

## REGULAR ARTICLE

# Delivery room cuddles for extremely preterm babies and parents: concept, practice, safety, parental feedback

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**Abstract**

**Aim:** Following extreme preterm birth, there has traditionally been felt an imperative to rush baby to the neonatal unit for ongoing intensive care. Immediate needs of parents to bond with their babies through direct early physical contact have often been overlooked; many weeks can pass before parents get to hold their babies for the first time. Recognition of the importance of early contact is growing. We aimed to review the safety and value of routinely practising delivery room cuddles for extremely preterm babies.

**Methods:** We reviewed delivery room cuddles in babies born <27 weeks' gestation in our centre between 2006 and 2017 via case-control. We also conducted a questionnaire survey of mothers who experienced a delivery room cuddle to gain their feedback and perspectives.

**Results:** We found no difference in age or temperatures on neonatal unit admission. There was no case of inadvertent extubation associated with cuddles. Parental feedback was very positive.

**Conclusion:** With appropriate safeguards, delivery room cuddles are feasible and achievable for extremely preterm babies irrespective of birth gestation. Facilitation of the cuddle is an early and very important family-centred care practice which seems much appreciated by parents and which may improve bonding, lactation, and maternal mental health.

**KEYWORDS**

Contact, prematurity, bonding, family-centred care, neonatal

## 1 | INTRODUCTION

Recent years have seen a significant trend towards increased family-centred care (FCC), an approach that promotes mutually beneficial partnerships between parents and healthcare professionals in the

care of babies in neonatal intensive care units (NICUs).<sup>1</sup> The approach can be extended to include the delivery room, expecting that optimal health outcomes will be achieved when the parents play an active role in supporting their extremely preterm babies right from birth. Facilitating a neonatologist-supervised first cuddle between

**Abbreviations:** CPAP, continuous positive airways pressure; DRC, delivery room cuddle; FCC, family-centred care; NICU, neonatal intensive care unit; RCT, randomised controlled trial; SARS-CoV-2, Severe Acute Respiratory Syndrome Coronavirus 2.

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parents and their newborn in the delivery room is the ideal way to commence and promote the special partnership between parents and healthcare professionals in their baby's care.

While early physical contact including skin-to-skin care is well established for extremely preterm babies within neonatal units, it is not routinely commenced in the delivery room setting in most centres. A Swedish survey of first-time events experienced by parents showed that only 30% of mothers (and 29% fathers) of 81 babies born 28–33 weeks' gestation got to hold their baby in the delivery room<sup>2</sup>; a UK survey of 32 mothers of babies born at 24–32 weeks' gestation in 2011, showed that no parents held or touched their baby until in the NICU and the first cuddle often occurred weeks after birth.<sup>3</sup>

Following initial resuscitation/stabilisation, our centre has offered mothers the opportunity to cuddle their swaddled newborns for several minutes *before* NICU admission, irrespective of birth gestation,<sup>4</sup> with ongoing intensive care provided throughout. The 'delivery room cuddle' (DRC) has been practised at preterm deliveries in our centre for ~15 years. In early years it was offered only sporadically, that is, by only a minority of attending consultants according to their personal practice, though in more recent years it is now offered routinely as senior doctor/nurse/advanced neonatal nurse practitioner teams have gained experience and enthusiasm in its practice. Our practice of the DRC involves only limited direct skin-to-skin contact, as baby has been placed in a polythene bag and swaddled in a towel beforehand.

In this paper we: i) review the safety of the DRC practice in extremely preterm babies born in our centre; ii) elicit parents' perspectives and feedback on the practice; iii) discuss the rationale for DRC being routine delivery room practice; and iv) share our experience of practical and safety considerations for practising the DRC.

## 2 | MATERIALS AND METHODS

### 2.1 | Safety evaluation

Eligible babies were inborn in our hospital at <27<sup>+0</sup> weeks' gestation, without major congenital abnormality, and admitted to our tertiary-level NICU in the 12-year period 2006–2017. We reviewed birth history notes recorded in electronic patient records. We identified those with a documented DRC prior to NICU admission (DRC group), and compared them with a closely contemporaneous group of inborn infants matched for birth gestation and multiplicity, then (as far as possible) sex and delivery mode, whose written delivery room record indicated that they had been only '*shown to parents*' prior to NICU transfer (control group). Main short-term safety outcome measures of interest were inadvertent extubation during DRC, admission time and temperature on arrival to NICU, and survival to discharge. Data were compared using the Mann–Whitney and chi-square/Fisher's exact tests as appropriate. This review of routine service provision did not require formal ethics approval.

### Key Notes

- Safety and benefits of kangaroo-care cuddles for extremely preterm infants are well established, yet many mothers get first cuddles only weeks after birth.
- We show that delivery room cuddles *before* neonatal unit admission are feasible for extremely preterm babies, irrespective of gestation, and describe key safety considerations.
- Delivery room cuddles were greatly appreciated by parents, may improve bonding and breastfeeding, and may reduce maternal stress and guilt associated with pre-term delivery.

