4th International Neonatal Conference
2016
Poznan, Poland

Transition for the neonate

Can we do resuscitation on intact cord ?

David J R Hutchon
Emeritus consultant obstetrician
Darlington Memorial Hospital,
England.

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Should we do resuscitation on intact cord ?

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The 2015 ILCOR

"There is insufficient evidence to recommend an approach to cord clamping for infants who require resuscitation at birth, and more randomized trials involving such infants are encouraged."

Wyllie J, Perlman JM, Kattwinkel J, Wyckoff MH, Aziz K, et al. (2015) on behalf of the Neonatal Resuscitation Chapter Collaborators. Part 7: neonatal resuscitation: International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations. **Resuscitation 2015**.

World Health Organization

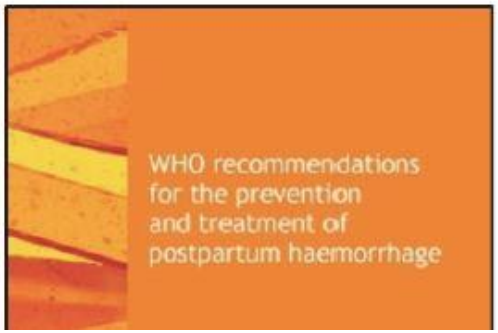
USAID FROM THE AMERICAN PEOPLE

MCHIP Maternal and Child Health Integrated Program

DELAYED CLAMPING OF THE UMBILICAL CORD TO REDUCE INFANT ANAEMIA

World Health Organization Recommends Delayed Cord Clamping

Late cord clamping (performed after 1 to 3 minutes after birth) is recommended for all births while initiating simultaneous essential newborn care.



Should delayed cord clamping be done for an asphyxiated newborn needing resuscitation?

This practice would depend upon the experience of the provider. The WHO 2012 *Guidelines on Basic Newborn Resuscitation* state that the cord should be clamped and cut to allow for effective ventilation in term or preterm babies requiring positive-pressure ventilation. However, if the clinician has experience in providing effective positive-pressure ventilation without cutting the cord, ventilation can be initiated at the perineum with the cord intact to allow for delayed cord clamping.[7]

HANDOVER

Obstetrician - expert in fetal care and birth

"hands over" to neonatologist – expert in neonatal care.

TRANSITION

from fetal placental breathing
to neonatal pulmonary breathing.

'Our little miracle' Ella the ice baby, who died in the womb and was stillborn, amazes doctors by coming back to life after 25 MINUTES

But despite a seemingly uncomplicated birth, Rachel's placenta had ruptured during the labour, restricting the baby's oxygen and blood supply. 'I'd held her for no more than two seconds when the midwife told Jason to pull the emergency cord,' Miss Claxton said.

'All of a sudden there were doctors everywhere.

E. Mortality Risk

Study or Subgroup	DCC / Milking Events	Total	ECC Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI	Year
Mercer 2006	0	36	3	36	33.8%	0.14 [0.01, 2.67]	2006
Hosono 2008	2	20	3	20	29.0%	0.67 [0.12, 3.57]	2008
March 2013	2	36	4	39	37.1%	0.54 [0.11, 2.78]	2013
Total (95% CI)		**92**		**95**	**100.0%**	**0.44 [0.15, 1.28]**	
Total events	4		10				

Heterogeneity: Chi² = 0.86, df = 2 (P = 0.65); I² = 0%
Test for overall effect: Z = 1.50 (P = 0.13)

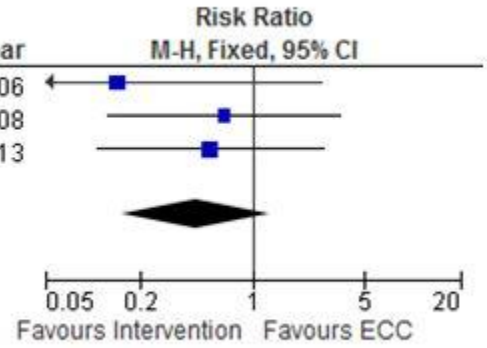
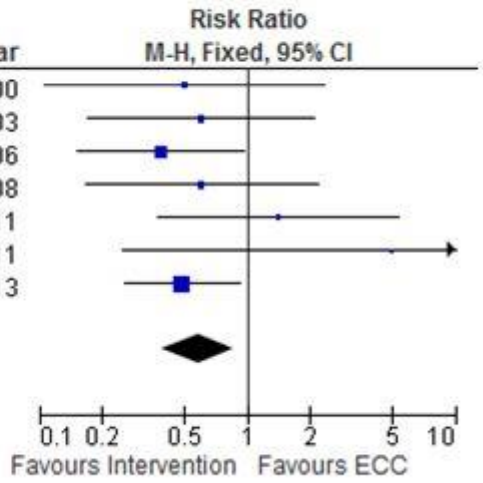


Figure 4: Meta-analysis and forest plots for neonatal morbidities

A. Total IVH

Study or Subgroup	DCC / Milking Events	Total	ECC Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI	Year
Ibrahim 2000	2	16	4	16	8.1%	0.50 [0.11, 2.35]	2000
Mercer 2003	3	16	5	16	10.1%	0.60 [0.17, 2.10]	2003
Mercer 2006	5	36	13	36	26.2%	0.38 [0.15, 0.97]	2006
Hosono 2008	3	20	5	20	10.1%	0.60 [0.17, 2.18]	2008
Oh 2011	4	16	3	17	5.9%	1.42 [0.37, 5.37]	2011
Gokmen 2011	2	21	0	21	1.0%	5.00 [0.25, 98.27]	2011
March 2013	9	36	20	39	38.7%	0.49 [0.26, 0.93]	2013
Total (95% CI)		**161**		**165**	**100.0%**	**0.58 [0.39, 0.87]**	
Total events	28		50				

Heterogeneity: Chi² = 4.83, df = 6 (P = 0.57); I² = 0%
Test for overall effect: Z = 2.64 (P = 0.008)



Backes C H, Rivera B K, Haque U, Smith C V, Hutchon D J R, Mercer J S. **Umbilical cord clamping and other placental transfusion strategies in very preterm infants: A systematic review and meta-analysis. (2013)** Submitted to **Obstetrics and Gynaecology.**

“Placental transfusion”

