9.

Table 3 Mortality for the baby before discharge from hospital

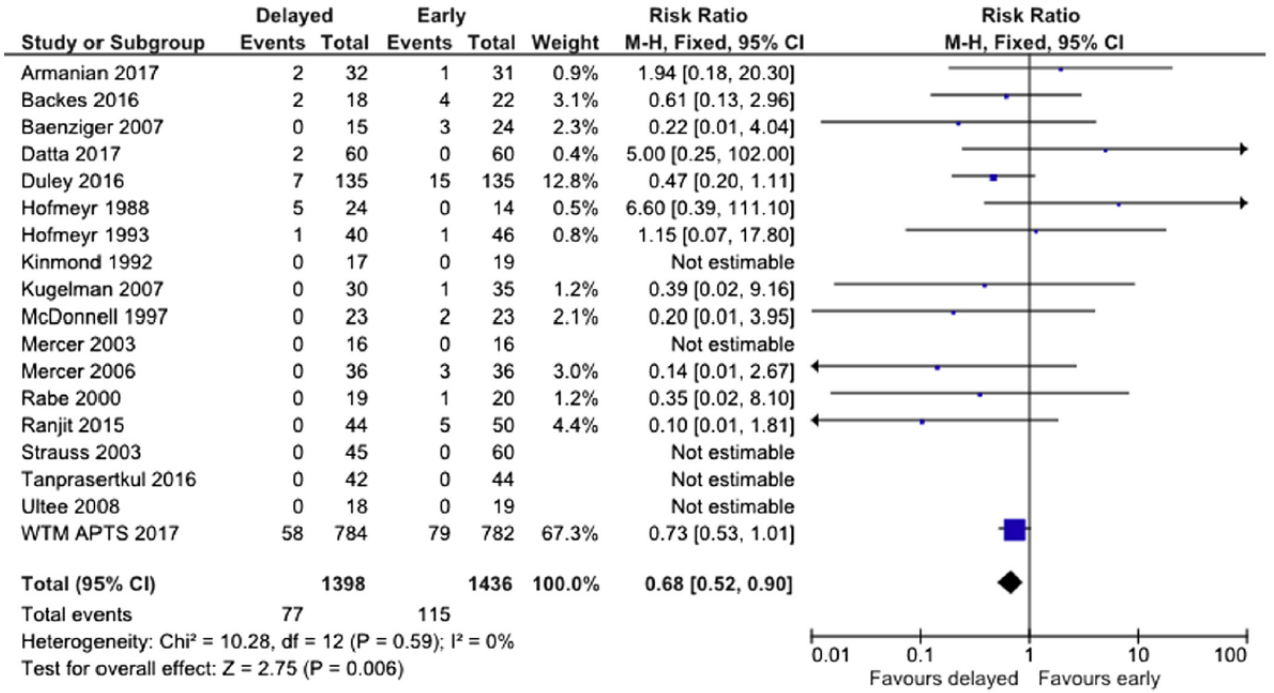
		Clamp ≥2 minutes + neonatal care with cord intact (n=135)	Clamp ≤20 seconds + neonatal care after clamping (n=135)*
Death		7 (5%)	15 (11%)
Stillbirth		1	2
early neonatal death		3	7
late neonatal death		2	5
post neonatal death		1	1
Gestation at birth (weeks):	$30 – 31^{+6}$	-	1
	$28 – 29^{+6}$	1	3
	$26 – 27^{+6}$	-	4
	<26	6	7

Risk difference (RD) 5.9%,
95% confidence interval -0.6% to 12.4%.

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

FIGURE 3
Meta-analyses showing effect of delayed clamping on mortality



Meta-analyses showing effect of delayed vs early cord clamping on risk ratio for hospital mortality in 18 trials in 2834 infants <37 weeks' gestation (top) and 3 trials in 996 infants ≤28 weeks' gestation (bottom).

All infants born <37 wk			
Hospital mortality	18/2834	0.68 [0.52–0.90]	−0.03 [−0.05 to −0.01]; 8% vs 5%
Infants born ≤28 wk gestation			
Hospital mortality	3/996	0.70 [0.51–0.95]	−0.05 [−0.09 to −0.01]; 17% vs 12%

Aims of QIP

* To increase the use of the Lifestart platform to allow premature newborn (<32 weeks gestation) resuscitation and stabilization with in intact umbilical cord.
* To increase the use of delayed cord clamping of >2min in preterm infants <32/40

* We aimed for more than 80% uptake.

