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CRITICAL ANALYSES OF THE IMPLICATIONS OF KANGAROO MOTHER CARE ON A PRETERM INFANT

Abstract

This case study will critically analyse the implications of Kangaroo Mother Care on a preterm infant and her family. Although Kangaroo Mother Care is recognised globally as an integral part of essential newborn care, there is currently a lack of standard clinical policy and guidelines recommending Kangaroo Mother Care as best practice within NHS UK wide. Whilst Kangaroo Mother Care can be easily implemented, there is potential for it to be overlooked in practice during an emergency situation. The aim of this article is to present a case study that describes the experiences of a women post caesarean section and discusses the issues and questions that have been considered following no early skin to skin execution. In addition to exploring the current evidence based practice for providing kangaroo mother care, this article will focus on the impact of separation between mother and infant, as well as overcoming the barriers to using Kangaroo Mother Care in a neonatal setting.

Keywords

Kangaroo mother care, preterm, emergency caesarean section, skin to skin, breastfeeding.

Introduction

Early physical contact refers to skin to skin contact or holding between a newborn and their mother soon after birth, and is deemed common practice among healthy full term infants. However, for many small, preterm infants who would benefit most from early skin to skin or Kangaroo Mother Care (KMC), only a very small proportion actually receive it. Examining the available evidence and literature, an analysis of the nurse's role in promoting KMC for a preterm infant receiving special care will be explored.

Research suggests that early skin to skin contact is an effective way to meet baby's needs for warmth, breastfeeding, parental contact, stimulation and love. KMC is now considered a fundamental component of developmentally appropriate therapy for hospitalised preterm infants. In accordance with the Nursing and Midwifery Council (2015) regarding confidentiality, informed consent was gained and all names have been removed.

Case Presentation

A 6 week old infant born at 32 weeks gestational age to a 30 year old prima gravida women presents to the primary health care team following discharge from a neonatal unit. The nursing notes revealed the infant was delivered by emergency caesarean section within an hour of arriving at the hospital and weighed 1.640g (3lb, 6oz) at birth. The infant required immediate resuscitation and was instantly transferred to the neonatal intensive care unit (NICU) with respiratory distress syndrome. The mother initiated breastfeeding after five days of separation; however, due to difficulties

encountered with attaching the infant to the breast, the infant was fed with an artificial formula. The infant was discharged home with instructions to administer prescribed medications and to continue feeding every two to three hours. An appointment with the health visitor was scheduled.

Newborn and Medical History

The infant was floppy and pale at birth, requiring immediate bag and mask ventilation at delivery and again after 2 minutes. The infant was intubated at 8 minutes by an anaesthetist. The infants heart rate remained above 100 throughout resuscitation and saturations 80-90 percent on 40 percent oxygen. The infant remained ventilated for one day and required continuous positive airway pressure (CPAP) for a further two days. Ultrasound found clusters of choriod plexus cysts on both the right and the left side of the brain. The infant also had difficulty maintaining body temperature at times, and had one episode of neonatal hypothermia and was transferred back into special care into a hot cot for one day. In total thirty eight days was spent on the neonatal unit.

Pertinent Maternal and Family History

The mother began her prenatal care during the first trimester, with no complications. Nursing notes revealed the mother had a condition known as pre-eclampsia, and a suspected diagnosis of post traumatic stress syndrome and is currently waiting to be seen by professionals. The remainder of the maternal and family history was non-contributory.

Developmental History

The infant seeks interaction with both parents by using sounds and facial expressions. Signalling needs by crying and using good visual response to track the mothers movements. Responding positively when held and comforted, and shows good head movement to allow the mouth to reach towards a touch. Both hands are tightly fisted when awake.

Personal History

The infant lives at home with both parents, the mother is the main carer. It was evidently clear the maternal interaction observed between mother and infant would indicate early signs of insecure attachment. The mother questions the overall care received both during the delivery and on the neonatal unit. She believes herself to be a "failure" as she wasn't able to provide her infant with the basic biological needs of warmth, nutrition and protection from the very beginning. She believes this was because she was separated from her infant straight after the delivery with no early skin to skin contact.