## 2.2 | Questionnaire Survey of Parental Feedback

We surveyed parents of babies born <27<sup>+0</sup> weeks' gestation who had a DRC in the 13-year period 2006–2018. Of 32 mothers identified, we excluded nine bereaved mothers whose infants had subsequently died, and one mother who died post-partum. Between June and December 2018, we invited 22 mothers of still-living babies to participate in a web-based questionnaire. A single reminder email/letter was sent to non-responders. The questionnaire (Appendix S1) was developed with the input of a mother (EA) with personal experience of a DRC with 23-week twins.<sup>4</sup> This service evaluation did not require formal ethics approval.

## 3 | RESULTS

### 3.1 | Safety outcomes

Our NICU admitted 396 babies born <27<sup>+0</sup> weeks' gestation in the 12-year study period; 233 (59%) were inborn. 27 (12%) received a DRC prior to NICU transfer. The DRC followed initial on-resuscitative stabilisation which included endotracheal intubation in all but one case, and surfactant administration (endotracheally) in 25/27 cases. Table 1 presents baseline demographic data and short-term safety outcomes. No inadvertent extubation was recorded during any DRC episode. There were no significant differences in age at NICU admission, admission temperature or survival to discharge for the 27 DRC babies versus controls.

### 3.2 | Parental feedback

12/22 (55%) mothers responded. Their index birthing had occurred 0.25–12 years previously: ten vaginally and two emergency Caesarean. Two were mothers of 23-week gestation twins, and two were mothers of 26-week gestation twins. All remembered being

**TABLE 1** Baseline characteristics and short-term outcomes in babies who had a delivery room cuddle compared with matched controls

	Maternal Cuddle n = 27	'Shown' only n = 27	p-value
Birth gestational age, weeks <sup>+days</sup>	24 <sup>+6</sup> (22 <sup>+5</sup> –26 <sup>+5</sup> )	24 <sup>+4</sup> (23 <sup>+1</sup> –26 <sup>+5</sup> )	0.89 <sup>a</sup>
Birth weight, grammes	728 (506–1170)	685 (545–1132)	0.50 <sup>a</sup>
Singleton:Twin, n:n	18:9	17:10	1.00 <sup>b</sup>
Male:Female, n:n	15:12	15:12	1.00 <sup>b</sup>
Delivery mode vaginal:caesarean, n:n	26:1	23:4	0.20 <sup>c</sup>
Apgar score at 1 min	5 (1 to 9)	5 (0 to 9)	0.29 <sup>a</sup>
Apgar score at 5 mins	8 (2 to 9)	7 (1 to 10)	0.14 <sup>a</sup>
Apgar score at 10 mins	8 (5 to 10)	7 (3 to 10)	0.29 <sup>a</sup>
Postnatal age at NICU admission, minutes	19 (11–41)	21 (11–37)	0.53 <sup>a</sup>
Admission temperature, °C	36.5 (34.0–38.5)	36.6 (33.1–38.2)	0.89 <sup>a</sup>
Survived to discharge, n (%)	18 (67)	17 (63)	1.00 <sup>b</sup>

Data are median (range) or n (%) unless indicated.

<sup>a</sup>Mann–Whitney test.

<sup>b</sup>chi-square test.

<sup>c</sup>Fisher's exact test.

given their newborn baby/babies to cuddle in arms in the delivery room before NICU admission (10 vividly, 2 vaguely) and associated feelings. On a Likert scale (0=not at all important, 10=extremely important) they rated the importance of this first cuddle with median score 10 (range 4–10, IQR 9.9–10). Six reported feeling relieved/reassured; six reported intense feelings of pride and love; three reported initially feeling scared at the prospect of holding their tiny baby with additional comments reflecting anxiety that their baby's intensive care may have been delayed (Appendix S2). Nine reported being able to have a photograph taken during that first DRC, often very appreciated (Appendix S2).

We asked how important it was 'that neonatal doctors/nurses try to offer, as far as possible, mothers of newborn premature babies an initial cuddle in the delivery room...'. Rating on a Likert scale (0=not at all important, 10=extremely important), the 12 respondents gave median rating 10 (range 5–10, IQR 9.25–10).

Figure 1 shows a selection of comments from respondent mothers regarding what the first cuddle meant to them, and Appendix S2 provides all free-text comments returned. A pertinent reflection is provided by a co-author (EA) on her DRC (Appendix S3).

## 4 | DISCUSSION

### 4.1 | Current evidence and rationale

Following acute delivery room stabilisation of the extremely preterm baby, immediate NICU admission has traditionally been considered absolute priority. Parents have generally, therefore, only been allowed a brief cursory 'showing' of their baby before its urgent transfer to the NICU. Other reasons the DRC is not yet routine

may include concerns regarding the lack of safety and outcome data in extremely preterm infants, and an absence of published practice guidance. Importantly, practitioners may not have considered the direct involvement and needs of parents in the immediate postnatal management of extremely preterm babies, their views and wishes regarding this first early cuddle, and potential mutual benefits of the DRC. Waiting until *after* NICU admission, when remote from their mothers, inevitably decreases the chance for very early infant-maternal contact. Facilitating a first, early cuddle then becomes logistically far more challenging, when the constraints of incubator, lines, tubing, monitor wires and ongoing procedures pose real physical barriers – explaining why many weeks can thus pass before the first cuddle.