Exclusion Criteria

* Pre specified appropriate reasons for not using the Lifestart were:
  * Monochorionic twins
  * Maternal bleeding

QIP Main Outcome measures

1. To achieve >80% in the use of Lifestart at preterm deliveries (<32weeks)

2. To achieve at least 2 minutes of deferred cord clamping in >80% of preterm deliveries

Lifestart Quality Improvement Project

* Multi-disciplinary team established.
* Data collection on all <32 weeks inborn babies over a 13 month period.
* Series of PDSA cycles.

PDSA cycles

Lifestart Quality Improvement Project

* Review of all non-compliant cases.
* Understand barrier and devise solution.
* Regular feedback to staff.
  * Bi-monthly newsletter
  * Performance data
  * Lessons learnt.
* Lesson of the Week
* Induction / Mandatory training

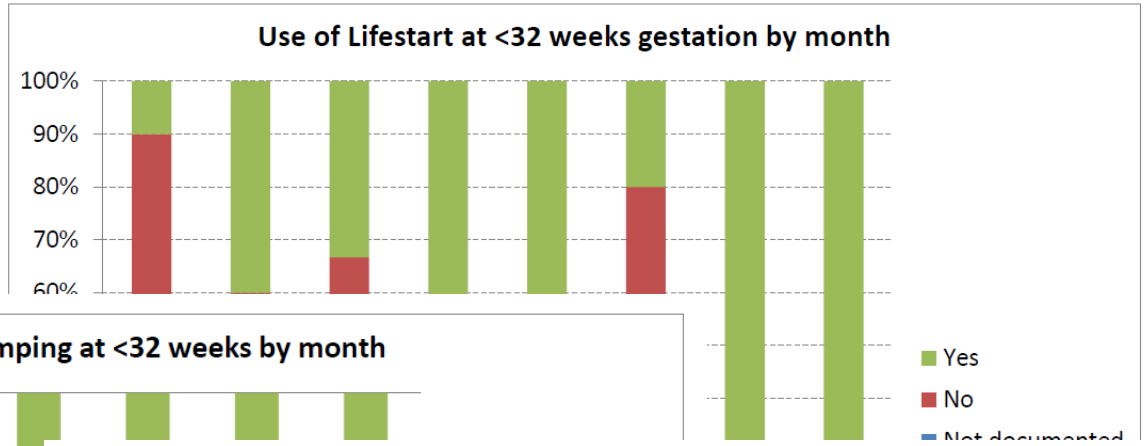
LIFESTART QUALITY IMPROVEMEN

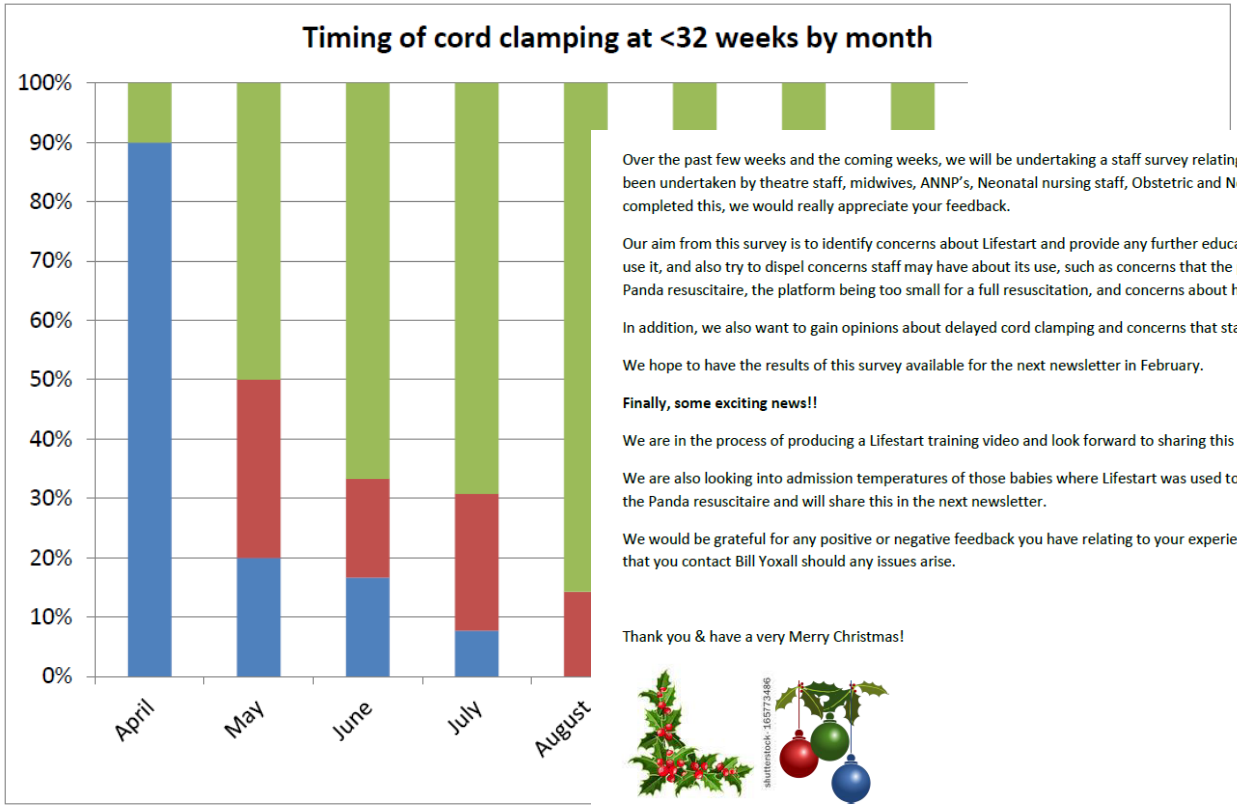
What are we doing in this project?