Review of systems

The mother reports that she is no longer breastfeeding and the infant is on artificial formula. The infant continues to gain weight and is currently on the 0.4th centile on the growth chart. (De Onis 2015)

CASE STUDY QUESTIONS

1. What is the current best evidence for implementing kangaroo care on a preterm infant?
2. What are the implications of mother/infant separation immediately after birth?
3. What makes skin to skin contact the basis of breastfeeding?
4. What are the methods to overcome the challenges faced with implementing kangaroo care and making it more successful for the nurse, the infant and the parents?

CASE STUDY ANSWERS

1. What is the current best evidence for implementing kangaroo mother care on a preterm infant?

Kangaroo Mother Care (KMC), in a broad view, is a form of care that involves continuously holding a preterm baby skin to skin. (Cruz 2015) To help further understand why KMC has such profound effects on the baby, WHO (World Health Organisation) has defined it as a total care strategy with three components; skin to skin contact, exclusive breastfeeding, and support to the mother and infant (WHO 2003).

Although this case study focuses primarily on the implications of KMC on a preterm infant, it is important to recognise that this prolonged early skin to skin is favourable for all infants. All of the fundamental requirements that a premature baby needs, apply to full term babies as well. There is now unprecedented opportunities for improving newborn health following decades of research that have not only generated solid evidence on the causes of infant mortality, but also ways to accelerate progress and scale up interventions to save lives. KMC is recognised as one intervention that can provide all infants with the basic requirements necessary for rest, growth, and natural healing and; therefore, must be at the forefront of efforts in order to save lives and improve health outcomes (UNICEF 2014).

Recent estimates outlined by Liu et al. (2015) suggests that birth weight is a significant determinant of newborn survival, and states low birth weight (LBW) as an underlying factor in more than 60% of neonatal deaths. Furthermore, prematurity is the largest direct cause of neonatal mortality, accounting for an

estimated 29% of the 3.6 million neonatal deaths every year (Lawn et al. 2010). Bergman (2015), believes that 25% of these babies could survive if KMC was initiated as soon after birth as possible. The theory of his research being that LBW infants lack the ability to control body temperature; therefore, when they are put skin to skin they are measurably warmer by half a degree, they have a higher blood sugar, they are breathing better and above all they are awake and alive (Bergman 2015).

This concept is not new. KMC originated in Bogata, Columbia; a city with limited access to medical facilities and resources. In the neo natal intensive care units (NICU) there was a shortage of incubators for babies with severe hospital acquired infection, and consequently 80% of all preterm infants born, were failing to thrive (Hall & Kirsten 2008). Dr Rey and Dr Martinez introduced a method to alleviate the shortage of caregivers and lack of resources, after they witnessed an infant being held tightly under layers of clothing, tucked close into the chest and commented "it was like a kangaroo carrying her joey in the pouch". They were shocked to find that when mothers became the incubator, and secured their infants firmly to their chests for prolonged periods, these infants not only survived but thrived. (Chiu et al. 2009)

Equally, it could be suggested from the research, that although survival of these (LBW) infants in Bogota was similar between "Kangaroo Mother Intervention" and "traditional care", questions remain about quality of life; especially regarding issues around weight gain and neurodevelopment (Charpak et al. 2005).

Ruiz-Pelaez, et al. (2004) conducted a trial to assess the long term clinical effects of KMC on LBW infants in Bogata. An open, randomised control trial of KMC on

seven hundred and forty six LBW infants was carried out, and results showed that at one year corrected age, KMC had reduced severe illness, infection and improved successful breastfeeding rates in 93% of children. Results also highlighted a marked improvement in mother-baby bonding, as well as improved outcomes with neurodevelopment evaluations. Given these results; it could be assumed that KMC is at least as good as traditional care with incubators.

However, although this trial demonstrated that the risk for death was lower after stabilisation; there was no significant disparity in survival between KMC and traditional care. The results also found no major differences in physical growth patterns. On balance, whilst research has clarified some of the rational bases of KMC, and provided evidence for its effectiveness and safety; it does not necessarily improve survival. The hypothesis that KMC may improve survival when applied before stabilisation would need to be further explored to evidently define the efficacy of the intervention, not only in different settings but also for different therapeutic goals (Charpak et al. 2005).

