# STUDY PROTOCOL

# EFFECTIVENESS OF KANGAROO CARE EDUCATION PROGRAMME ON MOTHERS, NURSES, AND INFANTS OUTCOMES IN A NEONATAL INTENSIVE CARE UNIT

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# CHAPTER 1: INTRODUCTION

## 1.1 Background

A neonatal intensive care unit (NICU) is a unit that specializes in the treatment of ill preterm infants. The World Health Organization (WHO) 2013 defined a preterm birth as one where an infant is born alive prior to 37 weeks of pregnancy. Preterm infants are sub-categorised depending on gestational age: extremely preterm (below 28 weeks), extremely preterm (28-<32 weeks), moderately preterm (32-<34 weeks), and late preterm (34-37 weeks) WHO (2013). Generally, preterm or premature infants have a low birth weight (LBW), weighing less than 2500 grams. To achieve a balance of fluids and nutrients, premature infants are placed in an incubator and observed closely until they reach a predetermined weight according to hospital protocol.

### 1.1.2 Premature infant

According to the WHO (2012) Global Action Report on premature births, it is estimated that 15 million infants (1 in 10) are born prematurely each year (that is before 37 weeks of gestation) and this number is escalating. Prematurity is the world's leading cause of newborn deaths and many prematurely surviving babies face the possibility of disability for a lifetime. Complications of premature birth are the dominant cause of death for children under the age of 5, accounting for about 1 million deaths in 2015. Premature birth prevalence ranges from 5 to 18% of all infants born over 184 countries. In Malaysia, based on the National Obstetrics Registry, the incidence of premature births for 14 tertiary care hospitals in 2012 was 11.3%, and this was deemed a serious health issue (New Straits Times, 2014).

### 1.1.3 Kangaroo care

Kangaroo care (KC) is a simple evidence-based nursing practice intervention that can benefit premature newborns' lives by helping to increase weight gain, reducing the length of hospitalization, and increasing breastfeeding rates. KC was started in Colombia in 1978 as a way to address mother and baby separation issues, overcrowding, and a lack of incubators in infant care hospitals (Charpak, Ruiz-Pelaez & Figueroa de Calume, 1996). KC is termed for its similarity to how kangaroos carry their babies and was originally designed to look after preterm infants in places where incubators were either inaccessible or unreliable. Basically, KC is introduced in order to simulate an incubator whilst naturally fostering mother-infant attachment. This is supported by the theory that neonates, as well as preterm infants, should not be separated from their mothers. Therefore, KC is essentially a natural incubator used by the mother.

According to this principle, a preterm infant is positioned in a vertical position on its mother's bare chest or in a slightly upturned position between her breasts with head turned to one side; its arms and legs flexed (frog-leg position), and with its umbilicus and abdomen on the upper belly of its mother. The infant is then covered to keep it warm, and so that the maternal body heat can help control its body temperature (Ludingtone-Hoe, 2008). In KC, the preterm infant is stimulated by mechanisms such as vestibular stimulus of the mother's breathing and chest movements, hearing stimulus of the mother's voice, normal respiratory sounds and her heartbeat, and mother's skin touch stimulation.

These types of stimulation are essential for the growth and development of the preterm infant. KC provides a biological environment where the infant can get the basic needs of its early days i.e. warmth for development, nutrition such as breast milk for growth and close observation for example, apnoea in prematurity. According to WHO (2015), nearly three-quarters of premature birth-related deaths can be avoided by a cost-effective intervention that involves giving KC treatment, antenatal corticosteroids, and antibiotics to premature infants.

Antenatal corticosteroids, early initiation of continuous positive airway pressure (CPAP), and KC have enhanced preterm infant survival and are a cost-effective treatment (Bhutta, Das Bahl, Lawn, Salam, Paul, Sankar, Sankar, Blencowe, Rizvi, Chou, & Walker, 2014). KC may be safely started at greater than 28 weeks of postconceptional age (Cattaneo, Davanzo, Uxa., & Tamburlini;1998 & 2007).

KC is a simple type of nursing care starting from the Neonatal Intensive Care Unit(NICU). which assists preterm infants throughout the whole process of growth and development. Contact with and assistance from the preterm infant's mother is essential in order for her to demonstrate strong accountability in her attention to her preterm newborn. The KC techniques implemented by the postnatal mother in this universe of neonatal care come from her context of life, even though her behaviors originate from the guidance of health professionals. Nevertheless, in order to continue exclusive breastfeeding, the socio-cultural network seeks to have a greater influence on the treatment of premature infants. KC is now available for premature infants who need neonatal intensive care, including those who are extremely premature and with a ventilator assistance as well.

In addition, it was stated at the second International Workshop on KC held in Bogota, Colombia, that KC is a fundamental right of the neonatal as an integral part of LBW management, in all settings and at all care levels in all countries. To support this, KC training must, therefore, be structured and involve mothers' and nurses' initiatives for KC application to be successful in the neonatal setting and after the mothers return home. In addition, this can also be achieved by providing KC guidelines and protocol information through high-quality public health programs and through home-visiting as a central service for young mothers with LBW infants. According to Purbasary, Rustina, and Budiarti, (2017) home visiting will support and determine the capacity of young mothers to apply KC with their LBW infants.

Over the past three decades, KC has been known as a safe and effective technique for infant care; practicable for increasing the survival of LBW newborns, especially in low- and middle-income countries. Despite, much investment in implementation, education, and training, some countries find it hard to increase their efforts to support KC, and individual organizations are still struggling to institutionalize KC in a sustainable manner. A greater understanding has developed over the past decade about the health system mechanisms to be followed in implementing KC. KC may be started early once the infant is clinically stable. However, for those with a severe illness or for those unstable preterm infants requiring special treatment, it is recommended to wait until the infant has stabilized before initiation of KC. This is supported by Thukral, Chawla, Agarwal, Deorari, & Paul, (2008).

Although many researchers have stated that KC is a fundamental element developmentally congruous with therapy for hospitalized preterm care which has short and long-term beneficial effects for infants (Ludington-Hoe, 2013), resource limitations, increased staff turnover and an inadequate supply of trained nurses inhibits the implementation of KC in the hospital setting. Limitations, such as facilities, staff shortages, high turnover of experienced staff, and insufficient numbers of nurses qualified in KC inhibits the performance of KC in the hospital setting (Lee, Martin-Anderson, Dudley, 2012).

According to Ghani, Edvardssonb & Amir (2020), current or potential obstacles include the absence of a clear framework or guidelines for supporting KC techniques, lack of ability and incentive to adopt KC practices, mothers not interested in KC, lack of professional coordination, staffing and time constraints, and a medical birth environment that prioritizes interventions over KC.

As well as the limited resources for enforcing KC, the perceptions of mothers and nurses must also be at the forefront of KC's success in the NICU. Accordingly, nurses are the key drivers in providing relevant information and positive views on reactions to KC, knowledge

on KC, and ability to perform the KC technique. Furthermore, nurses in the NICU must be dedicated to successfully implementing KC as a continuous basic quality neonatal care practice. According to Cho, Kim, Kwon, Cho, Kim, Jun, & Lee (2016), KC has substantial positive effects on physiological functions, such as respiratory rhythm, enhances bonding, and health, and has the capability to relieve mother's stress, as well as contributing to infant's weight gain. Mothers of LBW infants lack confidence to care for their babies (Smith, Bergelson, Constantian, Valsangkar, & Chan, 2017). This might mean that young mothers do not realize the big impact the nature and effect of their attachment with their premature infant has, because they have insufficient information, experience, and strength, and they might not be physically or psychologically mature, psychologically or physically (Kuo, Chuang, Lee, Liao, Chang, & Lee, 2012). Therefore, this study aims to identify the perceptions, knowledge, and perceived barriers that primipara or multipara mothers with premature infants face when implementing KC in relation to to their confidence and ability to perform KC until their premature infants reach 3-months-old.

A study was done by Norimah, Marlina, & Rashidah (2018) on infant weight gain patterns at PPUKM Malaysia. The mean gestational age score for infants in the experimental group was M=38.13;(SD=2.05) while the mean gestational age in control group was M=37.6 (SD= 2.26). The findings revealed that, within four weeks, there was a significant ($p$<0.00) difference in improvement in weight gain pattern beween the groups. In the experimental group, the weight increased from 2.89 kg to 3.38kg in contrast with the control group, where there was a slight gain from 2.98kg to 3.33kg after the four week study period. However, the study explored only the efficacy of breastfeeding and weight gain patterns among term babies. No study has been done in a local setting regarding the efficacy of KC in association with weight gain among preterm infants. Therefore, the researchers would like to explore the weight gain status of premature infants with respect to kangaroo care and breastfeeding rates.

NICU is a physically complex setting and mothers require proper supervision in order to be able to work within the environmental limitations. The environment is a robust predictor of achievement or failure of breastfeeding awareness (Norimah et.al., 2018). Hence, mothers depend on nurses to provide precise, detailed and reliable feedback on breastfeeding their high-risk infants. Even though mothers have background knowledge on breastfeeding obtained via websites, reliable information on breastfeeding should be provided by the health care providers (Norimah et al., 2018).