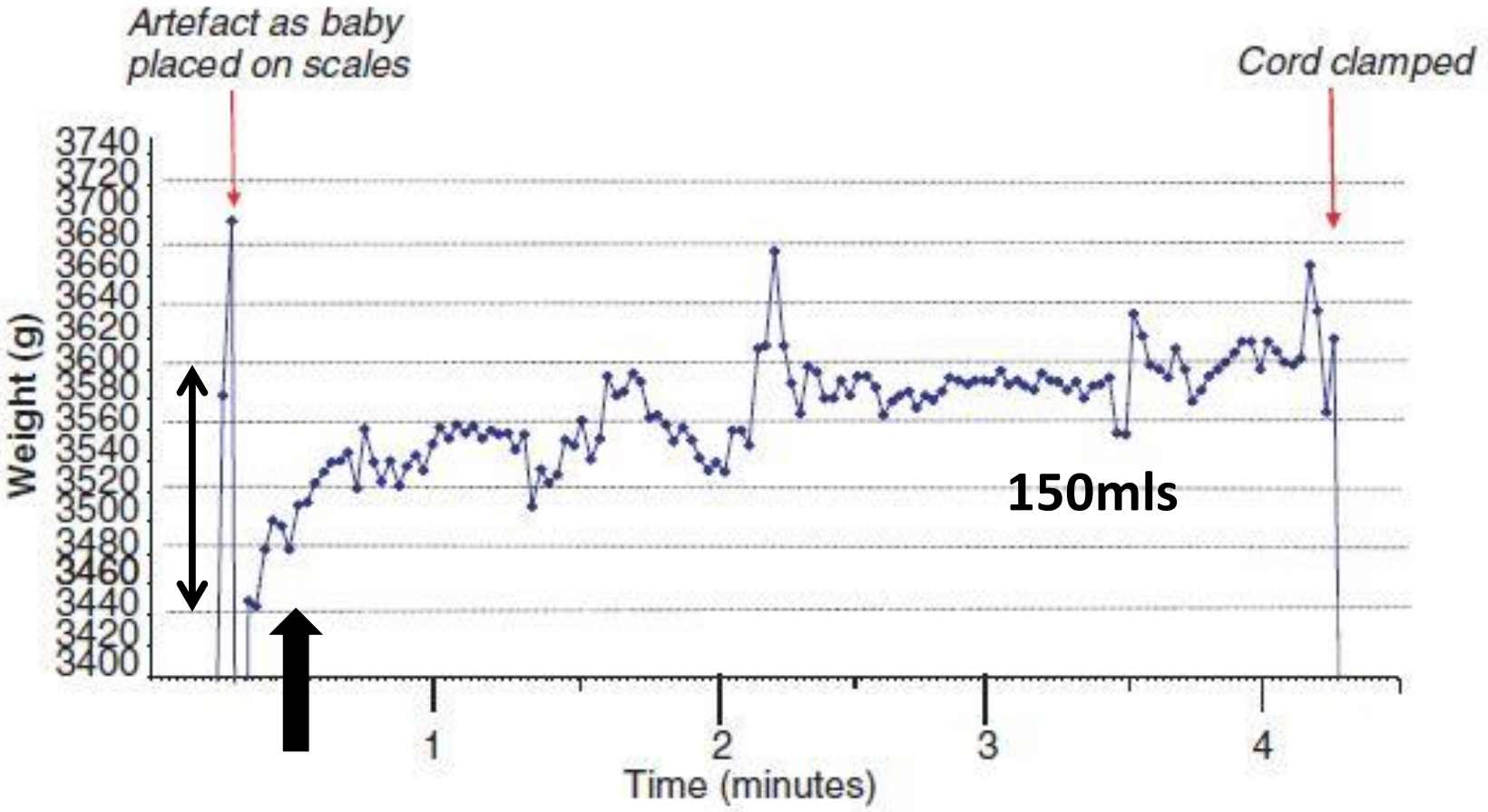


Figure 1. Weight change from birth to cord clamping.

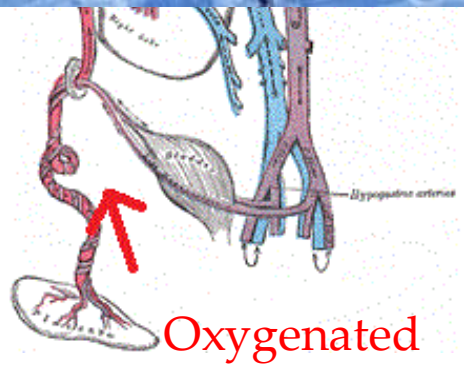
Farrar D, Airey R, Law G, Tuffnell D, Cattle B, Duley L. Measuring placental transfusion for term births: weighing babies with cord intact. BJOG 2011;118:70–75.

One baby gained at least 214 gms, this equals 204 mls blood volume

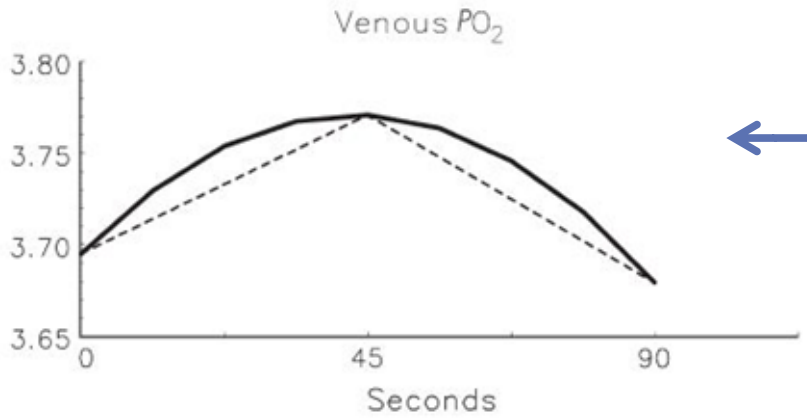
3597	131 (64–198)	0.6
3225	101 (36–167)	
3332	96 (38–154)	–0.9
3504	139 (64–214)	
3530	122 (69–174)	–0.6
2913	93 (-17–204)	
3426	87 (64–111)	7.
3613	79 (57–100)	0.

Placental circulation af

- The placental circulation **continues for several minutes** until stopped by **vasospasm** in the umbilical arteries and vein.
- There is a **significant oxygen content 3.7 to 3.77 kPa** in the blood returning to the baby.