In a 2010 published meta-analysis of three randomised controlled trials from 15 developing countries (Lawn et al. 2010), researchers found that when initiated within one week of birth, KMC did in fact, substantially reduced neonatal mortality by 51% compared with incubator care. It should be noted however, that these studies all took place in well equipped hospitals, yet arguably the most notable impact of KMC would be felt in settings with limited resources. Given, that many LBW infants are born in health facilities where incubator care is inaccessible, or are cared for by ineffective and dangerous thermal pieces of equipment in developing countries, there is clear evidence that KMC does offer a safe substitute. It could also be argued, that if KMC could be implemented

immediately after birth, a significant proportion of LBW infants born in these circumstances could be saved and would consequently improve the practice of neonatology (MCHIP 2012).

According to Bick (2012), addressing preterm birth is now an urgent priority for reaching Millennium Development Goal 4, calling for the reduction of child deaths by two-thirds in 2015. 'Born too soon: the global action report on preterm birth' proposes actions for policies that if acted upon will substantially reduce the incidence of preterm birth (Howson et al. 2013). More than 15 million babies across the world are born to soon, predisposing them to a greater risk due to loss of body heat, breathing difficulties, infection and lack of nutrition. Therefore, implementing priority evidence based interventions, including carrying the baby skin to skin, could save an estimated 450,000 babies each year (Blencowe et al. 2013).

Dr Nils Bergman a leading world authority in SSC, maintains that when a preterm baby is placed on its mothers chest it will not get cold; consequently, able to conserve energy not expend it on trying to thermo regulate. As a result the lungs will function better (Bergman 2014). In a powerful case report published by Ludington-Hoe et al.(2006), a mother's skin was able to respond to two babies different thermal needs at the same time, suggesting twins can also be simultaneously held in KMC without physiologic compromise.

The Cochrane review in 2011 on KMC finds strong evidence that a baby in SSC will feel safe with the mothers familiar heart beat and because of this will not be stressed, thus, stabilising the heart rate and blood pressure. Also, whilst on the mother's chest the baby stimulates the production of breast milk. This milk is vital

for providing premature infants with the exact food needed to grow the brain (Conde-Agudelo, et al. 2011). Another Cochrane review on SSC, finds sixty four different outcomes, all of which favour SSC, of which 72% do so with statistical significance (Moore et al. 2007). Although, this particular study did not look for mortality (as healthy newborns should not be expected to die) it does however show significant benefits for SSC; such as improved weight gain, lower respiratory tract disease and length of hospital stay. Furthermore, the review concluded that there was now enough evidence to advocate the use of KMC in infants who were stabilised.

The infant referred to within this case study required instant resuscitation and ventilation. This was administered whilst separated from the mother, and then placed in an incubator without getting any vital SSC for five days. According to Liu et al. (2015) rapid decision making at birth is key for neonatal survival and can only be successful if specific interventions such as neonatal resuscitation and technology are put into practice straight away.

Conversely; however, Bergman (2014) argues that the behaviour of the infant is determined by the environment, and the correct environment should be the mother's body. He believes that KMC should be executed immediately after birth, increasing more complexity whilst the infant remains in skin to skin. He further states that infants who are mechanically ventilated appear to respond to KMC particularly well with improved oxygen saturations and a more regular heart rhythm.

In light of the above discussion, it would have to be questioned whether implementing KMC would have even been considered by the medical staff in this

case study. Both the mother and father, were in a situation where they were unable to make any decisions, and given that the primary concern was the survival of the infant; it would appear that it was not feasible for the medical staff to implement KMC before resuscitation; even though they could have been aware of its essential value. This evidence would; therefore, suggest a review of current practice is required to adopting KMC in an emergency situation.

In context it is not just survival of the preterm infant, but also the quality of that survival in terms of brain growth, emotional connectedness, bonding and attachment (Belizan et al. 2013). A recent study conducted by Feldman et al. (2014) found that when maternal infant skin to skin was given to 73 preterm infants for 14 consecutive days compared with 73 infants receiving standard incubator care, by 10 years of age children receiving KMC showed attenuated stress response, improved respiratory sinus arrhythmia, organised sleep and better cognitive control. He concludes that these findings are the first to demonstrate long term effects of early touch based interventions and results show the dynamic cascades of child physiological regulation and parental provisions in shaping developmental outcome which may have salient implications for the future care practices of preterm infants.