The Third National Health and Morbidity Survey (NHMS III) conducted in Malaysia revealed a 94.7 percent overall prevalence of breastfeeding among children less than 12 months of age (95 percent confidence interval, 93.0-95.9 percent). However, the overall prevalence of under 6 months of exclusive breastfeeding was very low: 14.5 percent (95 percent confidence interval, 11.7–17.9 percent).The Second National Health and Morbidity Survey (NHMS II) found that the average prevalence of children breastfed in Malaysia was 88.6%.The rate of exclusive breastfeeding was just 29% at four (4) months postpartum (Ho, Salim, Aris, Ibrahim, Hassan Nudin, Salleh, Hamid, 1999; & Fatimah, Siti Saadiah, Tahir, Hussain Imam, Ahmad Faudzi, 2010). In 1983, the Baby-Friendly Hospital Initiative (BFHI) was effectuated by all government hospitals. In addition, a report on exclusive breastfeeding rates among infants under 4 months in Malaysia was conducted in 2006. The evidence showed a decrease of 19.3%, 15.5%, and 23.9%, while breastfeeding rates dropped by 14.5%, 11.7% and 17.9% for infants below 6 months (Fatimah et al., 2010). The survey also showed that exclusive breastfeeding was more common in rural areas (30.7%, 95 % CI 23.3-39.2) than in urban areas (12.9%, 95 % CI 8.9- 18.5), (Fatima et al., 2010). Statistics from the Kuala Lumpur Maternity Hospital (MHKL) indicate that up to 100 per cent of mothers breastfed their babies while 92.2 per cent breastfed exclusively before hospital discharge (Department of Obstetrics and Gynaecology MHKL, 2010). Although all mothers in

Malaysia initiate breastfeeding, Malaysia has the lowest prevalence among South East Asian countries of 6-month exclusive breastfeeding rates (Fatimah et al., 2010). According to Sulaiman, Liamputtong, & Amir (2016), although there is literature on the risk of giving formula milk to infants, most infants still do not receive exclusive breastfeeding for up to six (6) months as recommended by WHO, 2001; Al-Sahab, Lanes, Feldman, & Tamim, (2010).

These studies show that working women need to be encouraged by their immediate families and their colleagues at work to continue breast-feeding after returning to work. This is a concern for public health, as 70% of urban women work in Malaysia and during their reproductive years (Fatimah et al., 2010).

According to Hassan (2014), in Malaysia, there is no legal provision for female workers to breastfeed or express breastmilk at work. According to Mohd. Azri, Azrina, & Maheran (2017) in their recent study in the Kuala Muda District area, in order to ensure exclusive breastfeeding in the registered nursery, it should be ensured that caregivers are able to give breastmilk while in the nursery. Therefore, to support breastfeeding partially or exclusively every single person involved in taking care of a baby has an essential role to play in encouraging partial or exclusive breastfeeding.

A previous study by Engler, Ludington-Hoe,Cusson, Adams, Bahnsen, Brumbaugh, Coates, Grieb, McHargue, Ryan, Settle and Williams (2002) on nurses' perception of KC revealed that a positive perception of the nursing evidence-based practice of KC would encourage nurses to integrate KC in the NICU setting for the care and treatment of premature infants. According to Kymre and Bondas (2013), KC is the right nursing intervention for the dying premature infant. It has the advantage of providing a shared sense of connection between the mother and the preterm baby and it impacts the nurses in the context of caring for the critically ill infant.

A study in Indonesia (Bergh, Charpak, Ezeonodo, & Udani, 2012) stated that the supporting factors for KC practice were only viewed positively at the vital administrative level. However, KC was only considered a trial at the district or city level. Therefore, nurses' knowledge of KC is vital in order to incorporate this evidence-based treatment for premature infants. For better results in disseminating knowledge related to KC, some researchers have provided strategies to study models, learning, and training. When a nurse is knowledgeable in KC, this will help her to professionally encourage mothers to apply KC as one of the developmental care strategies required by their preterm infants. A sound knowledge and a positive perception on the part of nurses about caring for premature infants are crucial to guide and promote KC (Waiswa, Nyanzi, Namusoko-Kalungi, Peterson, Tomson, & Pariyo, 2010). Therefore, this study significantly correlated KC with nurses' perception, knowledge, and practice regarding KC. In Utomi & Huang (2019) and Engler et al. (2002), KC was found to be a nursing intervention related to systematic evidence-based practice. For this reason, KC is often the only available method of caring for premature infants in many developing countries.

Therefore, KC is widely recognized as an effective intervention in the NICU and endorsed as a routine procedure to improve the outcomes of premature infants in relation to weight gain, length of hospitalization stay (LOS), and breastfeeding rates. However, this practice is uncommon in Malaysia, and only a few hospitals have implemented KC, but without a proper protocol or guidelines. From our observation, not every mother in the NICU feels the bonding relationship of a normal mother with her premature infant, as they can not act like real mothers, while some of the mothers are afraid to touch or handle their tiny babies for the first time. Therefore, it is important to provide empirical evidence to convince the mother with a preterm infant about perception, knowledge, and how to reduce the stress preventing them from implementing KC. In addition, it is also important for nurses to identify the level of

stress faced by mothers whose infants were admitted to the Intensive Neonatal Care Unit (NICU). This is one approach for mothers who do not feel overwhelmed by the presence of their premature babies and who can perform the KC techniques comfortably. In addition, the researchers also evaluated nurses' perceptions of KC perceptions, knowledge, and practice as routine practice that should be supported for quality neonatal care in the NICU.

Mothers and nurses in NICUs in Malaysia have previously initiated KC in a few hospitals, for example in Pulau Pinang, Klang Valley, Seremban, and Kelantan, but with limited information regarding guidelines and protocol for KC application with preterm infants.

Therefore, the researchers have taken this opportunity to comprehensively assess mothers' and nurses' perspectives regarding KC implementation in relation to perception, knowledge, perceived barriers, stress, and practice of KC. Therefore, the aims of this research are to further explore the effect of KC on premature infant outcomes at three (3) months old in relation to weight gain, length of hospitalization stay and breastfeeding rate after conducting a structured kangaroo care educational program (KC-EP) for mothers and nurses in the NICU in Malaysia. Observing the increasingly high number of premature infant deliveries in Malaysia, a study of the feasibility of implementing KC, to be implemented gradually, in the Malaysian setting, is valuable. Other than that, in this study, the researchers have discovered that not only mother with premature infant outcomes but also nursing outcomes regarding KC implementation are involved. Therefore, exploring KC implementation with regards to both parties who care for preterm infants will help benefit and enhance the quality of premature infant outcomes in relation to weight gain, decrease in length of hospitalization stay and escalation in breastfeeding rates. The researchers also provided a KC-EP and then followed-up the outcomes of the mother –infant dyads until the infants were 3 months old in order to evaluate the effectiveness of the KC-EP that had been given to the mothers. The researchers also provided significant information on the evidence-based nursing practice of KC. KC

helps to effectively improve weight gain, reduce the length of hospitalization stay, and increase breastfeeding rates among premature infants if their mothers consistently perform KC using the proper position and technique as well.

### 1.1.4 Mothers' and nurses' perspectives on perception, knowledge, perceived barriers and the practice of kangaroo care.

The quality of the health care systems and nursing also affects the scaling up of evidence-based neonatal treatments such as KC and breastfeeding. KC's physiological effects and health benefits have been extensively established in various settings among preterm and low-birth weight (< 2000 g) infants (Lawn, Mwansa-Kambafwile, Horta, Barros, & Cousens, 2010; Bergh et al., 2014).

The mother's care is essential to indicate and strengthen her knowledge on KC during her infant's hospitalization in the NICU (Ong, Abdullah, Danaee, Soh, Soh, Kee Lee, & Daw Hussin, 2018). In another study, premature infants were claimed to have benefits from receiving KC and their mother's involvement in their care i.e. infant vagal tone maturity was accelerated and a good sleeping pattern was observed, as well as mothers were more sensitive during later interactions (Feldman & Eidelman, 2003).

A previous study by Engler et al., (2002) on the perception, knowledge, practice, and barriers regarding KC among nurses revealed that a positive perception of KC and a greater knowledge of evidence-based nursing practice will encourage nurses to integrate KC in the care and treatment of preterm infants in the NICU. According to Kymre and Bondas (2013), a positive perception and good knowledge of KC is the right nursing intervention for the dying preterm infant. It demonstrates the value of having mutual connections between both the mother and the premature infant, which influences the nurses' engagement in caring for the critically ill infant. A survey in Indonesia (Bergh et al., 2012) noted that it was widely regarded only at the central government level as the enabling factor for KC activities. At the

district or city level, however, KC was seen only as an obstacle. Hence, the knowledge and practice of KC by nurses is essential for the adoption of evidence-based practice in preterm infant care. Some researchers presented a technique for studying modeling, learning, and training with better results in the dissemination of information about KC-related knowledge and practice. If the nurse is knowledgeable and skilled in KC, it would help the mothers to promote and use KC professionally as one of their neonate's developmental care needs. Nurses with a good perception, knowledge, and practice of caring for the preterm infant is essential for the promotion of KC (Waiswa et al., 2010). The nurses' perspectives of KC related to perception, knowledge and practice were discussed in the previous study done by Utomi & Huang (2019); and Engler et al. (2002) found that KC practitioners are more likely to develop a caring attitude and to have a positive perception of nursing practices related to scientific evidence. For this reason, KC is often the only available method of caring for premature infants in many developing countries.