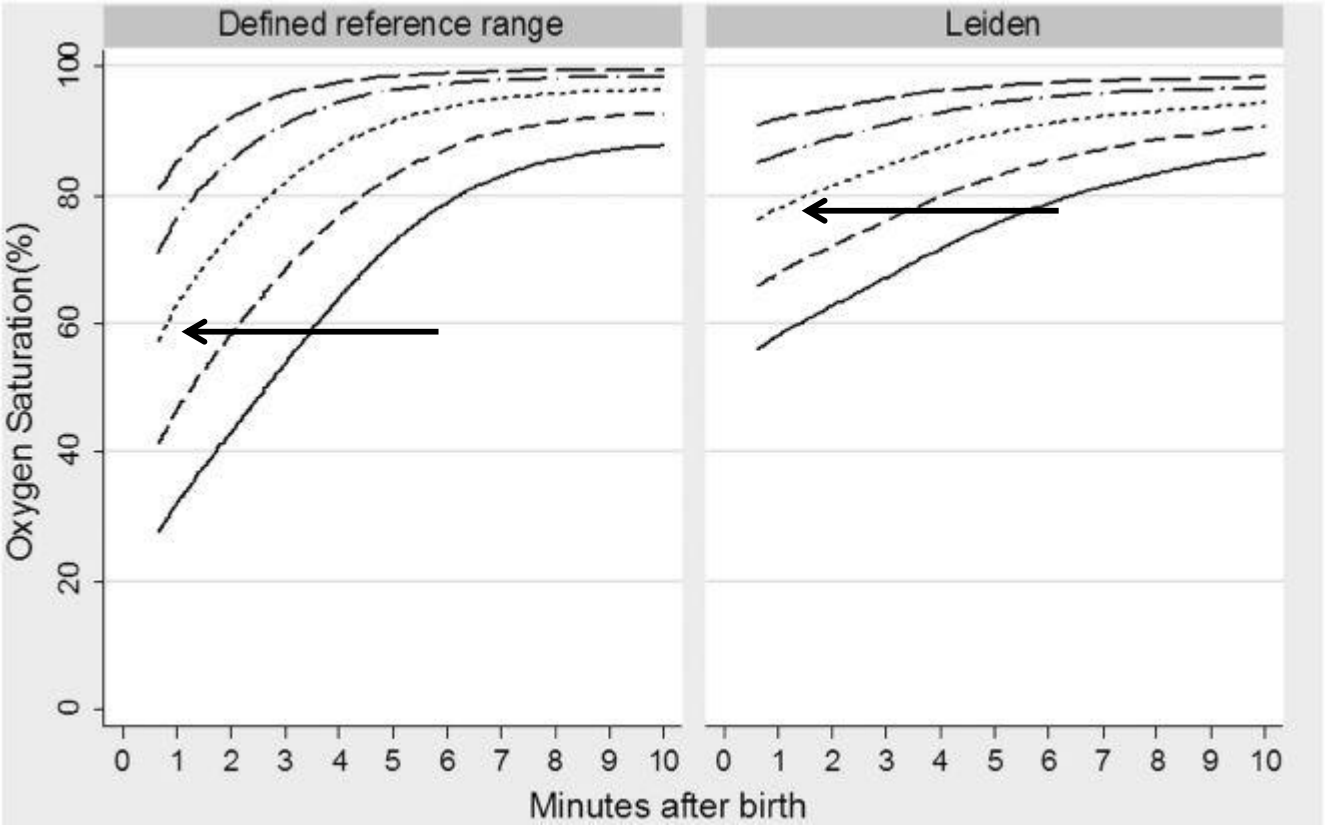
Oxygenated blood returning from the placenta to the baby



← Umbilical vein

90 seconds

Immediate cord clamping leads to lower oxygen saturation for the first few minutes after birth



Smit M, et al. Arch Dis Child Fetal Neonatal Ed 2014;0:F1–F6.

Effects of cord clamping

- Venous occlusion
- **Arterial occlusion (40% of CCO)**

Fig 1. Direct measurement of the umbilical arterial pressure in a healthy term neonate delivered by caesarean section showing the arterial surge associated with umbilical cord clamping even 35 s after birth.

Hofmeyr G J. et al Periventricular/intraventricular haemorrhage and umbilcal cord clamping. S Afr Med J 1988 73 104