2. What are the implications of mother/infant separation immediately after birth?

When a newborn is admitted to a NICU, there is immediate separation between mother and infant. More often than not, the vital functions of the infant will often overturn the physical contact with the mother until much later on (Moore 2015). The necessary separation often continues throughout the infants hospital stay, and can have adverse negative and psychological effects on both the infant and the mother. Bergman (2014) strongly believes that zero separation should be upheld at all costs. He states for the infant, zero separation is based on the need for a safe place and this place is deemed to be the mother. It may seem contentious to suggest that a mother is a "place", but to the newborn brain she is that safe place, and consequently becomes that safe person (Bergman 2014).

Recent neuroscience shows that the parents presence is vital for the quality of brain development. Researchers appear to have gained significant insight into what happens to an infants brain during KMC (Bergman 2011). Until recently, it was presumed that the newborn brain was very undeveloped at birth, and that maturation was first and foremost a genetically guided procedure and therefore, somewhat resistant to the early care given at birth (Kaffashi et al. 2013).

What science has shown, is that the newborn brain is completely wired and able for early extra-uterine life (Zeedyk 2012). When a preterm infant is put very tightly into skin to skin contact, much like in the uterus almost, that containment is in deep pressure touch and goes directly to the emotional processing unit of the brain so reassuring the amygdala that they are safe (Higham 2010).

High levels of noradrenalin following a birth wakes up the brain and activates the lungs and, more crucially, ensures early bonding with the mother (Ross & Young 2009). According to Zeedyk (2012) when an infant is in KMC, it is the mother's smell, warmth and uninterrupted physical presence that signals a pathway from the baby's armygdala to its frontal lobe, connecting the newborn's emotional and social brain circuits. Ross & Young (2009) believes that whilst genes have made this possible, it is zero separation that make it happen.

The general perception of a newborn is that it is put into a cot where it is expected to either cry or sleep, and swaddling could help to stop the crying. It may however be considered a good thing to cry since it helps to expand the lungs with air (Riem et al. 2011). Arguably, Hofer (2005) does not support this view. His theory is that the physiology of the baby is controlled by its mother's body sensations, and that each maternal sensation has a specific effect on the circuits of the brain. This will subsequently make connections to the body and its organs. In other words, the mother provides what is known as regulation, and it is this prolonged maternal regulation that results in healthy physiology set points. Providing the ideal setting for the newborn to be able to sustain all obtainable energy for growth.

Hofer (2005) believes it is the absence of these maternal sensory regulators that cause infants to cry. Shonkoff & Jack (2012) contends that a baby separated from its mother is highly stressed, and physiologically unstable. The infant feels insecure, the brain transmits "danger" signals to the body, increasing the stress hormone cortisol, consequently increasing the heart rate and breathing, in what is known as a basic fight or flight reaction. This will continue to affect the infant until returned to its mother.

Furthermore, when the body is being regulated by cortisol, less efficient homeostatic set points are being programmed in the physiology of the infant. It is believed these inefficient set points could remain for life (Cong et al. 2015). Stettler et al. (2005) recognises that rapid infancy weight gain during the first 12 months of life could be a risk factor for obesity in adulthood, and considers this as generally the most well established effect of this re-programming. Furthermore Coe et al (2008) believes that it is long term conditions such as hypertension, high cholesterol and diabetes which could also become likely health outcomes because of these homeostatic changes. It must be stressed however, that not every infant will experience such detrimental change. Most full term infants will have some inbuilt resilience to overcome this. Preterm babies on the other hand have less resilience, and as a result will have a higher risk for developing such adaptive changes (Shonkoff & Jack 2012).

Currently in most hospital settings, maternal separation has become fairly routine practice after birth (Flacking 2012). However, the physiological impact of this is unknown. Given that stress-response is orchestrated by the autonomic nervous system, coupled with heart rate variability being influenced by arousal. Measuring sleeping patterns could be one way of accurately assessing both the physiological, and the negative physical health disparities of both mother and infant (Bergman 2014).