Parental cuddling of extremely preterm infants is not a new intervention. A strong body of evidence already supports the safety and efficacy of 'kangaroo-care' skin-to-skin contact in the NICU, even from the earliest days, in both short- and long-term outcomes.<sup>5–13</sup> In meta-analysis of low, middle and high resource settings, kangaroo care was associated with lower mortality, lower incidence of neonatal sepsis, and improved head growth in low and very low birth weight infants.<sup>6</sup> During skin-to-skin contact, infants demonstrate enhanced physiological stability in respiratory rate and regularity, glucose homeostasis, reduced incidence of apnoea and cyanosis, increased oxygenation, improved thermoregulation and better pain measures.<sup>5,6,9</sup> In addition, infants receiving skin-to-skin care have enhanced sleep-wake cycling with longer sleep cycles, and electroencephalographic evidence of accelerated brain maturation,<sup>11,12</sup> with potential for enduring neurobehavioural, neurodevelopmental and social benefits.<sup>8</sup> During cuddles, parental stress reduces, feelings of parental competence increase,<sup>6,7</sup> and increased rates of successful lactation and sustained breastfeeding are observed.<sup>5,6,9</sup> The European Foundation for the Care

- #1. *I got a cuddle with both!!-it was so beneficial!!!!!! To hear them cry & stop to have that first cuddle was what we needed as I wasn't going to have another cuddle for a while!!!*

*They said here are your daughters said give them kisses and they were doing hand held breathing for them while I had my cuddles before they went to nicu.*

*And to have that first cuddle I felt like a mummy and I was very thankful because I didn't get another cuddle until 24 days later I think, which again was very emotional.... to see them and touch them... & maybe that first touch was what we all needed knowing it was going to be a really tough journey ahead!!!*

*Thankfully we are the lucky ones, didn't think that at the time!!, but maybe that was what HELPED them survive?"*

*I was and am so grateful to have had that first cuddle and luckily I got that chance. I really hope this becomes the normal thing to have straight after delivering your baby/babies- it is such a powerful connection you have even at that early on time, and I feel that is part of why the girls have done so well because of as much skin to skin I could do from the minute I could.*

**Mother of 23<sup>+6</sup> week twin girls**

- #2. *For me, I was very stressed and in hindsight I am glad I held her briefly whilst wrapped in a towel but I have often wondered why on earth I was allowed that when she needed so much medical attention, it makes me panic to think I took any time away from all the serious medical help she needed. But if I had lost her, I am happy I had that. I suppose I felt it was a bit selfish. But everything happened so quickly it was a strange moment. And she looked quite scary but I wasn't scared of her, I just wanted her looked after*

**Mother of 24<sup>+6</sup> week girl**

- #3. *Making the initial cuddle as close as it could have been had he been full term to make it feel 'normal' was great.*

**Mother of 26<sup>+4</sup> week boy**

- #4. *They said how handsome my son was and how I seemed to look comfortable and natural holding him, despite the chaos!*

*It was incredibly important as I did not get to hold my son again for two weeks as he was too sick. That cuddle helped to initiate my breast milk and I was able to express and eventually breastfeed my son when he was stronger.*

**Mother of 26<sup>+0</sup> week boy**

- #5. *Relief, love, instant closeness, frightened, but knew that there was nothing my husband and I could now do best to leave it to the experts.*

*They were telling us and reassuring us that they were fine and breathing and it was normal for a baby that size not to cry. Would have been nice to have held them a bit longer as I didn't get to hold them again till 1 week later, but I understood why.*

**Mother of 26<sup>+1</sup> week twin boys**

- #6. *I didn't think I'd get a cuddle so it meant the world to me to have those few seconds bonding with my beautiful boy. I have a photo of us both and it brings some memories back but not all, I'm crying in the photo but I don't really remember that I'm sure it would have been a lot of mixed feelings at the time.*

**Mother of 24<sup>+4</sup> week boy**

- #7. *Before the cuddle the midwife took pictures while the doctors and nurses set up the breathing equipment. The cuddle, we were given enough space to enjoy it. But with the doctors and nurses close enough to reassure us they were looking after him extremely well. They also gave us the first hat that he wore during the cuddle ... it was amazing to be able to have the cuddle so I could be reassured he was ok. This also meant the wait until we could see him didn't feel so hard.*

**FIGURE 1** Selected free-text comments received from mothers relating to their delivery room cuddle. One mother of a baby not <27<sup>+0</sup> was inadvertently invited to participate in the survey, her response is nevertheless included