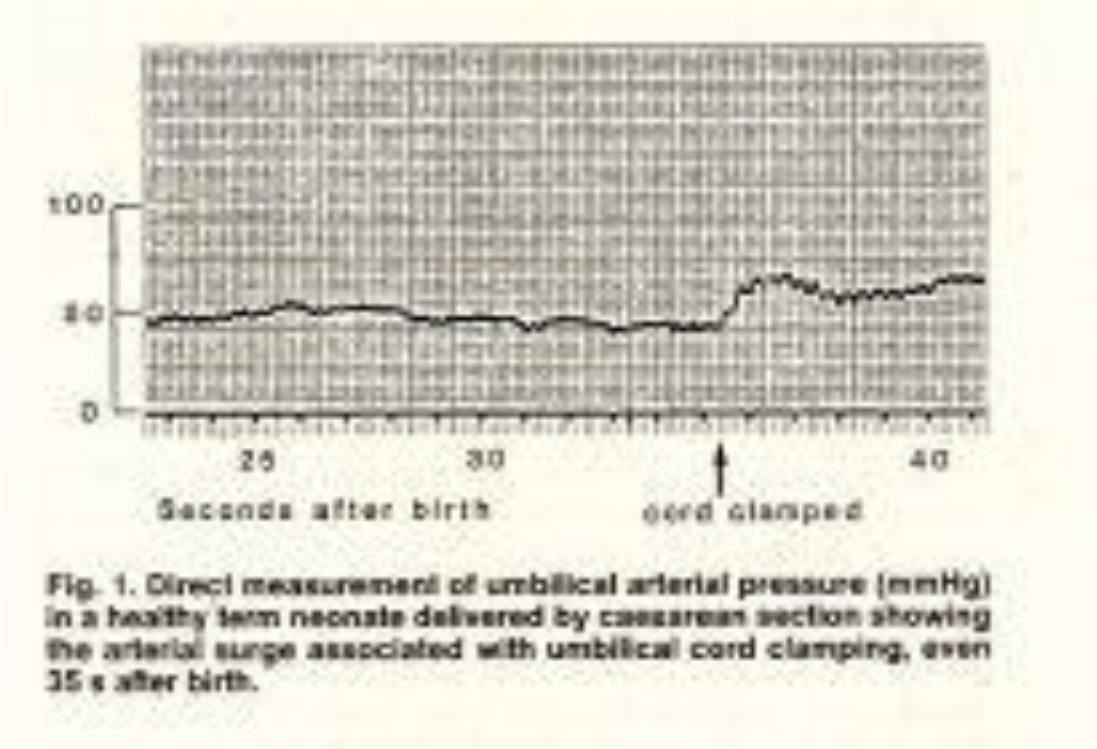


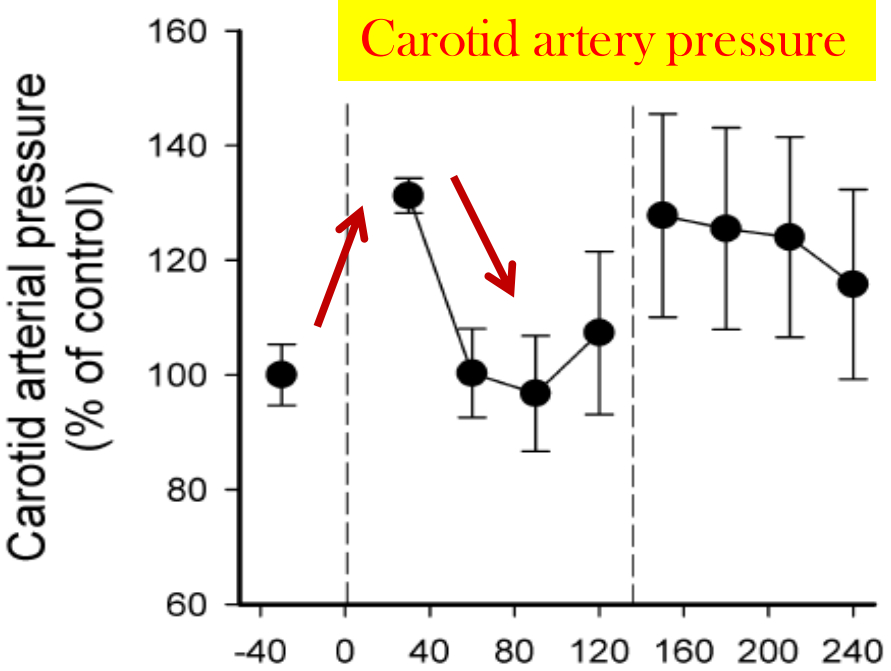
Fig. 1. Direct measurement of umbilical arterial pressure (mmHg) in a healthy term neonate delivered by caesarean section showing the arterial surge associated with umbilical cord clamping, even 35 s after birth.

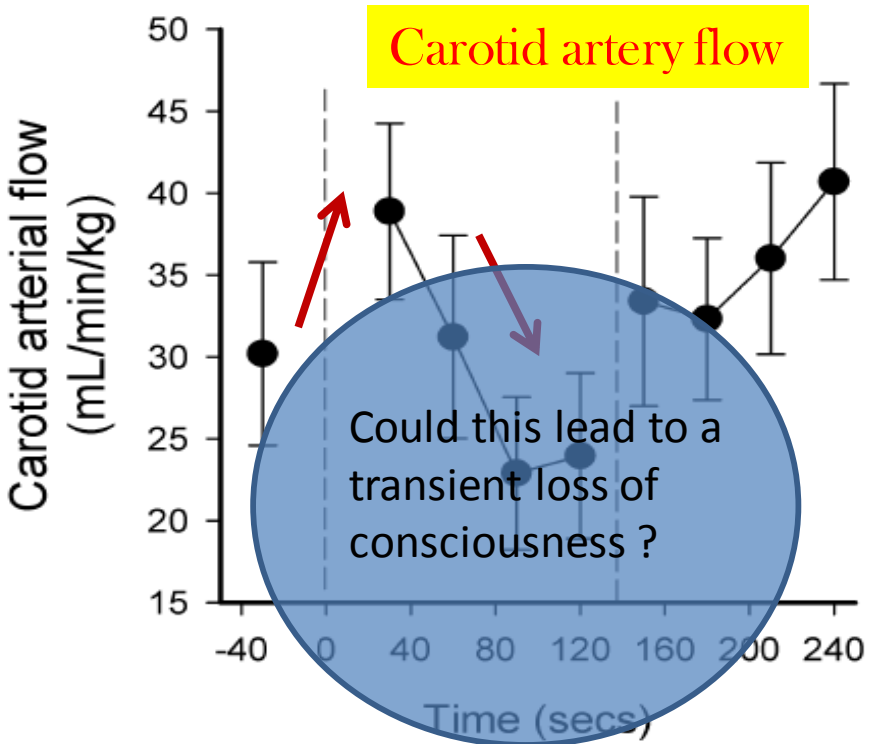
There is a transient increase in Carotid Artery pressure and flow soon after cord clamping

But, by 1 minute both Carotid Artery pressure and flow begin to drop profoundly to <50% baseline

They recover slowly after ventilation onset

Bhatt et al. *J Physiol* 2013; 591:2113-26
Figure courtesy: Dr. Stuart Hooper





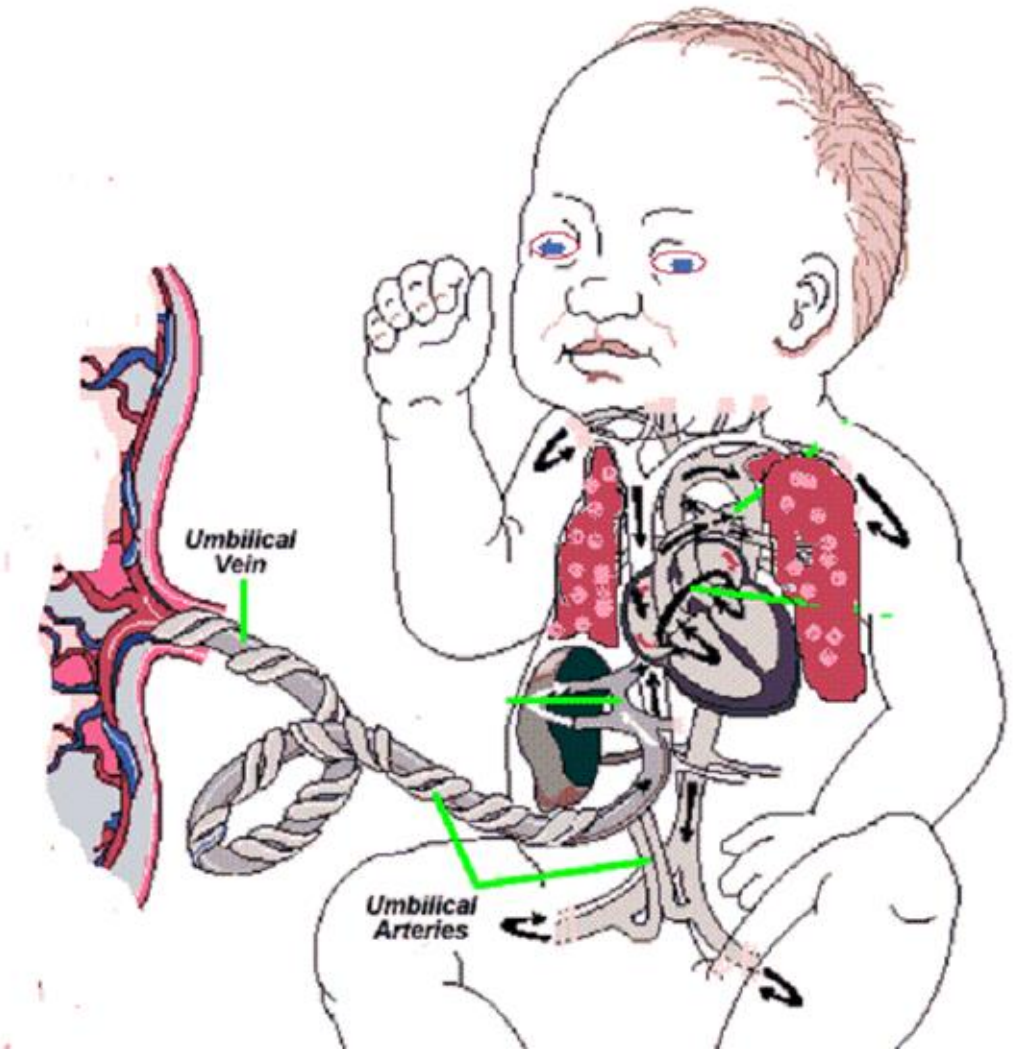
Lamb studies
What did the Data Say ?