### 1.1.5 Maternal Stress

Prematurity is a condition that may hinder or interfere with parenting interactions between the mother and the preterm infant by preventing the mother from holding and caring for her baby (Coşkun & Günay, 2020; Çelebioğlu, & Polat, 2010; Törüner & Büyükgönenç, 2017). According to Brandon et al. (2011), Howland, Pickler, Mccain, Glaser & Lewis (2011), following their premature infant's admission to the NICU, mothers may experience developed background anxiety and stress pertaining to prematurity, lack of familiarity and opportunity in relation to neonatal care, that may change their primary motherhood capability.

In addition, circumstances such as premature infant prognosis, uncertainty, fear of failure, inability to perform maternal roles, and feelings of distress and fatigue may cause mothers to

experience numerous worrying feelings such as anxiety, confusion and stress (Alışır, Šeker, Güler, Anaç & Türkmen, 2010; Erdem & Çelepkolu, 2014). The high levels of stress suffered by premature infant mothers are one of the most significant factors prohibiting mothers from getting involved in breastfeeding and neonatal care (Küçükoğlu, Aytekin, & Gülhaş, 2015). In contrast, other studies reported that mothers have poorer physical health related to the insecurity of their premature infant's health status, which may affect their emotions. The stress and exhaustion felt by mothers may also adversely affect their post-birth stress (Hill & Aldag, 2007; Mortazavi et al.,2014).

Mothers who have LBW infants lack confidence to care for their infants (Smith, Bergelson, Constantian, Valsangkar, and Chan, 2017). It could happen that young mothers do not realize that the nature and effect of their attachment with their premature infant could have a big impact because they have insufficient knowledge, exposure and abilities, and they may not be physically or psychologically mature enough for reproduction (Kuo, Chuang, Lee, Liao, Chang, & Lee, 2012). This research is aimed to evaluate the effect of KC education on perception, knowledge and perceived barriers to KC on preterm infant-mothers' confidence levels and their capability to perform KC. Research conducted by Cho, Kim., Kwon, Cho, Kim, Jun, & Lee, (2016) revealed that KC had a constructive effect on physiological functions such as respiratory rate, enhanced bonding, safely and efficiently reduced stress on mothers, plus contributed to infant's weight gain.

### 1.1.6 Weight gain

An interventional study was done by Norimah et al. (2018) on infant weight gain patterns at Pusat Perubatan University Kebangsaan Malaysia (PPUKM) between an experimental group of infants mean score gestational age M=38.13;(SD=2.05) and a control group mean score

gestational age M=37.6 (SD= 2.26). The findings revealed that, within four weeks, the weight gain pattern for the intervention group of infants had increased significantly ($p$<0.00). In the experimental group, the weight gain had increased from 2.89 kg to 3.38kg compared to the control group, which gained from 2.98kg to 3.33kg after the four week study period. However, the study only explored the efficacy of breastfeeding and weight gain patterns among term babies. No study has been done in a local setting regarding the efficacy of KC in association with weight gain among premature infants. Therefore, the researchers would like to explore the weight gain status of preterm infants in relation to KC and breastfeeding rates.

### 1.1.7 Breastfeeding rates

During the last trimester, preterm infants are unable to get adequate nutrients and immune response components passed from the placenta because their organs and systems are not fully mature. This is why they need special attention and also more breast milk (Arslan & Yeniterzi, 2013; Bağ, Yaprak, Halıcıoğlu, Parlak, & Harputluoğlu, 2006). Therefore, breastfeeding should be regarded as a priority for its nutritional, immunological, psychological and economic benefits. The NICU is a medically complex setting and mothers require adequate guidance to cope with the various changes in their roles. The environment is a good indicator of whether breastfeeding learning will fail or succeed (Norimah et.al.,2018). Mothers depend on nurses to provide reliable, informative and exact breastfeeding knowledge regarding their high-risk infant's care. Despite the mother having obtained a background knowledge of such information via websites, reliable information on breastfeeding should be provided by health care professionals (Norimah et al., 2018).

Nonetheless, the United Nations International Children's Emergency Fund (UNICEF,2018) estimates that 77 million babies worldwide do not get breast milk in their first hour of life, which can increase the risk of neonatal mortality by up to 80%.

Therefore, breastfeeding or expressed breast milk (EBM) is the essential nutrient that enhances the growth and development rate of premature infants (Brown, Raynor & Lee, 2011).

The Second National Health and Morbidity Survey (NHMS II) found that in Malaysia there was an 88.6% overall prevalence of children breastfed for some period of time. At 4 months postpartum, the prevalence of exclusive breastfeeding was just 29% (Fatimah et al., 1999). The Baby-Friendly Hospital Initiative (BFHI) was introduced in all government hospitals in 1983. A subsequent national survey conducted in 2006 found that the overall prevalence of exclusive breastfeeding in Malaysia for babies under 4 months of age fell to 19.3%, 15.5% and 23.9%, while the overall prevalence of exclusive breastfeeding below 6 months was dropped to 14.5%,11.7% and 17.9% (Fatimah et al., 2010).

The survey also revealed that exclusive breastfeeding was substantially more common in rural areas (30.7%, 95 % CI 23.3-39.2) compared to urban areas (12.9%, 95 % CI 8.9-18.5) Fatimah et al. Al., (1990). The available data at the Kuala Lumpur Maternity Hospital (MHKL) showed that up to 100 % of mother-infant dyads were breastfeeding and 92.2 % were breastfeeding exclusively prior to hospital discharge (MHKL Department of Obstetrics and Gynaecology, 2010). While almost all Malaysian mothers start breastfeeding, Malaysia has the lowest prevalence among Southeast Asian countries of 6-month exclusive breastfeeding rates (Fatimah et. al., 2010). Literature has been developed on the consequences of formula feeding (Sulaiman et. al., 2013). Most infants do not receive the World Health Organization's mandated 6-month exclusive breastfeeding (WHO 2001; Al-Sahab et.al., 2010). Previous research indicated that working women need to be encouraged by their close relatives and their colleagues at work in order to continue breastfeeding after returning to work. It is a public health concern as 70 % of women in urban Malaysia are working and the remainder are working in their reproductive years (Fatimah et al. 2010).

There is no constitutional provision in Malaysia for women workers to breastfeed (or express milk) at work (Hassan, 2014). Previous research in the Kuala Muda District by Azri, Azrina, & Maheran (2017), found that childcare workers may also serve as another potential resource in registered nurseries to maintain exclusive breastfeeding. The encouragement of breastfeeding in part or exclusively for each person involved in taking care of the baby, therefore, has a major role to play in promoting partial or exclusive breastfeeding.

### 1.1.8 Structured teaching program on kangaroo care.

At Bogota's second International Workshop on KC, Colombia, it was announced that KC is a fundamental right of the newborn for handling low birth weight in all settings and at all care levels in all countries. Therefore, to support the above fact, KC training must be organized and it requires the efforts of the mothers and nurses for KC implementation in the neonatal environment. Nevertheless, only a few hospitals in Malaysia have initiated KC i.e; Pulau Pinang, Klang Valley, Seremban and Kelantan, but with limited information regarding the guidelines and protocol for KC with preterm infants.

The researchers took this opportunity to comprehensively assess the mothers' and nurses' perspectives towards KC implementation on perception, knowledge, perceived barriers, stress, and practice of KC. Therefore, the aim of this study was to further explore the effectiveness of a KC-EP provided for mothers and nurses regarding preterm infant outcomes at 3 months old on in terms of weight gain, LOS and breastfeeding rates after conducting a KC-EP for mothers and nurses in the NICU, Malaysia.

Several studies suggest that KC is a fundamental component of a developmentally appropriate treatment for hospitalized premature intervention that sustains beneficial effects for infants in the short and long term (Ludington-Hoe, 2013). However, no article has been published to prove the effectiveness of KC, with proper structured teaching, guidelines, and

protocol for KC to be safely implemented among premature infants, in terms of weight gain, LOS, and breastfeeding rates in the Malaysian setting.

### 1.2 Problem Statement

Prematurity among births and morbidity is increasing and prolongs the separation of infants from their mothers. KC is not yet standardized and is not widely implemented, and our nurses are not committed to KC techniques. Possibly this may be due to lack of commitment, lack of awareness and/or, lack of knowledge among nurses and mothers in the NICU.