*Having the first cuddle is one of the only things that is like a 'term' delivery. If this was not available I think I would have found the first few hours after he was born so much more stressful.*

**Mother of 26<sup>+1</sup> week boy**

#8. *Reassured me that baby was ok, that they could feel her heartbeat was very strong and that meant baby was really enjoying our little chat.*

**Mother of 27<sup>+3</sup> week girl**

#9. *It was reassuring to be able to see and cuddle my babies as they didn't cry immediately upon delivery.*

*Reassurance that my babies were in good hands. They created a positive atmosphere ...it was a lovely experience.*

**Mother of 26<sup>+2</sup> week twin girls**

#10. *It was fantastic. Everybody was relaxed and this abated the anxiety I had felt about giving birth so early. [The consultant] suggested and offered to take a video of our cuddle and we are eternally grateful to him for this; again, we were so worried that capturing such an important moment was not the foremost, in our minds!*

*I was thinking about my delivery room cuddle this morning and that postnatal fatigue is so tangible, even now. Considering how unclear the outcome of his birth was, I can honestly say that cuddling [my baby boy] was probably the most encouraging factor in deciding to express milk for him.*

**Mother of 22<sup>+6</sup> week boy**

FIGURE 1 (Continued)

of Newborn Infants, a parent-led organisation, considers early skin-to-skin care to be of 'particular importance' for very preterm infants and recommends skin-to-skin contact be initiated as early as possible as standard care.<sup>14</sup>

Nevertheless, the literature describing parent-infant cuddling *within the delivery room*, or very early (first-hour) following very preterm birth, is sparse and recent. It includes a first case report in a 23<sup>+1</sup>-week twin,<sup>4</sup> a small case series of 10 preterm babies (28–32 weeks' gestation)<sup>15</sup> and two small randomised controlled trials (RCTs): Linnér et al. reported 55 babies (gestational age range 28<sup>+0</sup>–33<sup>+6</sup>) randomised to immediate stabilisation on maternal chest after birth with skin-to-skin contact for the first postnatal hour, or immediate stabilisation on a resuscitaire. Infants in the immediate skin-to-skin group were marginally cooler at 1 hour (mean: 36.3°C vs. 36.6°C,  $p = 0.03$ )<sup>13</sup>; Mehler et al. reported 88 babies (mean gestation 29 weeks, range 25–32) randomised to either 60 mins of delivery room maternal skin-to-skin contact or 5 minutes visual contact only. Intubated babies and those needing >40% oxygen were excluded. Quality of mother-child interaction responses (primary outcome) at 6 months corrected age was better ( $p = 0.04$ ) in those who received direct early skin-to-skin contact. NICU admission temperature was *higher* in the early skin-to-skin contact group (median: 36.6°C vs. 36.1°C,  $p < 0.001$ ). The authors concluded that delivery room skin-skin contact promotes maternal-child interaction, decreases maternal depression and bonding problems, and may benefit preterm development.<sup>16</sup>

In our experience, mothers invariably want to cuddle their extremely preterm newborns. Cuddling the newborn baby in arms after birth is instinctive for parents, irrespective of gestation. Abrupt separation and removal of the baby to NICU are traumatic. A calm, supervised initial cuddle gives an opportunity for neonatologist and neonatal nurse to provide initial reassurance to parents, for parents to meet and form an initial physical and psychological bond with their baby, touch, kiss, smell, and perhaps hear them, and for baby to feel their first embrace. The DRC provides a brief moment of calm that can be enjoyed by both in anticipation of potential storms that may lie ahead after NICU admission and may help parents transition to their new 'parental role'.<sup>3</sup> Parents can whisper their first words and – assisted by attendant staff – get their first family photographs/video together. Appendix S4 provides a short video clip illustrating one mother's DRC with her 22-week gestation newborn; Figure 2 presents typical delivery room timings illustrated by this case.

The first minutes and hours after birth are now recognised as crucial for the formation of a tight bond between mother and infant. This 'early sensitive period' is a time of heightened maternal sensitivity and responsiveness, thought to be oxytocin mediated.<sup>17</sup> Facilitating contact in this period may improve quality of mother-preterm baby interactions and increase chances for long-term secure attachment.<sup>17</sup> This may be especially the case for the mothers of extremely preterm infants where abrupt separation at birth and often no direct maternal contact for weeks has hitherto been the accepted norm and expectation.