We are trying to increase the use of the Lifestart to allow newborn resuscitation
than 80% uptake.

Why are we doing this?

Deferring clamping of the umbilical cord saves lives!!!
For every 33 premature babies who have deferred cord clamping, there is an ext
For every 20 premature babies born before 28 weeks gestation who have deferr





Over the past few weeks and the coming weeks, we will be undertaking a staff survey relating to the use of Lifestart and delayed cord clamping. This has been undertaken by theatre staff, midwives, ANNP's, Neonatal nursing staff, Obstetric and Neonatal Doctors, and Anaesthetists. If anyone has not yet completed this, we would really appreciate your feedback.

Our aim from this survey is to identify concerns about Lifestart and provide any further education to those who are unsure of the indications for use, how to use it, and also try to dispel concerns staff may have about its use, such as concerns that the platform will not maintain a baby's temperature as well as the Panda resuscitaire, the platform being too small for a full resuscitation, and concerns about how to use it in theatre.

In addition, we also want to gain opinions about delayed cord clamping and concerns that staff may have relating to this.

We hope to have the results of this survey available for the next newsletter in February.

Finally, some exciting news!!

We are in the process of producing a Lifestart training video and look forward to sharing this with you once completed.

We are also looking into admission temperatures of those babies where Lifestart was used to see if the temperatures are lower than those resuscitated on the Panda resuscitaire and will share this in the next newsletter.

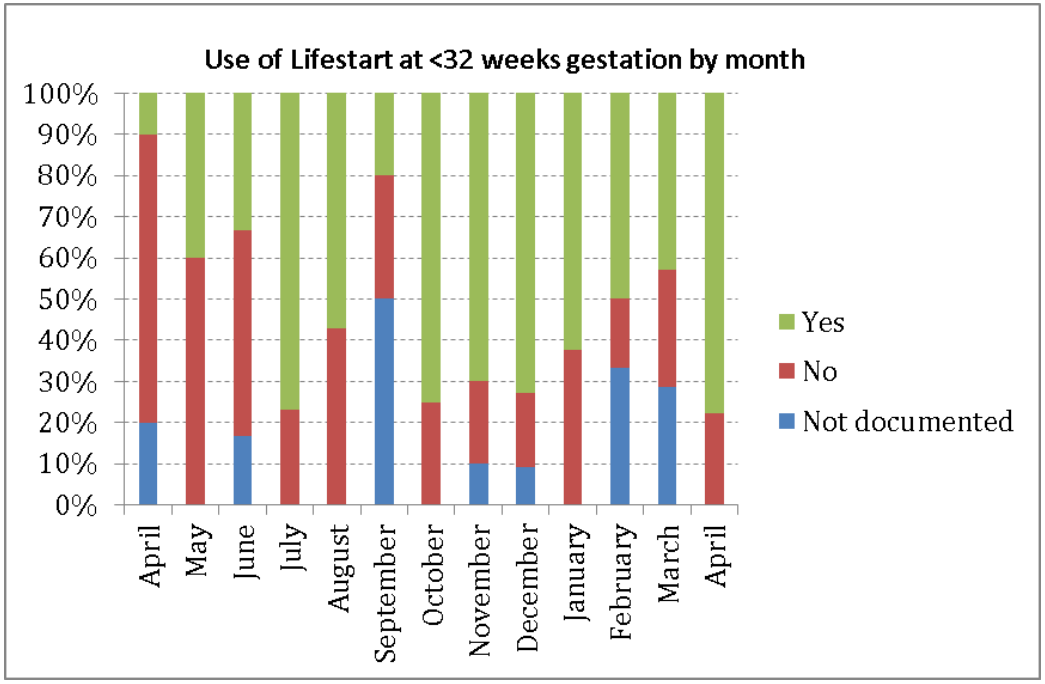
We would be grateful for any positive or negative feedback you have relating to your experience of the Lifestart and delayed cord clamping and would ask that you contact Bill Yoxall should any issues arise.