There is no formal training on KC techniques. Based on an in-depth analysis of the existing literature, it was decided that a scholarly intervention would be the best information transfer tool for this research, explicitly targeting mothers and nurses to overcome the above issues. The educational intervention designed for this study included theoretical and practical sessions of KC using guidelines, principles and procedures from the United States Institute for Kangaroo Care (USIKC, 2018).

Kangaroo Care is globally recognized as effective interventions and is recommended as routine neonatal care in the NICU. However, this practice is uncommon in Malaysia and only a few hospitals have implemented KC, but without proper guidelines or protocols. From our observations, not every mother recognizes a natural maternal bonding attachment with her preterm infant in the NICU. Therefore, it is important to obtain empirical evidence in order to explore the perception, knowledge, and perceived barriers to KC as well as levels of stress of those whose premature infants are admitted to the NICU. The researchers also evaluate nurses' personal beliefs regarding their perceptions, knowledge and practices in support of KC as a routine nursing intervention in the NICU for the quality of premature infant care.

In addition, the limitations of contextual curriculum resources in nursing subjects may affect the quality of trained nurses and prevent KC from being implemented in the hospital environment. Limitations such as facilities, shortage of staff, availability of experienced staff,

and insufficient number of nurses trained in KC prevented the implementation of KC in hospitals (Lee et al., 2012). Certain current or potential obstacles, according to Ghani, Edvardsson, & Amir (2019), include the lack of comprehensive policies and guidelines to endorse KC procedures, and the lack of ability and incentive to adopt KC techniques. Mothers are not interested in KC, there is a lack of professional cooperation, there are personnel and time constraints, and a medical birth climate that does not prioritize KC involvement, as well as limited resources to enforce KC. Nurses are, therefore, the key drivers in providing relevant information and positive views regarding response to KC, knowledge of KC and ability to implement KC techniques. In a year, more than 15 million babies are born too early. More than 1: 10 infants (Liu et al., 2016) die each year from complications due to a preterm birth. According to the World Health Organization [WHO] (2018), complications of a preterm birth are the prominent cause of death for children under 5 years of age and were responsible for about 1 million deaths in 2015. The inequality in global survival rates is serious. Some premature infants born at 32 weeks of age suffer from a lack of qualified cost-effective treatments, such as supplying comfort for breastfeeding, and critical care for infections and respiratory problems. The use of sub-optimal technology in a low-income setting has led to an inability to care for neonatal preterm infants (WHO, 2018). For example, over 90% of preterm infants (less than 28 weeks) who are born in low-income countries (die?) within the first few days of life, while less than 10% of preterm infants die in high-income countries (WHO, 2018). As reported by the Vital Statistics of Malaysia, (2019) the incidence of live births was 501,946, while the number of deaths was 172,031. The average death rate was 1 death every 3 minutes, 20 deaths per hour and 471 deaths a day. In addition, neonatal mortality <28 days was 46 deaths per 10,000 live births. Of these, the male mortality rate (57.5%) was higher than the female (42.5%). However, for the death of a baby less than 1 year there were 72 deaths for every 10,000 live births. Subsequently, as reported

by the University of Malaysia Medical Center (UMMC), Department of Patient Information Management, Department of Statistics (2017), there were 5,495 total births in 2011 compared to 5,298 in 2015. This indicates a decline in births from 2011 to 2015. However, the number of premature infants increased from (2.54%, n=140) in 2011 to (8.49%, n=450) in 2015 and required special treatment in the NICU. Prematurity of infants with low birth weight (LBW) is a common problem in Malaysia. This is similar to a large population study, carried out in Austria by Waldhoer, Wald, & Heinz (2008), of 10,240 infants. Malaysian mothers' lower weight before pregnancy was a major risk factor associated with LBW infants. To my knowledge, only a few related studies have been conducted in Malaysia. In view of the limited research on KC in premature infants in Malaysia, the objective of our study was to evaluate the effectiveness of KC for premature infants in terms of weight gain and maintaining breastfeeding rate.

Seeing the increasing number of premature infants delivered in Malaysia, the feasibility of gradually implementating KC in Malaysian hospitals is valued. In addition, in this study, the researchers found that not only the mother's personal belief about KC but also nursing expectations were essential in assessing the efficacy of KC for premature infants in this environment. Therefore, exploring KC implementation for both parties who care for the premature infant will help to support and improve the quality of premature infant outcomes.

The incidence of premature infant prolonged hospitalization in neonatal settings appears to be increasing. Although comprehensive studies and clinical initiatives designed towards its reduction have been done abroad, no study has been conducted yet in Malaysia. In relation to this, according to the Little Aussie Premature' Foundation (2017), from 190 premature births, the average length of hospital stay was from 36 to 11 days depending on their gestation, from 32 to 36 weeks of gestation, when born. However, according to Dimes Perinatal Data Center (2011), the average hospital stay for newborns admitted to the NICU was 13.2 days, while

those born at 34 -36 weeks and admitted to a special care center stayed an average of 4.9 days longer than those born at 39-41 weeks. Biswas, Malpani & Ekka (2016) found that the KC group was discharged earlier than the control group with means of (11.4±4.3 vs 17.68±8.64) days ($p$<0.05) among newborns with a birth weight less than 1500gram at a hospital in central India. Jefferies (2011) revealed that KC was reduced in hospitalization for low birth weight infants. The LOS among premature infants was studied in a systematic review and meta-analysis of randomized controlled trials on probiotics preventing candidal colonization and invasive fungal sepsis in preterm neonates by Hua-Jian., Guo-Qiang., Qiao., Christi., & Zhong (2017). This study revealed that candida is the third most common cause of late-onset sepsis in preterm infants in NICUs, and invasive fungal infections have increased dramatically at a range of 1.6% to 9% in VLBW; < 1500 g is associated with an increase in the LOS. Therefore, implementing the KC technique in the NICU setting will help to decrease hospitalization stay and reduce infection among premature infants in Malaysia.

The Newborn Guidelines of the World Health Organization (WHO, 2013) recommends that post-natal mothers continue appropriate, successful, or exclusive breastfeeding for their infants for the first six months. The Baby-Friendly Hospital Initiative (BFHI) promotes breastfeeding in antenatal and postnatal settings around the world and has demonstrated substantial increases in breastfeeding levels and practices everywhere it is implemented (Nyqvist, Haggkvist, Hansen, et al., 2012). Malaysia's government, especially the Ministry of Health, has already done a tremendous job of promoting breastfeeding. However, according to Bachtiar, Hussain, Lanham-New., & Horton (2011) in their study in the Klang Valley, only 33% of mothers were breastfeeding their infants at four months and, by six months, just 21% of mothers had breastfeed their infants exclusively.

At the same time, although Malaysia's government has actively endorsed breastfeeding in all of its hospitals, the pick-up rate for breastfeeding is still unsatisfying. The same resource

shows that most mothers practice KC techniques to breastfeed their premature infant, so KC will help to achieve the goals of the National Breastfeeding Policy (NBP), at least for the first three months after discharge. The findings suggest that during hospitalization mothers really need reliable information and support from nurses. However, the workload of nurses and strict monitoring of premature infants in the NICU will affect the process and delay the delivering of health education on breastfeeding.

Therefore, evaluating the awareness of mothers regarding breastfeeding their preterm infants during hospitalization and mothers' willingness to continue breastfeeding before being discharged is important to enable mothers to continue breastfeeding after returning home. In the recent study done by Norimah, Marlina & Rashidah, (2018) it was stated that the breastfeeding failure rate was due to NICU staffing environment. The main reason was the lack of continuity of nurses to teach and advise mothers individually on breastfeeding at the community and health center level. According to Alina & Zaharah (2010), the mothers reported receiving contradictory guidance on breastfeeding in the NICU, and had various difficulties in initiating breastfeeding, ranging from concerns about the health of their premature infant to lack of knowledge and support in the NICU. Regarding the environmental issues the mothers and premature infants were kept apart due to sickness or employment. Even though they are separated, it is important to enable mothers to care for their premature infants (Norimah et al., 2018). Each mother needs to understand how to express breast milk (EBM) to feed her preterm infant in order to sustain lactation in a separation situation. However, breastfeeding of premature infants in the NICU depends on early and successful support for breast milk expression. The researchers found that the NICU environment and the staff's approach to promoting breastfeeding were a barrier in the context of successful conveyance of knowledge.