A study carried out by Morgan et al. (2011) highlights the impact of separation on newborns whereby infants who were cot sleeping were shown to have three times higher autonomic nervous system (ANS) activation compared with babies sleeping skin to skin contact. What was more alarming however was that quiet sleep was reduced by almost 86% in these separated babies with almost no sleep

cycling recorded. Morgan et al. (2011) believes this could possibly be the first paper published that provides any kind of research evidence on the effects of separation on the brain of a newborn. Infants that were sleeping apart from their mothers were shown to be in a state of "anxious arousal"; in others words they were stressed. What is also known, is brain development requires one hourly sleep cycles; these separated babies were not sleep cycling they were in an environment of fragmented sleep and devoid of this entirely. Hence, this paper identifies two separate pathways in which early separation could impact on the development of a newborn (Morgan et al 2011).

Skin to skin contact is the essential requirement for maternal - infant togetherness (Caruana 2008). Bramson et al. (2010) wholly advocates the concept that skin to skin makes the infants brain feel safe, encourages the infant to start breastfeeding and ensures sleep cycling between meals. Bergman (2014) describes this early biological regulation as the neural substrate of "bonding", which over time will lead to secure attachment. However he further states that breastfeeding is the ongoing engine that makes certain the continued sensory and socio-emotional exchanges that reinforce this secure attachment

A recent meta-analysis was undertaken to explore mother-infant attachment and relationships within the preterm and full term populations (Korja et al 2012). Even though the results show a more negative interaction behaviour with the mothers of preterm infants during the first six months. Five of the eighteen studies highlight a much higher quality mother-infant bonding at one year corrected age compared to the group of full term infants. This would indicate that mothers of preterm infants are therefore not at higher risk of insecure attachment (Korja et al 2012).

It could be suggested this is because mothers of preterm infants are known to be more overprotective and actively engage with their infants; perhaps compensating for guilt for not having been the caregiver they wanted to be during the first few months of life (Forcada-Guex et al. 2006). What these findings do emphasise nevertheless, is that the mother-preterm relationship is extremely complex and close physical contact is vital for the formation of secure and healthy relationships (Korja et al 2012).

3. What makes skin to skin contact the basis for breastfeeding?

Infants are born with the ability to breastfeed, but this ability depends on the right sensations (Bergman 2014). The earlier and more frequently the breasts and nipples are stimulated through touch and suckling, the more milk producing cells will be activated (Rapley & Murkett 2012). These are behaviours however that the newborn must do of its own accord in order to avoid any disruption to bonding and feeding capacity. Hence, uninterrupted skin to skin contact after birth is essential for this process to happen (Phillips 2013).

UNICEF advocates that all babies should have access to skin to skin as soon after the birth as possible as this is the time when a newborn is most likely to follow her natural instincts to breastfeed (UNICEF 2010). Once breastfeeding is initiated, skin to skin contact remains the needed stimulus for the normal behavioural programme of the newborn. From the onset this program consists of two major parts; eating and sleeping. When the infant wakes on mother's chest, the breasts are near and very little work is required to get to them and feed (Heidarzadeh et al. 2013). Caruna (2008) believes that once the infant has fed it will go to sleep and it is only when the infant is on the mother's body will this sleep be the right quality for brain wiring.

A study carried out by Bramson et al. (2010) observed that newborn infants who were given immediate skin to skin following birth were able to take care of themselves. These findings appear to be in accordance with those of Phillips (2013) who demonstrated that healthy newborns without any prompting and

without assistance, can, if placed skin to skin with the mother, crawl up to the breast, find the nipple, latch on and start to breastfeed.

Both these studies were carried out on healthy infants following normal vaginal births. It is important therefore to determine whether that maternal infant feeding relationship is the same following a caesarean section. Perez-Rios et al. (2008) believes too much emphasis is placed on the mothers recovery, rather than on their babies nutritional needs, and only recently have studies approached the topic of breastfeeding after caesarean section from a maternal perspective.