A further compelling justification for the DRC is that extremely preterm infants remain a very high-risk group for mortality. One cannot easily predict at birth which babies are destined to deteriorate

Time	Event
0 min:	Spontaneous vaginal delivery of 22+6 week boy weighing 530 g Active, good tone, attempting to cry
0-1 min:	Delayed cord clamping (60 s) then transferred to resuscitaire
2 mins:	Active, moving, spontaneous respirations, HR 100/min
4 mins:	Intubated, good air entry
5 mins:	SaO <sub>2</sub> low in air; persistently low in FiO <sub>2</sub> 0.40, so FiO <sub>2</sub> ↑. Peak inspiratory pressure 20 cmH <sub>2</sub> O with T-piece hand ventilation, heart rate >120/min
12 min	Poractant alfa 120 mg given
15 min:	Tube dislodged during fixing
25 min:	Re-intubation and securing of endotracheal tube complete Confirmation obtained from obstetrician and midwife that safe to bring baby to mother.
26 min:	Resuscitaire moved alongside mother's bed for DRC, baby transferred into mother's arms, remained attached to resuscitaire T-piece ventilator throughout
26-35 min:	Unhurried cuddle with mother lasting 9 minutes, ongoing T-piece ventilation by attendant neonatal nurse/doctor throughout (video clip extract: <b>Appendix S4</b> )
35-39 min:	Baby transferred into father's arms, 4 minute-long cuddle with father, hand T-piece ventilation and observation continued throughout
40 mins:	Departed delivery room in transport incubator
41 mins:	NICU admission, ongoing ventilation via endotracheal tube, FiO <sub>2</sub> 0.21 Admission observations: Temperature: 36.0°C Glucose (recorded at 55 mins) 3.1 mmol/L, pH: 7.33 Lactate 1.3 mmol/L

**FIGURE 2** First-hour times and events between birth of a 22<sup>+6</sup>-week gestation baby and his neonatal unit admission incorporating delivery room cuddle with both parents. This mother did not get the opportunity to cuddle her son again until postnatal day 38

rapidly in the first hours, days or weeks thereafter. If a first cuddle is offered to parents only when a baby is dying or terminally ill,<sup>4</sup> some parents out of utter grief feel unable to hold their baby in such circumstances and may live with consequent guilt.

## 4.2 | Practicalities and safety considerations

Potential risks include accidental extubation, medical gas disconnection, cold exposure, poor handling of baby and possibly hypoglycaemia. Mitigation of risks necessitates assiduous attention to cardiorespiratory and thermoregulatory monitoring throughout, and is achieved by having an experienced team lead, clear communication and a shared mental model of the DRC process. A pre-cuddle briefing should identify an infant's eligibility/stability for a DRC and empower the team to abandon or curtail the process in case of physiological instability. Roles should be assigned for safeguarding the airway, and moving/handling of infant and equipment. Clear inter-specialty communication is imperative. Anaesthetic/maternity teams will enable a

clear path between infant and mother, but must first also confirm that there is no maternal contraindication or pending intervention which should delay or prohibit the DRC.

## 4.3 | Practising the DRC

The process for achieving a safe DRC is outlined in Figure 3. Exact procedure will vary depending on available equipment, but no additional equipment is required beyond that commonly used for standard delivery room and NICU care (Figure 4).

The DRC takes place after initial on-resuscitaire stabilisation, including surfactant administration if indicated.<sup>18</sup> The baby will remain ventilated as appropriate, in accordance with local protocols, either by non-invasive support (eg nasal continuous positive airways pressure (CPAP) or high flow) or via endotracheal tube with secured airway. If lacking facility to provide definitive non-invasive respiratory support during the DRC, CPAP may alternatively be delivered manually using facemask and T-Piece with adjustable positive end-expiratory pressure