Therefore, this study attempts to address the gap by assessing the barriers and enabling breastfeeding through implementing the KC technique with premature infants. In relation to this, the researchers understand that practicing KC will also help to promote NBP goals i.e. an appropriate or exclusive breastfeeding effectuation until at least three months old. Therefore, the need to express breast milk (EBM) or earlier breastfeeding itself is paramount to help little preemies remain appropriate for breastfeeding, gain weight and weigh at least 1.8kg before being discharged. Moreover, it has become a major challenge for nurses, particularly for NICU staff, to encourage maternal participation in the care of their preterm infants in the NICU (Wigert, Hellstrom, & Berg, 2008). Studies have shown that mothers have not been offered the right conditions to participate in caring for their premature infants in the NICU. Having her premature infant admitted to the NICU may negatively affect the mother's ability to care for her premature infant, especially during her infant's hospitalization. Prior to a mother's participation, maternal stress levels in handling her infant's admission (Ahn & Kim, 2007; Brecht et al., 2012; Chourasia, Surianarayanan, Adhisivam, & Bhat, 2013; Howe, Sheu, Wang, & Hsu, 2014), and NICU related maternal ability (Lee, Wang, Lin, & Kao, 2013) need to be evaluated. This is to ensure that a better strategy that would benefit both the mother and their premature infants can be implemented. Hence, it is very important to conduct an intervention study to create a solid basis to guide nursing practice in the NICU; this would have a progressive influence on the preterm infant's growth and development in order to reduce maternal stress (Melnyk & Fineout-Overholt, 2011).

It is also not known whether the didactic intervention would directly influence the perceptions of mothers and nurses; enhance the application of KC; and improve premature infant outcomes. The purposes of the study are described in the following section.

### 1.3 Significance of The Study

**a) Nursing Policies**

Standard guidelines and policies for KC implementation among premature infants, thus encouraging collaboration between health care providers and neonatal nurses, are needed. Administrative direction and written declarations are crucial if all parties incorporated in neonatal care are to implement KC with an understanding of their own and others' roles, accountability and responsibilities. The policy should further promote the involvement of all nurses in proper monitoring of the performance of KC and successfully documenting detection of KC implementation by the mother and premature infant against KC. However, the provision of additional nursing staff to ease NICU workloads is not easy, especially because of nursing shortages and the need to make effective use of human resources due to global economic concerns. The development of new approaches to offset bedside teaching and easing the workload of nurses can increase nurses' emphasis on quality neonatal care.

**b) Nursing practice**

Nurses should encourage mothers to provide KC either in the hospital or in the community setting to improve the quality of health of their premature infants. Education and care should be given to every mother whose infant has LBW because it is premature and she should be encouraged to do KC. Furthermore, KC has demonstrated the advantage of homeostasis compared with standard treatments (incubators, radiator coolers, or open beds). Premature babies receiving KC tend to sustain a stable body temperature and demonstrate improved breathing patterns (Conde-Agudelo, Belizan, Diaz-Rossello, (2014); Christensson, Siles, Moreno, Belaustequi, De La Fuente, Lagercrantz, Puyol, Winberg, (1992); Rojas, Mario, Kaplan, Michael, Quevedo, Maria, Sherwonit, Elaine, Foster, Lauren, Ehrenkranz, Richard, Mayes, Linda, (2003)). Regarding preterm infant hospitalization in general, KC is associated with a reduced risk of infection, serious illness, and mortality.

**c) Nursing education**

Nurse educators should have the responsibility of increasing the perception, knowledge, practice, and skills of student nurses regarding the kangaroo care technique by arranging in-service education in institutions and also at the hospital level. They should also take active steps to include kangaroo care content in the section on development and growth in neonatal care in the nursing curriculum. Thus, during their practical posting, the students will advocate for mothers in the NICU, hospital, clinic or at the community level to routinely implement KC with their premature infants. This will be recorded in a logbook so the students can achieve the objectives of their posting in an NICU setting in relation to the topic of obstetric, gynaecology, neonatology and peadiatric nursing.

Nurse administrators should concentrate on workshops, continuous nursing education(CNE), and in-service education as this will update their perception, knowledge, and practice regarding continuing KC and promoting exclusive breastfeeding. Nurses play a vital role in the care and management of hospitalized preterm infants.

**d) Mothers and premature infants**

First, early bonding and attachment between a mother and her preterm infant will relieve the mother's physiological and psychological stress. Second, calming practices (holding, touching, talking) and the smell and warmth of the mother's body help to regulate the premature infant's basic behavior, and may contribute to the ability of the infant to control its state. Third, the KC protocol facilitates the individualized attachment between mothers and their preterm infants. Such attachment helps the mother improve her compassion for and reaction to interactive signs from her preterm infant, particularly during feeding.

In addition, the interactions between the mother and her preterm infant are likely to promote growth and development, as well as the recovery and stabilization of the mother's situation by reducing maternal distress, thus fostering the bond between mother and preterm infant.

Finally, breastfeeding after birth motivates and promotes responsive interactions for the maternal and preterm infant bonding attachment. It provides a mother with confidence to take care of her premature infant, increases breast milk supply and is low cost. Practicing KC means a mother's visiting rate is increased and this helps to encourage breastfeeding.

The findings of this study determine that KC, as one of the most relevant nursing interventions, might effectively promote bonding between the mother and preterm infant, as well as foster the growth and development of the infant. The benefits to the premature infant are that it normalizes infant physiology, provides warmth to the baby, promotes lactation, ensures more successful breastfeeding, provides a sense of security to the baby, improves the weight gain of the baby, reduces hospitalization stay, promotes baby-mother bonding and promotes deep sleep in the premature infant.

**e) Organization**

Implementing KC will help to reduce the LOS, and fewer infections will occur in the NICU. The organization can cut the purchasing cost of third level antibiotics or other expensive medications required to cure nosocomial infections in the NICU setting. It will also reduce outbreaks in the NICU.

**f) Nursing Research**

The KC intervention can be introduced into hospitals all over Malaysia. It is a simple, low cost, and highly effective intervention. Thus, the KC-EP can be provided to nursing students, nurses, and healthcare providers with the purpose of encouraging weight gain, reducing LOS, improving breastfeeding rates, and, therefore, enhancing the quality of neonatal care. A study can also be conducted with a large number of samples in different settings. A similar comparative study can also be conducted including mothers, fathers and other family members with a follow-up at six (6) months old for exclusive breastfeeding assessment.

### 1.3.3 Missing gaps in the existing literature

In a previous national survey on aspects of nursing done by Engler, Ludington-Hoe, Cusson, Adams, Bahnsen, Brambaugh, (2002), in relation to perceptions, knowledge, barriers, and practice related to KC, it was indicated that nurses need training resources to address obstacles to KC practice, stressing that knowledge and competence are necessary to reproduce KC securely and efficiently. Such training must also focus on the importance of KC for mothers and preterm infants in order to overcome the lack of knowledge and awareness about KC amongst mothers and nurses in Malaysia in general. Therefore, an intervention study needs to be conducted to evaluate the efficacy of KC-EP to shed light on the mechanisms behind these obstacles for the advantage and efficacy of KC for all preterm infants, mothers and nurses.

In previous studies, only nurses were investigated in terms of perception, knowledge, barriers, and practice. Therefore, it is possible to undertake a comprehensive study of the relevant issues not only for nurses but also for mothers of premature infants in order to determine KC-EP effectiveness.

In previous regional research by UNICEF (2004), during the neonatal period, premature infants with LBW are more prone to develop neonatal morbidities like acute respiratory failure. Those who survive in the neonatal phase tend to be more vulnerable to neonatal morbidity, relative to term infants and those of normal weight, including gastrointestinal disease, respiratory disorders, central nervous system, immunology, vision and hearing (Behrman & Butler 2007). KC will promote evidence-based nursing practice and have various advantages for mothers, premature babies and nurses. The differences between this study and the previous study are that the researchers are evaluating the mother's perspective and premature infant’s outcome starting from the day of admission until the infant reaches 3 months old. The researchers also evaluate the nurse's perspective as caregiver in the NICU setting before and after the educational intervention program is conducted.

As stated by Ong (2017), the nurse who is in charge of EBM is concurrently tasked with other administrative tasks due to a shortage of staff as well as the considerable amount of time and limited space to undertake KC. Moreover, the nurses responsible for advocating KC in the unit are also engaged in the work of administrative documentation. There is, therefore, insufficient time available to prepare and advocate for mothers to undertake KC in the unit. As reported by Chan, Labar, Wallb, and Atuna (2016), these reasons tend to reveal that shortages of staff, staff turnover, lack of knowledge, lack of awareness of the value of KC among nurses generate barriers to implementing kangaroo care within a facility (Seidman et al.,2015).

KC is not the ordinary routine approach in many NICUs in Malaysia. Knowledge and awareness of these techniques among neonatal nurses is still inadequate. This study shows that nursing staff require KC awareness and training to properly understand the effectiveness of KC so it is consistently enforced in the NICU and at home.

Even though over the past three decades, KC has been developed as a safe and effective technique for preterm infant care with the ability to enhance the survival rates of LBW infants, especially in low- and middle-income countries, in Malaysia a structured curriculum for KC, applicable in the local context, has not yet been designed.

This is despite numerous attempts to introduce, educate and train individuals and organizations in a sustainable way to improve coverage of KC. For this reason, KC is often the only available method of caring for premature infants in many developing countries.