- Otherwise, if there is a long delay between UCC and lung aeration, the infant will be exposed to a hypoxic episode superimposed on top of a period of severely restricted cardiac function.
- The combined effects of these two adverse events are potentially catastrophic, leading to a **severe hypoxic/ischaemic event**.

Hooper SB, et al. Arch Dis Child Fetal Neonatal Ed 2014;0:F1–F6.

The redistribution of blood into the baby occurs faster if the baby is breathing.

Redmond D, Isana S, Ingall D. Relation of onset of respiration to placental transfusion. Lancet. 1965;1:283–285



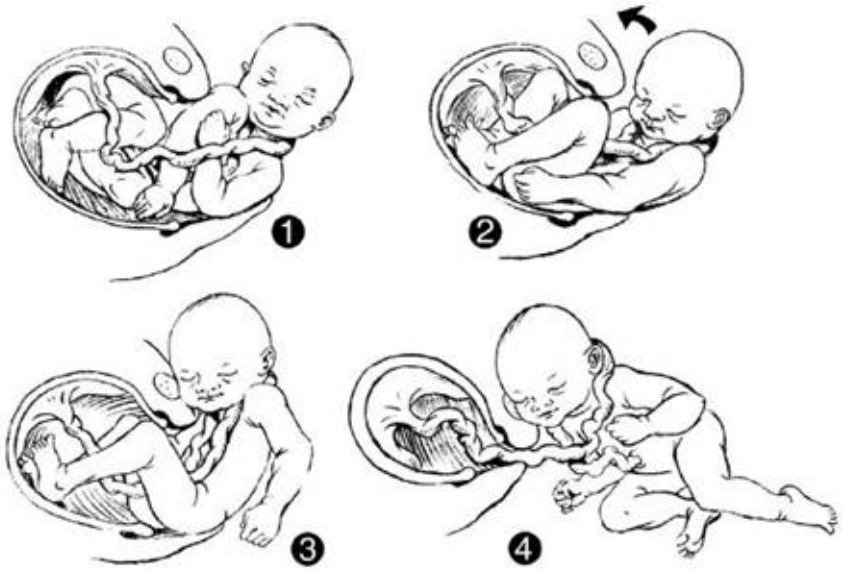
Summary

- Delaying cord clamping until the ventilation is established assures a smoother change during transitional circulation

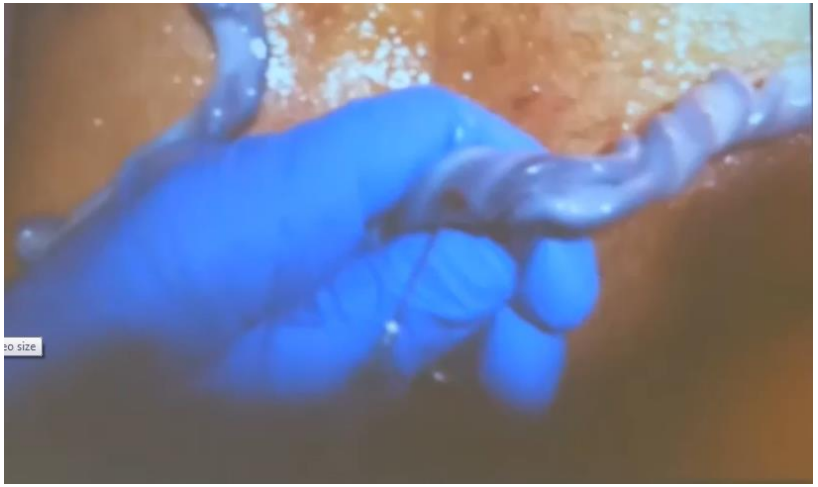
The Journal of Physiology Hooper S et al **February 11, 2013, doi: 10.1113/jphysiol.2012.250084**