Thank you & have a very Merry Christmas!

QIP Results - 1

113 consecutive births <32 weeks

The use of Lifestart increased from 10% in M1 to 79% in M13



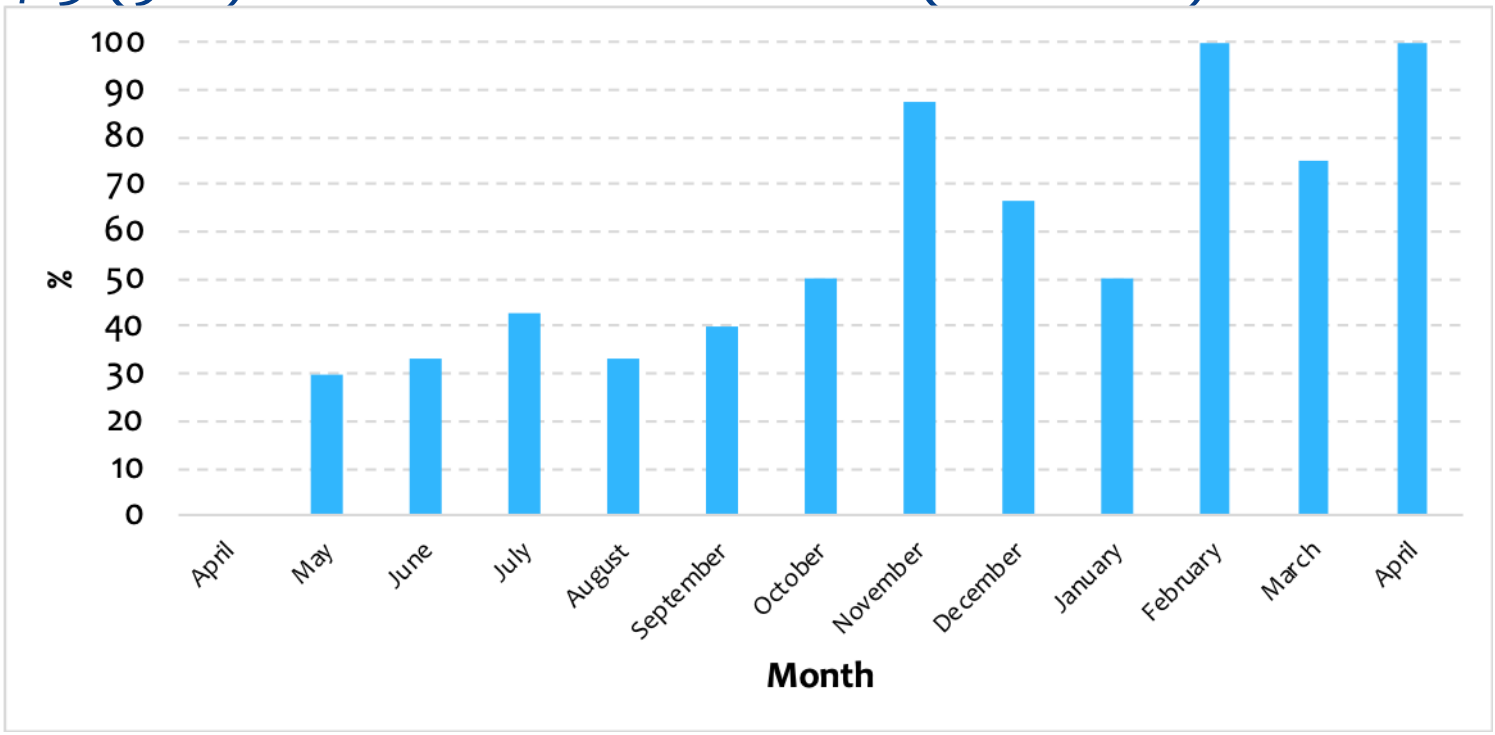
QIP Results - 2

* Only 65% of babies were eligible for Deferred cord clamping.