In a study by Bergh, Charpak, Ezeonodo & Udani (2012), it was reported that research on KC application, training and education practices and approaches was discussed at an international workshop, and further evidence was gathered from personal experiences, unpublished research presented by colleagues, and published materials. The study provides an illustration of some of the community's core implementing and training issues, and concerns about the

collaborative outcomes. Only nurses' perception, knowledge, barriers, and practice were discussed in the previous studies. The study also suggested a triangular transition change involving transition agents, and the choice of implementation and educational models. The specific positions of the change agents, addressed as drivers, trainers and implementers, were discussed.

KC teaching and training should be strengthened by the same fundamental conceptual definition and should be supported by awareness-raising, dedicated leadership, multidisciplinary collaboration, and ongoing top management support. It should be based on empirical evidence, conducted in line with existing educational best practices, and should be appropriate and applicable locally.

### 1.4 Research Questions

KC has gained acceptance as a chosen and effective technique for the quality care of premature infants. However, it is still a new phenomenon in the NICU in Malaysia; also no data has been published regarding the effectiveness of KC in relation to the perception, knowledge and, practices of nurses. In addition, emotional stress also occurs among those mothers whose preterm infants have been admitted to the NICU. This study also explores the outcomes of mothers in terms of their perception, knowledge, barriers and level of stress regarding KC implementation as well as the outcomes for their premature infants; weight gain, LOS and breastfeeding rates associated with compliance with the practice of KC in a Malaysian setting. In view of the lack of literature on a locally contextualized education model for the teaching of kangaroo care, I questioned the need for drafting such an education programme. The main research question of this thesis is;

Can a locally contextualised kangaroo care education programme aimed towards both mothers and NICU nurses be effectively implemented?

To answer the above research question, the following were analysed.

1. Are there any statistically significant changes in mothers' perception, knowledge, perceived barriers regarding KC and their level of stress after participation in a KC-EP between control and experimental groups of mothers at pre-intervention ($T_0$), 1-month post-intervention ($T_1$) and 3-months post-intervention ($T_2$)?
2. Does KC improve premature infants' weight gain, LOS, and breastfeeding rates between a control and an experimental group at pre-intervention ($T_0$), 1-month post-intervention ($T_1$) and 3-months post-intervention ($T_2$)?
3. Are there any statistically significant changes in the nurses' perception, knowledge and practice of KC before and after participation in a KC-EP?

## 1.5 Objectives of The Study

The general and specific aims of the study are as follows:

### 1.5.1 General Objective

The general objective of this study was to evaluate the effectiveness of a special KC-EP for mothers', nurses', and premature infants' outcomes in the neonatal intensive care unit (NICU).

### 1.5.2 Specific Objectives

This study aimed to evaluate a KC-EP supporting KC among mother-infant dyads and nurses.

The specific objectives of this study were to:

1. compare the effectiveness of KC-EP in terms of mothers' perception, knowledge, and perceived barriers regarding KC and their level of stress after participation in a KC-EP between control and experimental groups of mothers at $T_0$, $T_1$ and $T_2$.
2. compare premature infants' weight gain patterns, LOS and breastfeeding rates between control and experimental groups at $T_0$, $T_1$, and $T_2$.

3. compare nurses' perception, knowledge, and practice of KC before and after participation in a KC-EP for nurses.

## 1.6 Hypothesis

The following hypotheses guided the study:

- $H_1$: A KC-EP can improve perception, knowledge, and perceived barriers in relation to KC, and levels of stress among mothers.
- $H_2$: KC is effective in improving weight gain patterns, LOS, and breastfeeding rates among premature infants.
- $H_3$: A KC-EP can improve nurses' perception, knowledge, and practice in relation to KC implementation.

## 1.7 Conceptual and Operational Definitions

### 1.7.1 Effectiveness of kangaroo care

According to the Oxford Advanced Learner's Dictionary (2005), effectiveness is defined as producing an intended result or a successful result. In this study, effectiveness refers to measuring maternal, nurses' and infant outcomes before and after the implementation of KC. Maternal outcomes include maternal perception, knowledge, and perceived barriers regarding KC and stress, assessed using the adopted tools Kangaroo Care Questionnaires (KCQs) and Parental Stressor Scale: Neonatal Intensive Care Unit, Parental and Relationship (PSS: NICU: P&R), while the nurses' outcomes include the perception, knowledge and practice of kangaroo care, and premature infant outcomes are weight gain patterns, LOS and breastfeeding rates.

### 1.7.2 Kangaroo care (KC)

As stated by Ludington-Hoe et al., 2010 & 2018; Charpak & Ruiz-Palaez, 2011, KC is defined as the simple intervention of chest-to-chest, skin-to-skin contact between an infant and a significant mother. The preterm infant's head is turned to one side so that the ear of the infant is above the mother's heart. Wearing only a diaper, the infant is placed in a prone frog-like position (arms and legs flexed), head turned to one side and neck straight (open airway) for a minimum of one hour per session so as to complete one cycle of sleep (active sleep, quiet sleep and return to active sleep), Ludingtone-Hoe et al., 2018.

In this study, KC refers to a special holding technique where the premature infant is held in a vertical upright position. The premature infant wears only a diaper or a head cap/booties (optional for infants with a body weight <1500grams) and is placed on the mother's bare chest (between the mother's breasts). The infant's head is turned sideways facing either right or left, both knees and elbows are bent (M position) to form a frog-like posture. The premature infant's head and torso are covered from its feet until the auricular lobule (earlobe) with either the mother's clothes, a tube or a small blanket to retain warmth in order to promote the infant's growth and development.

### 1.7.3 Neonatal Intensive Care Unit (NICU)

NICU refers to a specialized setting in a hospital that provides comprehensive and continuous care for premature infants, aged from 22 weeks to less than 37 weeks, who need immediate, persistent and sustained close monitoring, and the help of highly technical specialist assistance, medications, and manpower to ensure maintain normal growth and development. The NICU increases the quality of care of preterm infants.

### 1.7.4 Premature Infant

According to Phillips, Goldstein, Hougland (2013), a baby born before 37 weeks of gestation (more than 3 weeks prior to the due date) is referred to as a preterm infant. In this study, a premature infant refers to an infant born alive earlier than usual, with a corrected age between 28 weeks to 36 + 6 weeks' gestation on its first admission to the NICU.

### 1.7.5 Perception

The definition of perception from the Cambridge English Dictionary (2020) is the way one thinks and feels about something. Perception in this study refers to how mothers think about, interpret, and accept the benefits obtained from KC in relation to their personal beliefs about premature infant care.

### 1.7.6 Knowledge

Knowledge is the understanding of or information about a subject you acquire through experience or study, known either by one person or by people in general (Cambridge English Dictionary, 2020). Nevertheless, knowledge in this study refers to the collection of information on a specific subject, such as the input and understanding of KC.

### 1.7.7 Perceived barriers

A perceived barrier is something that prevents or makes it harder for something to happen, according to the Cambridge English Dictionary (2020). In this study, the perceived barrier refers to measurements considered relevant or which make it difficult to conduct KC.

### 1.7.8 Maternal stress

A mother who feels worried and nervous (Cambridge English Dictionary 2020) is under maternal stress. Maternal stress in this study refers to the stress experienced by mothers who can not cope or deal with the experiences caused by a difficult situation, such as premature infant admission to the NICU.

### 1.7.9 Nursing Practice

The scope of nursing practice is seen in the variety of roles, tasks, commitments, and abilities which registered nurses are trained and authorized to perform (Scope of Nursing). Practice: Definition, Decision-Making, and Delegation, 2006). In this study, it includes nurses in the NICU being competent, confident, and responsible in the initiation of kangaroo care with premature infants, who require certain technical support and equipment.

### 1.7.10 Weight gain pattern

Weight gain pattern is characterized as an increase in weight and includes an increase in muscle mass, adipose cells, and excess fluids, such as water, or other factors, according to the Oxford Advanced Learner's Dictionary (2005). In this study, weight gain for a premature infant refers to an increase in muscle mass, fat deposits, and excess fluids, such as milk, based on a daily weigh in;1 day = 24 hours. The weight gain of a premature infant represents the amount of increase or decrease in infant body weight in a day; 1 day equals 24 hours.

### 1.7.11 Length of hospitalization stay (LOS)

The Organization for Economic Co-operation and Development OECD (2020) reports that LOS is the total duration of time that patients spend in hospital. It is normally determined by the number of admissions or discharges divided by the number of days stayed by all hospitalized patients over a year. In this study, LOS relates to the number of days that the preterm infant spent in the hospital starting from the day of admission to the NICU until it

was allowed to be discharged or return home (in a day; 1 day = 24 hours); The length of NICU stays represents the number of days the premature infant spent in the intensive care unit recorded in days (1 day equals to 24 hours).

### 1.7.12 Breastfeeding rates

Breastfeeding is the method of providing nutrients that are essential for healthy growth and development to young infants, according to WHO (2020). Colostrum is the sticky, yellowish breast milk formed at the end of pregnancy and is accepted as the perfect nutrition for the newborn; feeding begins within the first hour of birth. In this study, breastfeeding rate refers to the rate preterm infants started breastfeeding or taking EBM, partially or exclusively, starting from 29 weeks, and continued breastfeeding along with appropriate formula milk for the first 3 months and beyond or were weaned at a certain week of gestation.