- **(Ensures that a normal physiological transition is not interfered with)**

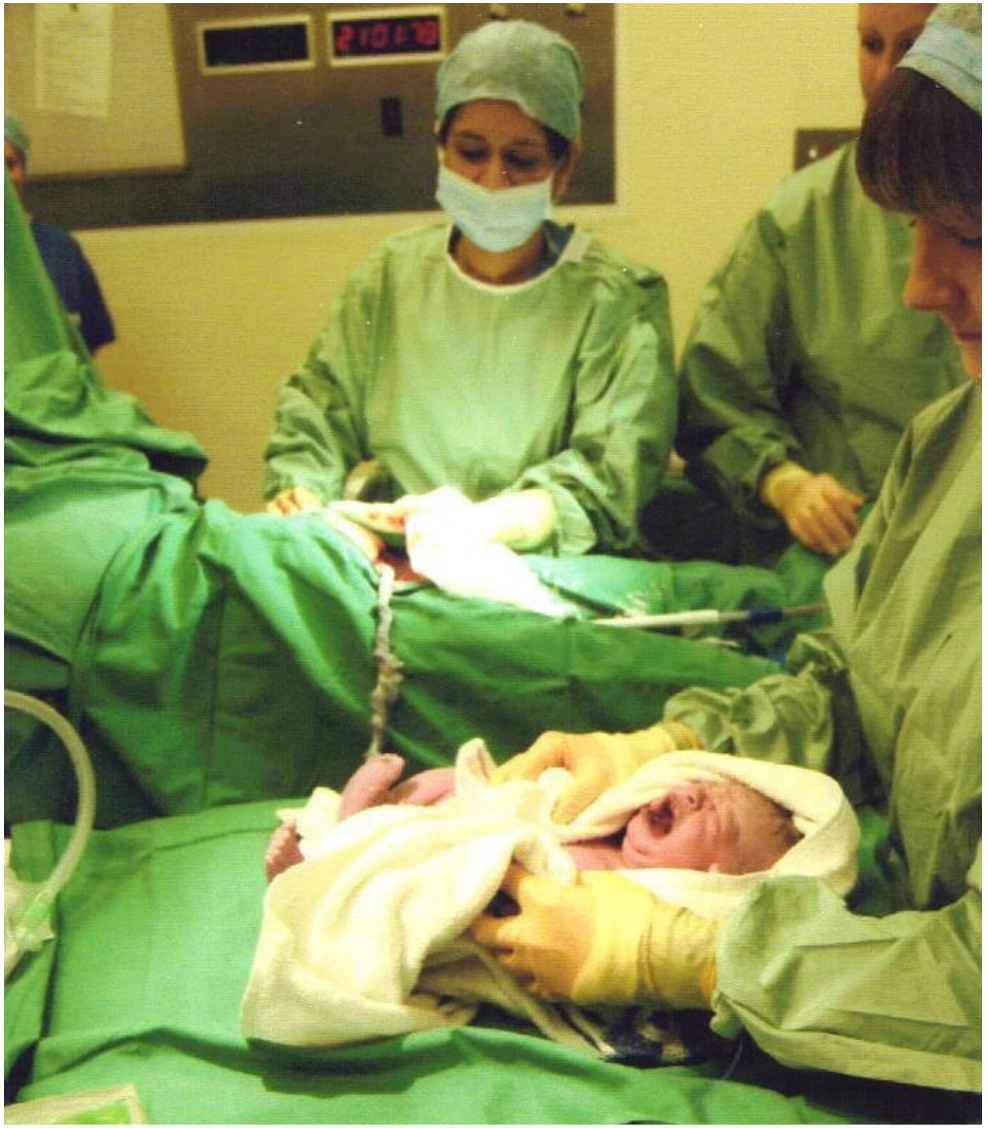
Somersault manoeuvre



Cord blood gases from the intact cord Wiberg N, Kallen K, Olofsson P (2008) Delayed umbilical cord clamping at birth has effects on arterial and venous blood gases and lactate concentrations. BJOG 115: 697-703.



Resuscitation with cord intact using standard resuscitation trolley



RCOG London Congress 2007

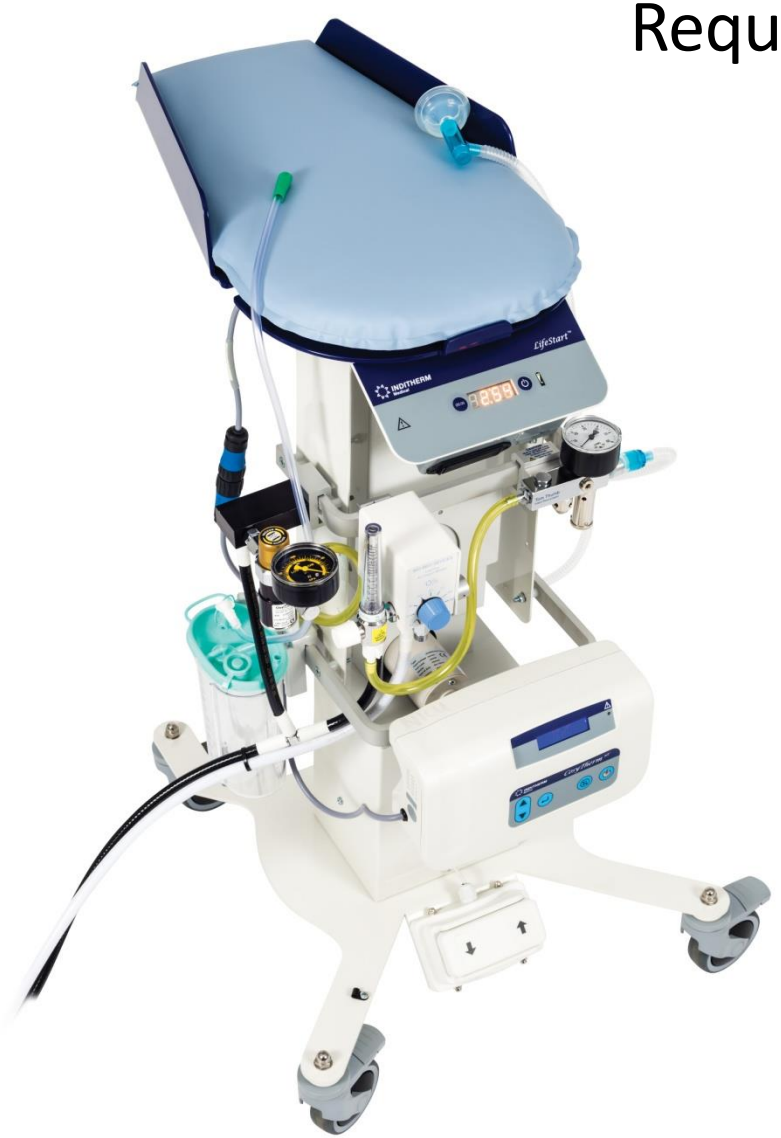
Difficult to move trolley quickly enough

Interference with operating surgeon

Not practical for assisted vaginal births

Problems with short cord.

Requirements



LifeStart trolley

•A stable warm platform with Inditherm mattress

•Medirails for **user preferred equipment**

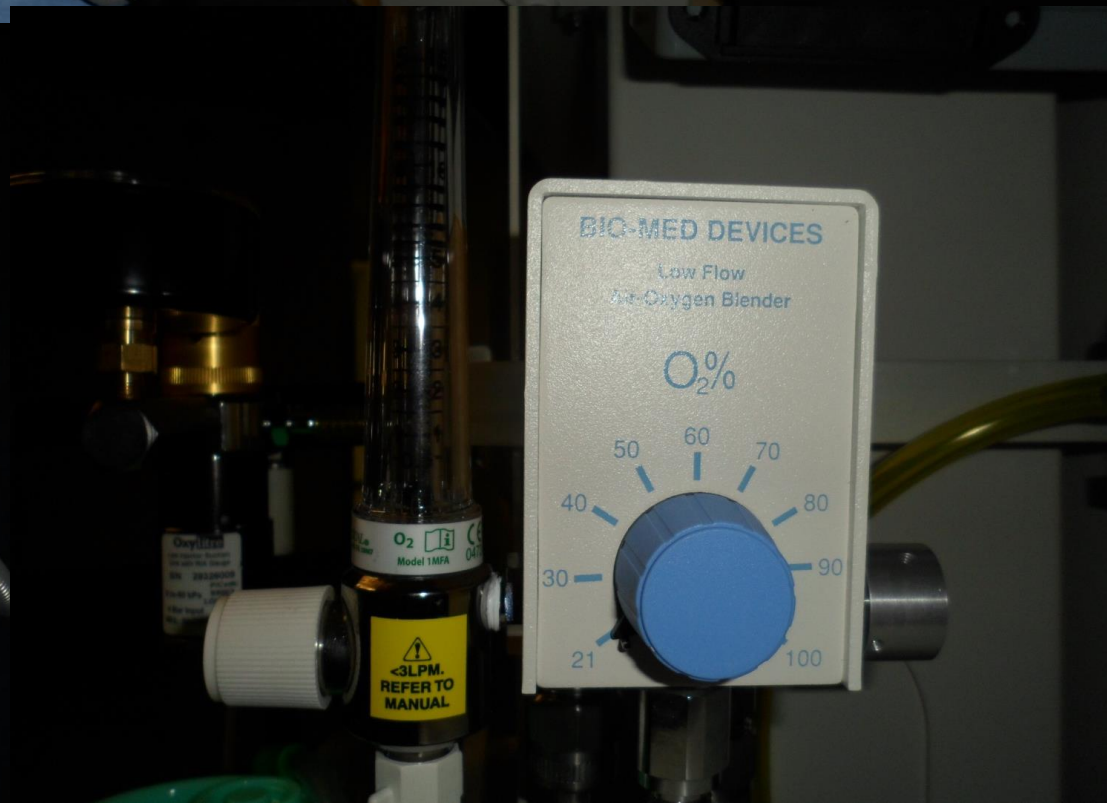
i. Tom Thumb PEEP
ii. Bird Oxygen Blender
iii. Suction