Reason	Number
Maternal Haemorrhage	4
Monochorionic twin	9
Baby delivered with placenta	12
Short cord	6
Cord snapped	1
True knot in cord	1
Delivery problem	1
Delivery outside Labour ward	2
Precipitate delivery before neonatal team present	3
Resuscitation difficulties	1

QIP Results

The proportion of babies eligible for DCC that received DCC increased from 4/23 (17%) in the first three months to 12/13 (92%) in the last three months (P<0.0001)



QIP output

* Normalisation of DCC
* Clearer clinical guidelines
* Improved induction and Mandatory training

* Training video – available at:

http://bit.ly/LWHLifeStart

National Data

Badgernet – all <32 weekers admitted to UK Neonatal units in 2018

Total <32 weekers admitted to NNUs in UK 2018	19392
No data entered about deferred cord clamping	12353 (63%)
Babies in whom cord was clamped after at least 1 minute	999
Babies in whom cord was clamped after at least 2 minutes	143

All babies: only 5% have a documented delay in cord clamping >60 secs
Babies with data entered: only 14% have a documented delay in cord clamping >60 secs

All babies: only 0.7% have a documented delay in cord clamping >120 secs
Babies with data entered: only 2% have a documented delay in cord clamping >120 secs

Conclusions

* Deferring cord clamping at preterm saves lives.
* The evidence for this intervention is better than the evidence for most of the other things that we do in neonatal medicine!
* Despite this – most babies are not receiving this intervention.