## 1.8 Organisation of thesis

The thesis is organized in six chapters to facilitate clarification and understanding of the study.

Chapter One presents an introduction to the research, and contains background, statement of problems, study significance, research questions, objectives, hypothesis, and operational definitions.

Chapter Two contains an appraisal of the literature on subjects, practice, recommendations, and previous studies on KC among premature infants related to weight gain, LOS, breastfeeding rates and KC-EP and conceptual framework.

Chapter Three includes a description of the methodology, research design, research tools, sampling procedures, and methods of collecting data. This section also describes the specifications of the pilot test, data analysis strategies, and ethical considerations.

Chapter Four describes the major results from the quantitative design. This includes the results of the effectiveness of the KC-EP for mothers', premature infants' and nursing outcomes; comparison of mothers' perception, knowledge, perceived barriers and level of stress between control and experimental groups at $T_0$, $T_1$ and $T_2$; comparison of premature infant weight gain, LOS and breastfeeding rates between control and experimental groups at $T_0$, $T_1$ and $T_2$; comparison of nurses' perception, knowledge and practice at pretest-posttest. Results for the mothers', premature infants' and nursing outcomes are presented. It also presents the association between the demographic characteristics of the participants and the main outcomes of the study.

Chapter Five presents a discussion of the results of this study. Quantitative findings are incorporated into the discussion of the specific issues arising from the findings. The findings of the current study can be used to complement and reach conclusions in relation to previous research.

Chapter Six provides the conclusion of the study, followed by the consequences and guidelines for nursing, education and clinical practices. Each section addresses the limitations and strengths of the study. The chapter ends with an overview of the findings of the study.

## 1.9. Summary

This chapter outlines the study's background, significance, objectives, research objectives, questions, aims, and hypotheses. It presents an explanation of the study-guiding conceptual framework. The provision of background information and the significance of the KC technique, the KC-EP and its practice highlight the importance of the study for the premature infant.

# CHAPTER 2: LITERATURE REVIEW

## 2.1 Introduction

The literature concerning kangaroo care (KC) among preterm infants in the Neonatal Intensive Care Unit (NICU) context is presented in this chapter. This chapter begins with a brief description of literature search strategies and their results, then identifies and retrieves

relevant published studies and articles. The conceptual framework is derived from the Donabedian Quality of Care Framework Model (Rochefort & Clarke, 2010), which will guide the development of this study.

## 2.2 Literature Search

A computer search was used to identify relevant studies and articles. A review of the literature in this study included KC use and effect of KC on infant outcomes: weight gain, length of hospitalization stay (LOS), and breastfeeding rates. In addition, a search on mothers' outcomes including perception, knowledge, perceived barriers in relation to KC, Parental Stressor Scale: Neonatal Intensive Care Unit, Parental and Relationship (PSS: NICU: P&R) and effect of a structural kangaroo care educational program (KC-EP) on KC was conducted. While for nurses' outcomes, the search included perception, knowledge and practices (initiating KC with monitoring devices). The KC-EP on KC was also delivered to the nurses. Criteria were set during the search process for relevant studies and articles to be reviewed and analyzed in this study.

### 2.2.1 Criteria

Criteria for inclusion and exclusion were established to guide the exploration of related studies and articles. The inclusion criteria used were as follows;

2.2.1.1 English language studies and articles

2.2.1.2 Primary search studies and articles (peer-reviewed research, dissertations, evidence-based clinical practice guidelines (EBCP) and evidence-based intervention practice (EBIP);

2.2.1.3 Secondary search studies and articles (systematic reviews);

2.2.1.4 Studies and articles relating to the effectiveness of KC with premature infants pertaining to weight gain, hospitalization stays, and breastfeeding.

The exclusion criteria were:

2.2.1.4 Non- English articles;

2.2.1.5 Studies and articles related to KC use among term babies, KC related to mortality, morbidity, and pain.

**2.2.2 Sources**

A comprehensive search was conducted on scholarly articles, books, dissertations, and conference proceedings relevant to KC use. In addition, citation search engines, such as GOOGLE and GOOGLE SCHOLAR, were also used. A hand search was carried out at the T.J. Danaraj Medical Library of the University Malaya to complete the systematic search in order to uncover important works not identified through keyword or citation search. The electronic database search was performed on databases subscribed to by the University of Malaya database digital library service:

2.2.2.1 MEDLINE Complete @ EBSCOhost,

2.2.2.2 Evidence Based Medicine (EBM) Review @ Ovid,

2.2.2.3 Journals @ Ovid Full Test.

The databases were as follows for the cumulative index of literature concerning Nursing and Allied Health:

2.2.2.4 Web of Science database

2.2.2.5 PubMed with Full-text database

2.2.2.6 CINAHL with Full-text database.

**2.2.3 Keywords**

The keywords used in the database search included:

i) KC related keywords (KC/KMC /Skin to skin contact /Chest to chest /LBW, premature infant /guidelines)

ii) Premature infant outcome related keywords (weight gain /decrease of hospitalization /length of hospital stay and breastfeeding)

iii) Mother outcome related keywords (recommendation perception /knowledge /barrier /stress level /breastfeeding)

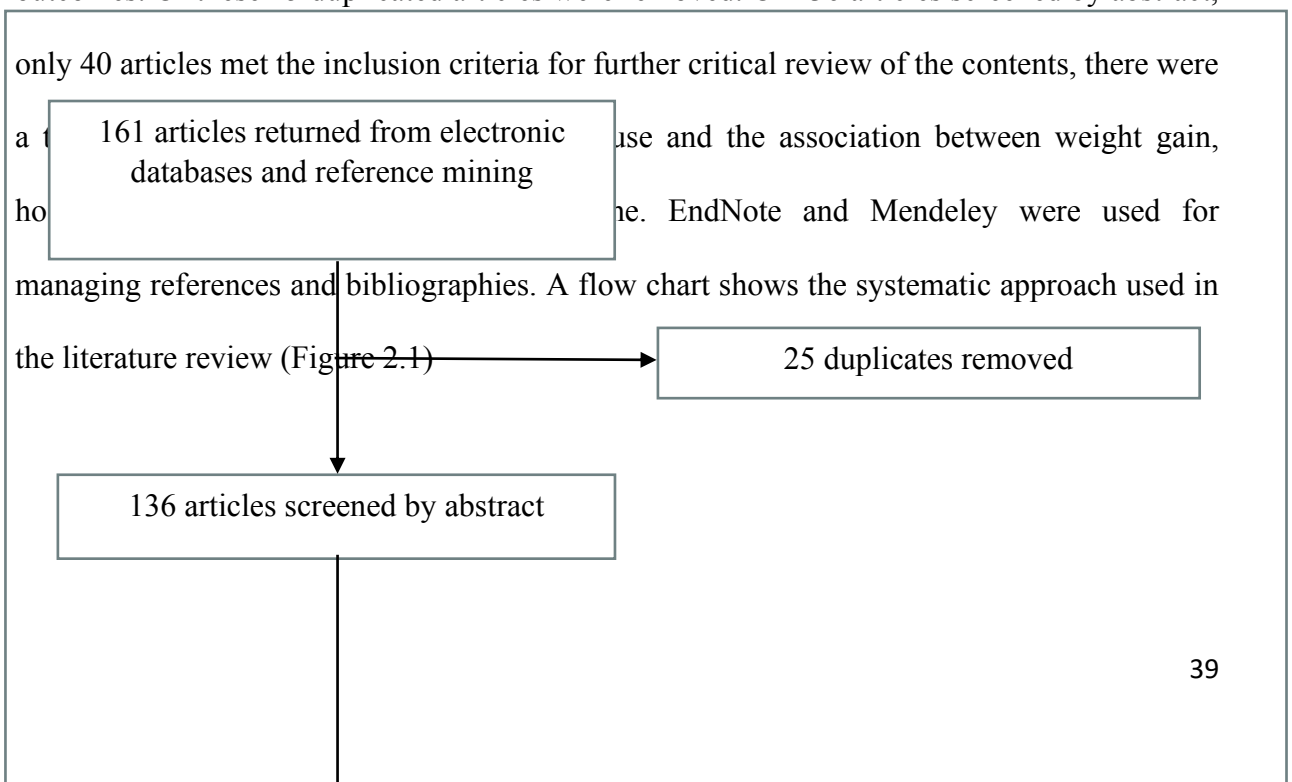
iv) Nurse outcome related keywords (recommendation perception /knowledge /practice)

v) Effectiveness/Structured Teaching Program (STP)/Kangaroo Care/Kangaroo Mother Care

Boolean operators AND, OR, and NOT were used to combine or exclude keywords during the literature search. These helped to connect search words together to either narrow or broaden the set of results. The results were limited to English full-text studies and articles over the last 10 years.