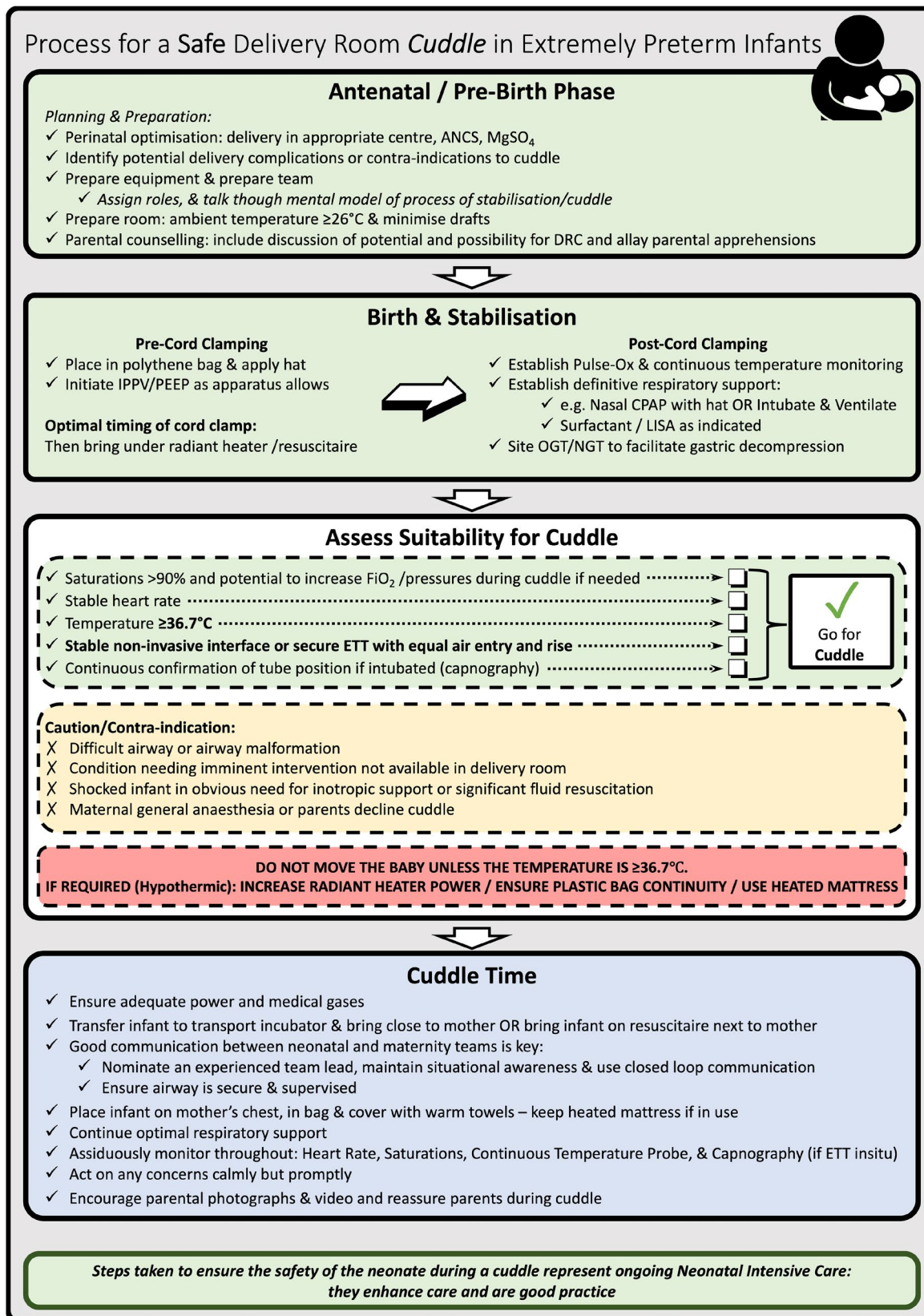
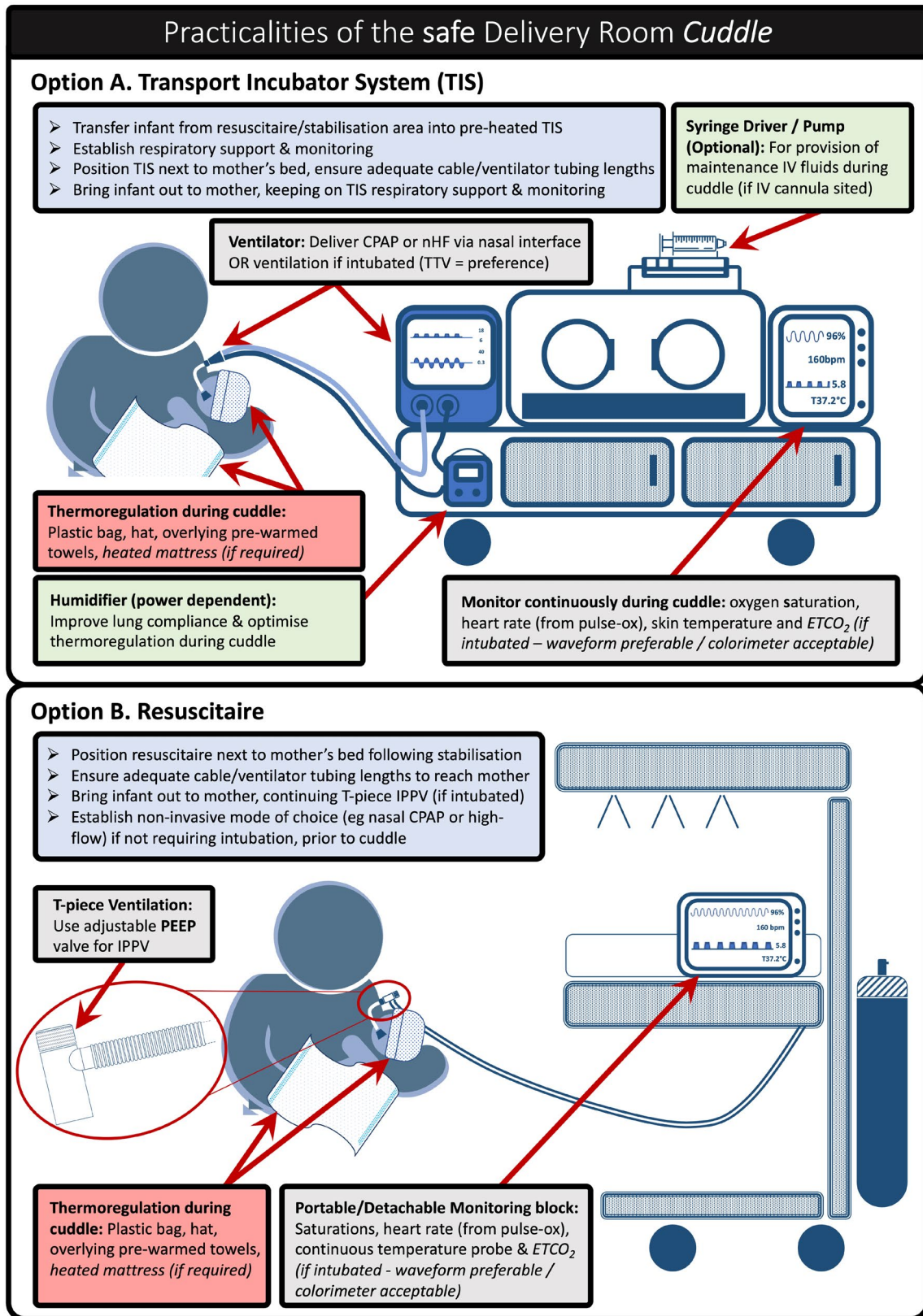