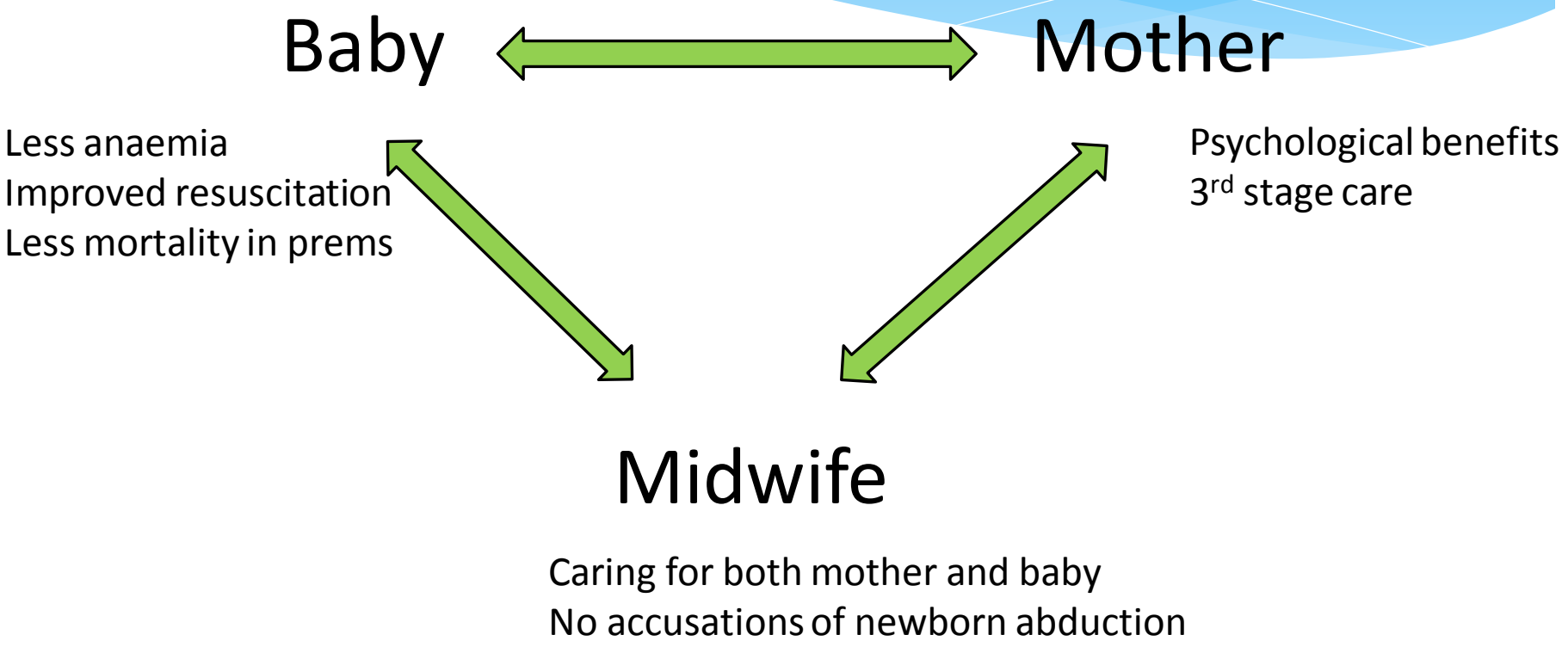
Conclusions

* Changing practise in difficult in a complex system.
* Multi-disciplinary working and Quality Improvement using PDSA cycles can quickly alter clinical practise for the better.
* This requires strong leadership and ‘buy in’ from all clinical groups in the team.

What is needed in low resource settings?

* Ability to resuscitate at bedside with intact cord
  * Platform
  * Equipment: bag and mask, stethoscope, suction,
* Simple instructions for use during resuscitation
* Affordable
* Easy to clean / sterilise

Bedside resuscitation in Africa



Collaborative development

* Royal Liverpool University Hosp – Watt, Barry
* Sanyu Africa Research Unit (Uganda) – Ditai
* Mbale Referral Hospital (Uganda) - Burgoine
* Liverpool Women's Hospital – Yoxall, Dewhurst
* University of Liverpool - Weeks

Funded: Sir Halley Stewart Trust
Grand Challenges, Canada

BabySaver Kit

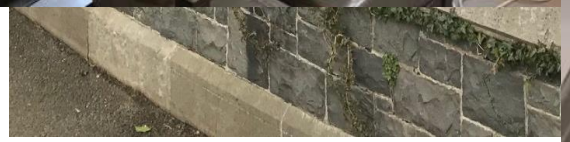
* Designed in Liverpool, engineered in Wales (and Uganda) tested and refined in Mbale
* Aim at $50 per kit (1000 for cost of one UK resuscitaire - enough for all Ugandan HCIII +)

Contents:

* 2 part container – lid becomes resuscitation platform
* Contains bag and mask, stethoscope and suction
* Simplified resuscitation instructions


COPY LASER PAPER
80 gsm | A4


SUPPORT
INSTRUCTIONS FROM HELPING BABY BREATHE
LWH




Dry thoroughly
Not Crying
Clear airway with suction device
Stimulate
Not Breathing
Golden minute

BABYSAVER

CONTENTS
Tray and Base
Stethescope
Latex gloves
Suction device
Ventilator and masks
Cotton wipes
Towels

CLEANING
USE water, liquid detergent and disinfectant or bleach.
DO NOT USE scouring pads or creams.

DRY and STIMULATE.
Only use suction if thick muconium.

Start ventilation within 1st min.
40 breaths/min for 60 secs.
Ensure chest movement.

GOLDEN MINUTE

Call for help (continue ventilation).
Reassess: Chest movement? Neck neutral? Good seal? Correct mask?

Chest compression (continue ventilation).
Only if heart rate under 100.
3 compressions to 1 ventilation breath.

Next Steps

* SAfRI has unlimited rights for Africa
* 18 month Grand Challenges Canada funding
* Local manufacturer: Makerere University Dept of Clinical Engineering

Next Steps

* Test prototype in Mbale on 30 babies
* Initially healthy, then those needing resuscitation
* Mixed methods evaluation
  * Size, shape, ease of use
  * Does it fit between the mother's legs? Is it stable?
  * Do mothers accept / value bedside resuscitation?
  * Do midwives accept / value bedside resuscitation?
  * Do babies need a heat source?

Thank-you…

Sir Halley Stewart Trust

Grand Challenges Canada®
Grands Défis Canada
BOLD IDEAS WITH BIG IMPACT®

UNIVERSITY OF LIVERPOOL

Liverpool Women's NHS Foundation Trust

NHS
The Royal Liverpool and Broadgreen University Hospitals
NHS Trust

GIG CYMRU NHS WALES
Bwrdd Iechyd Prifysgol Betsi Cadwaladr University Health Board

BakerBaird communications

SAfRI
Sanyu Africa Research Institute

THE REPUBLIC OF UGANDA
MINISTRY OF HEALTH