•Hands free height adjustment

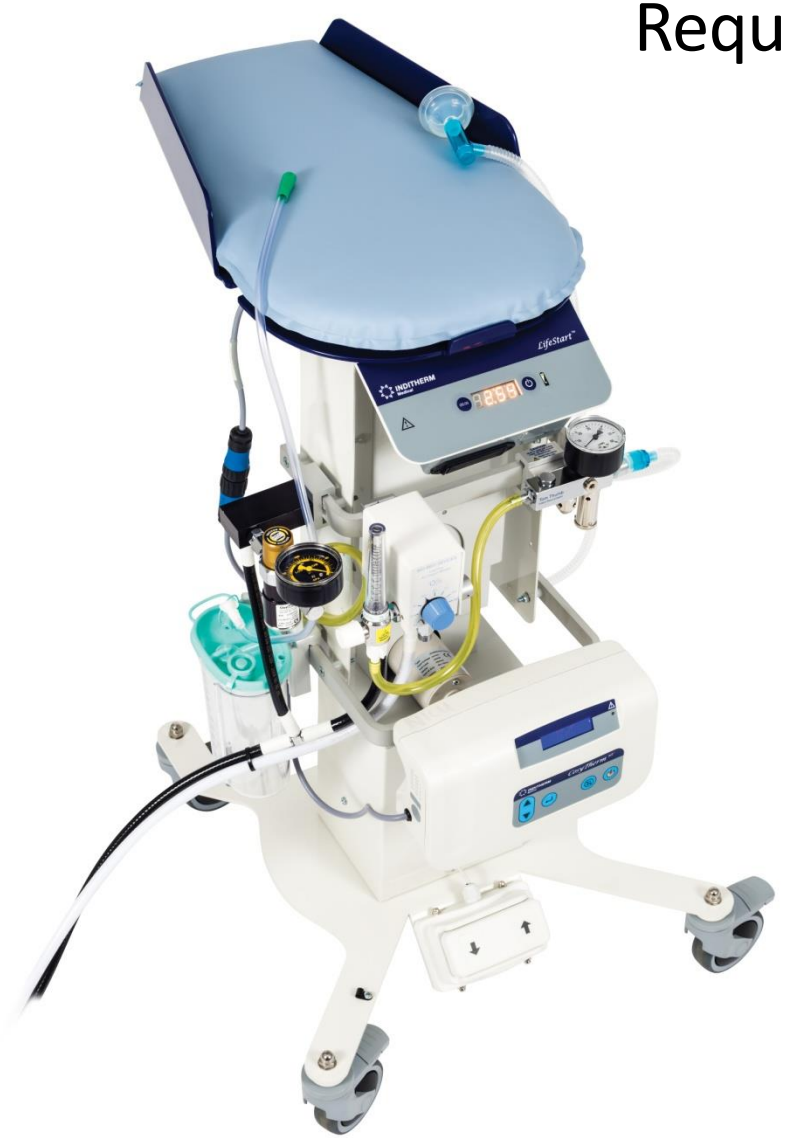
•Small footprint
•Good mobility


Temp Set
^ 40.0°C ^
INDITHERM
Medical
CosyTherm NT


ifeStart™
Northumbria Healthcare NHS
NHS Foundation Trust
SERVICE DUE
DATE 1/2/16
INITIALS LS
DO NOT USE AFTER
DATE 1/5/2016
cm Wg
VIAMED


BIO-MED DEVICES
Low Flow
Air-Oxygen Blender
O2%
21
30
40
50
60
70
80
90
100
O2
Model 1MFA
<3LPM.
REFER TO
MANUAL

Requirements



LifeStart trolley

- Co-operation by obstetricians, midwives and neonatologists
- Simulation practice in all modes of birth
- Written roles for each member of the team to be agreed
- Committed teamwork

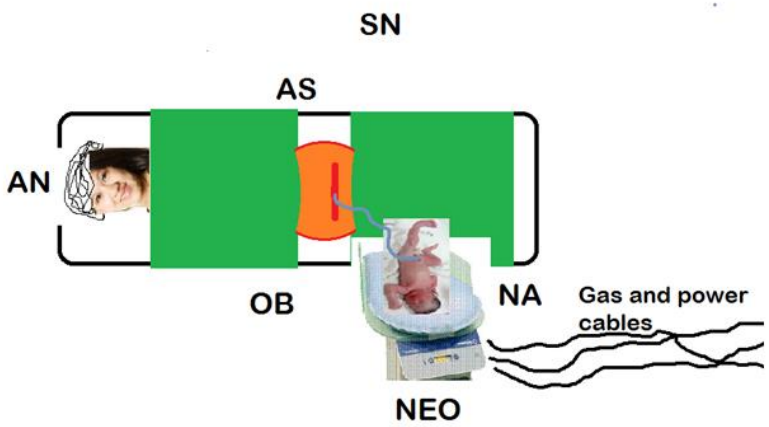
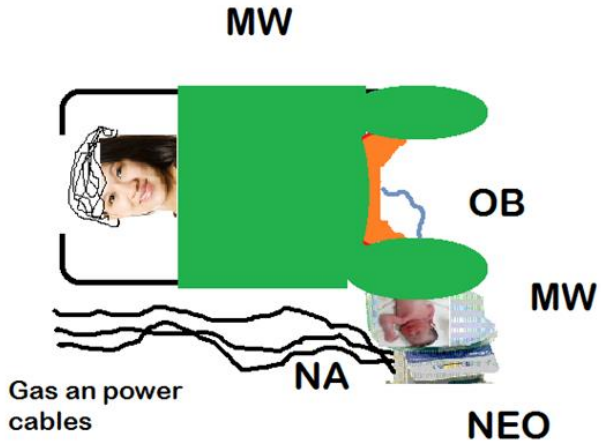


Figure 1

Position and role of each memeber of the team will vary from unit to unit and needs to be worked out and agreed, It must be documented and then practiced in simulated situations so that every member of the team knows their role.