FIGURE 3 Process for a safe Delivery Room Cuddle in extremely preterm infants. ANCS, Antenatal Corticosteroids; CPAP, Continuous Positive Airway Pressure; ETT, Endotracheal Tube; FiO<sub>2</sub>, Fraction of Inspired Oxygen; IPPV, Intermittent Positive Pressure Ventilation; LISA, Less Invasive Surfactant Administration; MgSO<sub>4</sub>, Magnesium Sulphate; OGT/NGT, Oro-Naso-Gastric Tube; PEEP, Positive End-Expiratory Pressure; Pulse-Ox, Pulse-Oximeter Saturations & Heart Rate



**FIGURE 4** Practicalities of the safe Delivery Room *Cuddle*. **Option A** demonstrates a more sophisticated model, through use of a Transport Incubator System. Benefits of option A include the potential use of easily transportable syringe-driver /IV pump, humidified gases and ventilator systems that may support Targeted Tidal Volume ventilation and non-invasive modes of ventilation. **Option B** describes use of a T-piece, standard resuscitaire and a portable/detachable monitoring block. For comparison purposes, infant shown is intubated in both options. IV: Intravenous, CPAP: Continuous Positive Airway Pressure; nHF: nasal high flow; TTV: Targeted Tidal Volume,  $ETCO_2$ : End-tidal Carbon Dioxide, IPPV: Intermittent Positive Pressure Ventilation, PEEP: Positive End-Expiratory Pressure



*"I never got to hold Leo until it was time to say goodbye, so hearing about the delivery room cuddle really struck a chord with me.*

*"I think that first cuddle is such an important and fundamental thing which is 'expected' when you have a baby and so when they're born preterm it is often something parents feel robbed of. I was very affected by that with Leo and again with his twin brother Oska (who did survive and was born 4 days later).*

*"I felt a lot of guilt and very angry at seeing those photos in delivery rooms of happy mums with their baby on their chest. When I heard about this I thought 'FINALLY'!! This could make a huge difference to parents, and baby and to the mental health of parents. Being able to reduce that feeling of guilt and grieving over what they've not had with their pregnancy and delivery is going to make a phenomenal difference."*

**Lottie, mother of 25-week twin boys and founder of the mental health charity Leo's**  
(<http://www.leosneonatal.org>)

**FIGURE 5** Unsolicited comments received from one bereaved mother who was not given the opportunity to cuddle her sons in the delivery room

valve.<sup>15</sup> This method, however, requires a skilled practitioner to assure adequate airway positioning. If available, heated-humidified gases may help maintain normothermia and enhance lung compliance.<sup>19,20</sup> Respiratory stability and normothermia should be confirmed prior to moving baby from resuscitaire to maternal chest.

Monitoring during DRC should be continuous and include oxygen saturations, heart rate, capnography (if intubated) and temperature. We routinely site an axillary skin temperature probe shortly after birth. The cuddle lasts for 5–10 minutes in our current practice.

#### 4.4 | Communication with parents before and during DRC

Naturally, parents may feel scared and anxious immediately following birth. It is imperative they are emotionally supported and involved in the decision to have a DRC. If not already discussed antepartum, an experienced member of the neonatal team should update parents on baby's condition, describe the DRC process and offer the one-off DRC opportunity.

In our practice, we specifically seek to reassure and encourage parents that their baby:

- is stabilised, receiving optimum care and ready to receive their cuddle
- will receive all medical support needed and be continuously monitored during the cuddle
- will be comfortable and safe, as we will be present with them throughout
- may derive benefit from this early physical contact

#### 4.5 | Which babies?

The DRC can be facilitated for most extremely preterm babies. We do not impose any lower gestational age cut off and have successfully

practised the DRC for the benefit of both mothers and babies even at 22–23 weeks' gestation<sup>4</sup> (Table 1; Figure 2; Appendices S3 and S4). In some situations, the DRC is impossible, unfeasible or inappropriate, for example acutely unwell mothers requiring medical stabilisation post-delivery, or Caesarean delivery under maternal general anaesthesia. Fathers should not be overlooked in such circumstances and welcome the chance to hold their babies. The DRC will be contraindicated in babies requiring urgent ongoing stabilisation (eg prolonged respiratory or cardiovascular instability) or interventions which cannot be supported within the delivery room during a cuddle, and with certain congenital malformations.