The literature from a study carried out by Tully & Ball (2014) would indicate that breastfeeding does in fact entail a maternal balance between self and infant care following a caesarean section. When delivery takes place by caesarean section the mother becomes a surgical patient with all the inherent risks and problems. The mothers within this study reported difficulties in accessing their infants, and reported confusion over infant physiological functioning and feeding cues. This could be because of confinement to bed, analgesia and anxiety and stress. Therefore a more structured antenatal and postnatal discussion of breastfeeding following caesarean section birth is needed. It would be hoped that as more hospitals become Baby Friendly accredited, mothers will benefit beyond this standard of care by receiving anticipatory guidance and tailored support for the breastfeeding obstacles common to their circumstances (Nyqvist et al. 2013).

The World Health Organisation recommend that mothers and newborns have skin to skin as soon as the mother is alert and responsive after a caesarean section (Stevens et al. 2014). A recent review was carried out to evaluate the evidence on the facilitation of skin to skin contact within one hour following delivery after a

caesarean section. A total of seven papers met the criteria and although evidence was limited, it did suggest that immediate contact not only increased breastfeeding initiation but also increased maternal and bonding satisfaction (Stevens et al. 2014).

It is well documented that early skin to skin contact is also known to promote and enhance breastfeeding in preterm infants (Ludington-Hoe 2008). A premature baby will need help to breastfeed and many premature babies will be stable in skin to skin contact after 90 minutes (Bergman 2015). One randomized trial showed that 98% of preterm infants who received KMC for 13.5 hours in a day were exclusively breastfeeding at 40 weeks post delivery compared to 76% of the infants who did not receive KMC (Ludington-Hoe 2008). Thus, the evidence supporting early skin to skin contact is so convincing, that recommendations to initiate KMC as soon as possible after birth have been made by the American Academy of Paediatrics (Bartick & Reinhold 2010).

What is evident from the research is that SSC is a vital intervention to help mothers successfully breastfeed (Ludington-Hoe 2008). Moreover, sustained periods of mother-infant SSC is considered an effective way to empower mothers to become familiar with their infants and reinforce their mothering at their own pace and is an easy way of enhancing maternal breastfeeding self-efficacy (Flacking et al. 2012).

4 *What are the methods to overcome the challenges faced with implementing kangaroo mother care in the neonatal unit, and making it more successful for the nurse, the infant and the parents?*

The last thing most mothers anticipate is the possibility of a pre term birth. Premature or pre term births often occur with very little warning. There are many causes, but all have the same result. These tiny fragile babies all need specialist care in a highly technical environment in order to survive and grow to reach the weight and maturity they would have had as full term babies (Lawn et al. 2013).

Whilst the evidence shows that KMC has a clear and major impact on prevention of neonatal death, questions still remain around how to execute the theory or practice? If mother nature is already providing the perfect method to tackle all these needs and more, why, is country-level adoption and implementation so limited? (Blencowe et al. 2013). To inform this process, it is crucial to have a solid understanding of the current situation of LBW/preterm infants in this country. Regardless of its potential to save thousands of babies every year, global implementation of quality KMC has not kept pace with the robust, long standing evidence since it was first recognised as an effective practice more than 35 years ago (WHO 2012).

Lawn et al. (2010) believes these constraints may be due to lack of information about effectiveness, a reluctance to change current practice, or perhaps even a lack of trust in mothers in providing KMC. It is imperative therefore that KMC is not seen as "poor country only solution" and more decisive work around these

constraints, as well as analysis of costs and potential cost savings on nursing time and length of inpatient stay need to be further explored (Engmann et al. 2013).

In 2011, the Picker Institute published a survey of over 9000 parents experiences during their stay on a neonatal unit and surprisingly only 50% of parents said that they were given the opportunity to carry out KMC (Howell & Graham 2011). This could be because many health care professionals are unaware of its positive effects, and their care reflects this lack of knowledge. What it highlights is a need to institute clear protocols and standard guidelines and to ensure all health care practitioners within a NICU setting are sufficiently educated to support KMC (Stikes & Barbier 2013). Whilst certain countries have yet to endorse KMC as national policy; in countries where there is national policy the evidence is compelling; there are still too many preterm infants being denied quality KMC (Moore 2012)

The recently published *Every Newborn Action Plan*, co-ordinated by UNICEF and the World Health Organisation, highlights KMC along with breastfeeding as one of the top methods of helping to reduce the global death toll of babies born prematurely (WHO 2012). Arguably, Great Britain still has a long way to go to meet the gold standard of kangaroo care in action at a neonatal unit in Uppsala, Sweden. This unit provides opportunities for parents to Kangaroo Care their infants 24 hours a day, 7 days a week. The philosophy of not separating parents and infants by providing specially designed clothing is one way they allow babies to continue to receive treatment, whilst being held in the comfort and safety of their parents chests (Cruz 2015).