EXAMPLE SET UPS



Normal births

Resuscitation with cord intact

Midwifery 34 (2016) 42–46

Contents lists available at ScienceDirect

Midwifery

journal homepage: www.elsevier.com/midw

Bedside resuscitation of newborns with an intact umbilical cord: Experiences of midwives from British Columbia

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Kathrin Stoll, BA, MA, PhD (Postdoctoral Fellow)[b,*], Dana Thordarson, PhD (R. Psych)[a]

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[b] School of Population & Public Health and Division of Midwifery, Faculty of Medicine, University of British Columbia, 2206 East Mall, Vancouver, BC, Canada V6T 1Z3

Delayed Cord Clamping:

A review of its introduction within a medium-sized UK consultant-led maternity unit.

George Brooks, Shonag MacKenzie, Michelle Salem Wansbeck General Hospital, Northumberland NE63 9JJ contact: george.brooks@northumbria-healthcare.nhs.uk

Background

This tentative review was undertaken to identify issues which could be examined in further studies to determine the impact of introducing "Delayed Cord Clamping for all" within an obstetric service providing low/high risk care.

Delayed Cord Clamping (DCC) was introduced within our maternity unit in 2009. DCC is recommended for up to 3 minutes within our low risk intrapartum care guidelines. A minimum of 1-2 minutes of DCC is advised for infants born by instrumental delivery/LSCS regardless of indication for delivery. This audit was planned to determine if this was being put into practice.

The resident neonatal staff , a team of Advanced Neonatal Nurse Practitioners (ANNP), work with the midwifery/obstetric teams to ensure infants benefit from DCC. Practice changes such as sitting alongside the obstetrician at instrumental deliveries were introduced.

Methods

A review of the most recent cohort of deliveries was undertaken. This looked at:

- Was DCC practised?
- How many babies required resuscitative measures?
- What proportion of infants born at term were admitted to the Special Care Baby Unit (SCBU) for respiratory care?
- These data were reviewed in light of what is known about resuscitation practice before the introduction of DCC.

Results

- 1973 births were reviewed (born late 2012-13)
- 1904 (96.5%) received at least 1 minute DCC
- 1456 (73.8%) received 2-4 minutes DCC
- 141 (7.14%) infants had an Apgar score <5 at 1minute
- 41 (2.07%) babies had Apgar score <7 at 5 minutes
- 81 infants were transferred to the resuscitaire for intervention (4.08%). Newborn resuscitaire measures in this instance were crudely identified as any action requiring transfer to a delivery room resuscitaire within the first 5 minutes of life.
- 50 (2.55%) were admitted to SCBU for respiratory care following delivery.
- Few (3.5%) of babies did not benefit from DCC
- Resuscitation incidence prior to introducing DCC was 15% (333/2470 births in 2006). At this time 4.5% of term infants were admitted to SCBU for respiratory problems.

Discussion

1. The introduction of DCC has resulted in a significant reduction in the number of babies born within our consultant-led unit receiving resuscitative measures at birth. Ashington now very much supports the practice of "assisted transition" from placental to pulmonary respiration. The act of delaying the separation of the infant from mother in itself appears to prevent infants *receiving* resuscitation that they don't *require*.

2. The only change in practice over the time period examined was DCC. In line with Kroll *et al* (1994) who demonstrated a dramatic reduction in resuscitation we also reduced the indications for ANNP attendance at birth over this time. However having an experienced midwife or ANNP attending births acting as an advocate for the baby (and DCC!) by holding their nerve in delaying the cord clamping of some compromised infants has also contributed to the decrease in intervention.

3. DCC is contraindicated if placental abruption was suspected or if an anteriorly positioned placenta was incised at caesarean section. Other reasons were cited such as cord snapping, PPH and a small number were attributable to non-compliance with the guideline.

4. DCC is explained and the women are reminded of this at the birth. Less separation from mother ensures our compliance with current requirement for facilitating skin-to skin contact at birth.

Future Action

- Consultant obstetricians and senior midwives will continue to remind junior staff at induction.
- Duration of DCC is now included in neonatal documentation which will facilitate further audit. The reason for NOT doing DCC has to be documented.
- Senior nurses and midwives attending delivery will continue to advocate DCC and the notion that allowing for normal physiological transition most babies will resuscitate themselves.
- A more formal project will add validity and transferability to the findings of this audit.

References

1. Kroll, L Twohey, L Daubeney, PE *et al* Risk factors at delivery and the need for skilled resuscitation. *Eur J Obstet & Gynecol and Reprod Biol* 1994; **44**: 175-7.

Northumbria Healthcare NHS
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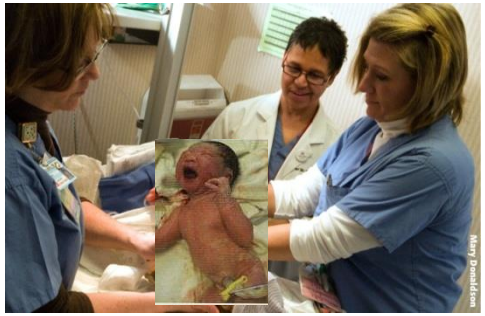

Remote resuscitaire

Many babies moved over to resuscitaire away from mother do not need any more care than could have been carried out by the mother

Mother and father “think the worst”

Two or three minutes seem like hours !

Consent
Montgomery ruling

In the UK valid consent has moved away from what the simply providing information as to the standard medical practice to that of providing the information regarding the risks that a reasonable woman would wish to know in order to provide the consent. Would a reasonable woman want to know the effects of early cord clamping in order to get her baby over to the resuscitaire ?

4th International Neonatal Conference
2016
Poznan, Poland

Thank you

Yes, resuscitation of the neonate at birth **can** be carried out with an intact cord.

David J R Hutchon
Retired obstetrician from
Darlington Memorial Hospital.

Questions ?

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Northumbria Healthcare NHS

NHS Foundation Trust

APGAR SCORING SYSTEM

	0 Points	1 Point	2 Points	Points totaled
Activity (muscle tone)	Absent	Arms and legs flexed	Active movement	
Pulse	Absent	Below 100 bpm	Over 100 bpm	
Grimace (reflex irritability)	Flaccid	Some flexion of Extremities	Active motion (sneeze, cough, pull away)	
Appearance (skin color)	Blue, pale	Body pink, Extremities blue	Completely pink	
Respiration	Absent	Slow, irregular	Vigorous cry	

Severely depressed	0-3
Moderately depressed	4-6
Excellent condition	7-10

APGAR = 2

Problem is lack of cerebral circulation

NOT

lack of oxygen