#### 4.6 | Introducing the practice

It is essential to have the whole team on board. A written unit guideline helps<sup>15</sup>; regular simulation training sessions will increase team confidence, awareness and consistency<sup>21</sup>; medical, nursing and midwifery champions can help troubleshoot and enthuse. While we routinely support DRC periods of up to 10 minutes, practising for shorter durations may initially feel more comfortable until confidence and experience is gained. Even a brief DRC is preferable to no contact. Prospective audit of DRC practice, including NICU admission time, temperature, blood glucose and parental feedback is recommended. Changes we have implemented include improved communication with parents before and during DRCs, and protocolised continuous skin temperature monitoring to assure admission normothermia. Routine early continuous temperature assessment has reduced rates of admission hypothermia in our centre compared with these historical cases.<sup>22</sup>

#### 4.7 | Practising DRC in the novel 2019 coronavirus pandemic

Evidence to date suggests that the risk of perinatal transmission of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) is

low.<sup>23-27</sup> For asymptomatic parents and/or those confirmed SARS-CoV-2 PCR negative, continued facilitation of the DRC should be safe, with adherence to appropriate personal protective equipment and local infection control guidelines.<sup>26,28</sup> For parents symptomatic or confirmed as SARS-CoV-2 positive, it would seem prudent to avoid routine early skin-to-skin contact until more is known about the risks of SARS-CoV-2 transmission to extremely preterm infants.

#### 4.8 | Strengths and limitations

This is the first paper to describe the concept, rationale and practice of the DRC for extremely preterm infants (<27<sup>+0</sup> weeks' gestation) needing invasive or non-invasive respiratory support, a sub-group not yet described within the current literature. We provide preliminary safety data and parental feedback from service evaluation of our routine practice, supporting the DRC in this population. In our practice, the DRC did not delay NICU admission, nor lead to any difference in admission temperatures.

Limitations relate to the retrospective nature of our data from a relatively small cohort. While 12% of inborn infants had a DRC recorded in their birth history, other infants may have received a DRC and been excluded inadvertently due to lacking documentation. Additionally, the risk of selection bias with more stable infants receiving the DRC cannot be excluded. We are unable to report duration of the DRC, heart rate/oxygen saturation trends, admission blood glucose and pH as these items were often unrecorded in the historical records. Long-term outcomes have not been assessed.

Our survey excluded bereaved parents. Nevertheless, our personal experience is that bereaved parents particularly cherish DRC memories.<sup>4</sup> One bereaved mother expressed deep regret she was never given the opportunity to cuddle her extremely preterm twins following birth elsewhere (Lottie King, personal communication via Twitter, 9<sup>th</sup> July 2018) (Figure 5).

#### 4.9 | Conclusions and future

Parents appreciate the DRC and would like it to be offered routinely. Effective communication and assiduous monitoring are vital throughout. Over the next few years, further evidence regarding the safety and benefits of the DRC will emerge from prospective studies presently underway in centres that have already adopted the practice as routine, and from currently recruiting trials.<sup>29,30</sup> With the inexorable move towards increased FCC, we predict that an early facilitated cuddle between mothers and their extremely preterm babies will in time become standard care for most babies before NICU admission and, furthermore, will become expected by parents.

For the future, we believe that the recent pioneering studies in very preterm infants<sup>16,29,30</sup> pave the way for trials that must include extremely preterm infants. We speculate that eventually their first

hour(s) of intensive care will be spent at the maternal bosom, their natural incubator.

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#### CONFLICT OF INTEREST

EA and SA have direct experience of the delivery room cuddle as mothers of extremely preterm-born babies. There are no competing interests and no conflict of interests to declare in relation to this work.

#### ETHICS APPROVAL

This study was reviewed by the Research Services Manager of the Norfolk and Norwich University Hospitals NHS Foundation Trust. It was judged that the study met the definition of a service evaluation/audit and did not require formal ethical approval or NHS permissions.

#### CONSENT TO PARTICIPATE

Not applicable.

#### CONSENT FOR PUBLICATION

Written parental consents were provided for publication of the photograph and video clip (Appendices S3 and S4).

#### PRIOR PRESENTATION

Data from this study were previously presented in abstract form at the REASON Neonatal Meeting, Warwick, UK, July 2018, 7th Congress of the European Academy of Paediatric Societies (EAPS), Paris, November 2018, and at the 3rd jENS Congress of joint European Neonatal Societies (jENS), Maastricht, September 2019.

#### DATA AVAILABILITY STATEMENT

Anonymised data collected for the safety review are available from the following online repository: <http://dx.doi.org/10.17632/mc39c53xp2.1> The parental questionnaire pro-forma is provided in Appendix S1.

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## SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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