Despite the numerous and proven benefits to KC, uptake remains slow but improving. In the National Evaluation of March of Dimes NICU Family Support published in the Journal of Perinatology in 2007, 67% of staff respondents rates KMC as highly effective in reducing parental stress. 73% as highly effective in providing comfort to parents and 80% as highly effective in facilitating parent/infant bonding. Surprisingly, however only 8% of staff stated that KMC was routinely performed in their units, despite the fact that the majority of parent respondents in the study said that "KMC or holding the baby was, the, singularly most comforting activity they could be offered in the NICU" (Cooper 2007).

Although this study was carried out in the USA, there is still an argument to suggest that in the UK, while staff attitudes to KMC practice is strongly supported in NICU's, there still remains a number of barriers which continue to stand in the way of its advancement (Valizadeh et al. 2013). To better understand these barriers, health professionals must be aware of how to overcome common obstacles to implementing KMC, as well as implementing strategies that enable parents the opportunities to practice positive touch with their preterm infant (Higman & Shaw 2008).

With the exception of some KMC interventions, very few trials incorporate strategies that relate to mother-infant interactions while the infant is in the NICU (Hane et.al 2015). Family centred care is a guiding principle in the UNICEF Baby-Friendly Hospital Initiative that aims to incorporate a family nurture intervention that focuses on supporting mothers to engage in certain mother-infant interactions as soon after birth as possible (Cockcroft 2012). The rationale underlying many features of this intervention is also supported by Higman (2015) who advocates that supporting and educating parents the practice of positive touch interaction;

including handling, massage and practices of KMC. Neonatal staff can facilitate parental involvement, augment the bonding process and lessen parental and infant distress.

The neonatal intensive care unit (NICU) has changed over the decades in terms of how an infants development has been protected and promoted. It is fundamental that neonatal staff are aware of how to overcome the environmental challenges within the NICU, and ways to ensure a mutual calm environment. Health professionals must be more mindful of the effects of both the macro and micro environments, for example; optimising the spatial configuration of the area; providing comfortable recliners, dimming the lights, minimising noise, allowing privacy and developing a nurturing unit culture by facilitating parents to have more time and proximity with their infants. (Hane et al. 2015) Based on the literature, implementation of the family nurture environment will provide a basis for helping mothers to learn and integrate into their behavioural repertoire a means to initiate interactions by responding to their infants in a way that maximizes a state of calm (Welch et al. 2012).

CONCLUSION

KMC has been demonstrated to have immeasurable benefits for both the infant and the parents, and there is strong evidence to support KMC being initiated with all preterm infants; however, there are identifiable barriers preventing this skin to skin contact and some health professionals do not exhibit an awareness of KMC research, or hold positive beliefs towards its use with sick or premature infants (Penn 2015).

When a baby is born prematurely, the health professional is required to be an advocate for both mother and baby (Neu and Robinson 2010). However, professionals must be aware of the importance of this advocacy role in order to empower KMC practice. It is only once this has been identified, then willingness to change and participate will happen.

It has been proven however, that optimal KMC implementation rates cannot be met without a standard policy. Therefore, not only should standard policy be better instituted so that the care can be more consistent, but a multi disciplinary approach to education is also needed so that the implementation of KMC can be augmented into everyday practice (NHS & DOH 2009). KMC is a scientifically sound, low cost and a high impact developmental intervention for both baby and mother. By raising the profile of the practices through formal training, will create a culture in NICU's that deem it a safe practice to deliver, which will lead to an overall increase in KMC participation, ultimately benefiting both mother and baby (Moore 2015).

There is no doubt about the benefits of KMC, however in view of the above discussion, there is still a question which needs to be asked; could anything have been done differently with this infant and her family? It is clear from the evidence, that even in such extreme circumstances, the implementation of KMC may have been plausible at some stage post delivery. Therefore, it could be suggested that a review of adopting KMC in an emergency situation is required.

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