### 2.2.4 Results of Key Studies

The search on electronic databases and reference mining yielded 161 full-text articles applicable to the effectiveness of KC and its association with infant, maternal and nursing outcomes. Of these 25 duplicated articles were removed. Of 136 articles screened by abstract, only 40 articles met the inclusion criteria for further critical review of the contents, there were a t[illegible]use and the association between weight gain, ho[illegible]ne. EndNote and Mendeley were used for managing references and bibliographies. A flow chart shows the systematic approach used in the literature review (Figure 2.1)



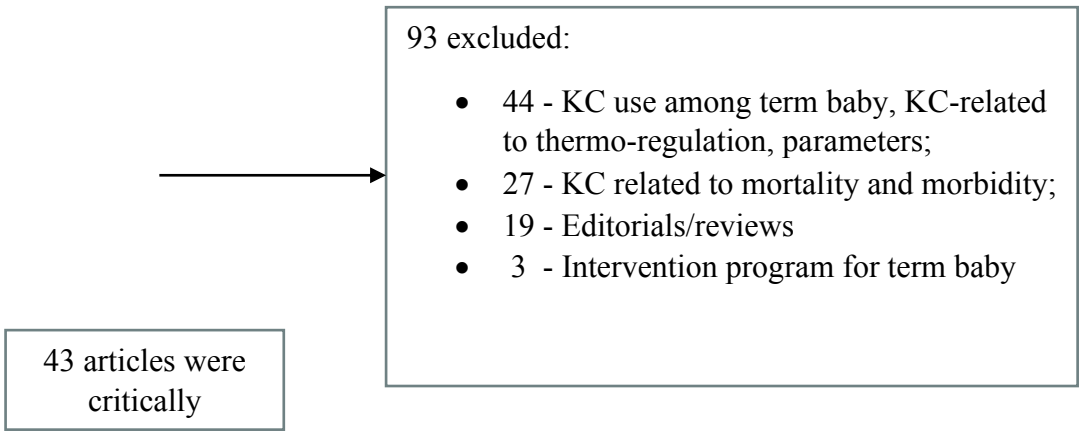



Figure 2.1: Flow chart of the systematic approach used in the literature review.

The NICU is a unit that provides medical and surgical action for infants after birth who require extraordinary attention. The conditions for admission include premature birth, low birth weight, breathing difficulty and septicity or infection. Combining unconventional technology and medical expertise, the NICU is responsible for the specialized care of the preemies. The most common medical conditions of premature infants requiring care in the

NICU are, for example, heart problems, respiratory distress, infections or birth defects. The NICU provides special premature infant care such as intermediate and continuing care especially for those born too soon. Every NICU has hospital guidelines and a protocol with discharge planning criteria that must be met for all premature infants. The basic discharge criterion is that every infant has a recommended more appropriate weight-gain target of 1.7kg. Premature infants in the NICU are divided according to intensity or level of effective action needs:

### 2.3.1 Level 1: Basic Newborn Care

The Level I nursery has a health care provider team which takes care of infants born at around 40 weeks and are in a stable condition (for example, their homeostasis is being maintained; they can breathe and maintain their body temperature on their own). This nursery is also for stable premature infants born between 35 weeks' to 37 weeks' gestation and for premature infants born earlier than 35 weeks' gestation or who are sick while waiting to be transferred to a nursery if they need a progressive care level.

### 2.3.2 Level II: Special Care Nursery

The level II Special Care Nursery (SCN) has a health care team which takes care of premature infants delivered at 32 weeks' gestation, weighing over 1,500 grams (3.3 pounds). These preterm infants might have some health conditions but they are not so severe that they need a higher standard of care. This nursery is also feasible for preterm infants born before 32 weeks of gestation, or are less than 1,500 g when relocated to a higher care level, infants who have just returned to the NICU and are growing and doing very well before they can go home and infants who really need technology to help them breathe. Such infants can only remain for about 24 hours or less in this kind of nursery; they are moved to a higher level of treatment if they need longer breathing assistance.

### 2.3.3 Level III: NICU

Level III: The NICU has a health care team looking after preterm infants born before 32 weeks of gestation with a weight of less than 1,500 grams, and infants of any age or weight who are severely ill and require technology to help them breathe and continue to survive. Preferably, preterm babies in this circumstance who might need a level of care are identified before birth and are born in a level III nursery and thus do not have to be transferred (moved) after birth from a lower nursery. This nursery has a complete range of healthcare professionals such as pediatric subspecialists (for instance, doctors specializing in the treatment of the heart, lungs, or kidneys of children), highly specialized nursing staff, and facilities to care for very ill infants.

### 2.3.4 Level IV: Regional NICU

This is the uppermost level of infant care. This nursery has a specialist team looking after infants who need special surgery for defects, abnormalities, and other problems. This nursery has a wide range of healthcare professionals, which include pediatric subspecialists and trained nurses, and devices to care for infants who are really sick.

### 2.3.5 Premature Infant

A premature infant is one born before 37 complete weeks, according to Phillips, Goldstein, Hougland (2013). Furthermore, the classification of prematurities such as mild, moderate, and severe is based on gestation as follows, according to About Kids Health (2016):

i) Mild prematureness applies to an infant born within 33 to 36 weeks of gestation, and/or is approximately 1500 and 2500 grams in birth weight.

ii) Moderate prematureness relates to an infant born between 28 and 32 weeks of gestation, with a birth weight ranging from 1000 to 1500 grams.

iii) Extreme prematureness refers to an infant born before 28 complete weeks of gestational or with a birth weight of less than 1000 grams

### 2.3.6 Premature Infant Outcomes

In general, premature infant outcomes are related to the development of the NICU in terms of the technologies and medical treatment provided. Therefore, to introduce KC is to foster an understanding of the additional care available for preterm infants in the NICU setting. Preterm infant outcomes are usually based on the gestation of the preterm infant when born, weight at birth and scope of medical complications.

However, preterm infant outcomes actually depend on the prematurity of the infant as well, the longer the preterm infant has endured in the uterus, the more the organs are developed and the readier they are for the challenges of the outside world.

### 2.3.7 Patterns of Weight Gain

Patterns of weight gain are closely monitored for all infants in the NICU setting. Preterm infants with slow growth tend to be slower in development according to research studies. Weight gain in the premature infant depends on the gestation and prematurity of the infant. A few days after birth, the infant will start losing some weight but then regain it after a while. According to Davidson, Ladewig & London, (2012) KC helps to increase growth parameters among premature infants. Thus, if the infant is born very soon and is also very tiny, its weight gain might be as little as about 5 gm a day, whereas the gain in weight could be as high as 20 gm a day for bigger infants as well as those delivered closer to their due date. Discharge policies also include a specific bodyweight criterion prior to discharge, regardless of where the premature infant has been treated in the hospital or medical care service. Most hospitals

have a predetermined weight protocol, which premature infants should meet before they can be allowed to return home. Some hospitals evaluate the routine pattern of the premature infant's weight gain. If it corresponds to their criteria of a healthy weight gain, the infant may be allowed to be discharged. In this study setting, weight gain is monitored three times a week. Discharge criteria are a baseline body weight of between 1.7kg to 1.8kg, a good sucking reflex, being clinically stable and the mother having the confidence to take care of her premature infant (after attending a briefing session on the care of the premature infant: personal hygiene, feeding and Cardio Pulmonary Resuscitation (CPR) in the NICU by the doctor in charge).

### 2.3.8 Length of Hospitalization Stay (LOS)

Premature infants will often stay longer in the NICU to ensure that they get the right fluid and nutritional balance, and are gaining weight. Incubators or special warmers help the premature infant to stay warm in the NICU setting. KC has been shown to shorten infants' LOS. A shortened LOS is associated with the benefits of reducing medical treatment bills and preventing infection due to the immature, innate, and adaptive immune system of the premature infants ( any ref /).

### 2.3.9 Breastfeeding Rates

Breast milk is an impeccable nutrition for preterm infants which helps to protect them against infection and is associated with gaining weight. However, in order to breastfeed a premature infant successfully, the mother-infant dyad requires practical advice and psychological support from health care providers such as nurses. The nurse in the NICU setting is supposed to help mothers by giving them time, adequate information and support, as well as practical knowledge of mother-to-mother breastfeeding groups; Weimers, Svensson, Dumas, Navér.,

& Wahlberg, (2006). The staff must be aware of any written policy based on recent evidence-based practice to improve the chances of breastfeeding success. The unit should also play a critical supporting role to provide accurate input on the management and benefits of breastfeeding for the preterm infant. Three research studies examining the effects of KC on breastfeeding rates in preterm infants showed positive correlations between these two factors. Infants who received KC were much more likely than infants who did not receive this care to breastfeed more frequently, more extensively, and for a longer period of time. Breastfeeding has been demonstrated to enhance the development and growth of infants while giving infants important antibodies to enable them to fight illnesses that might affect them throughout the beginning portion of their lives. This is especially important in preterm infants, who may already be compromised in their general health, ability to grow and immune system functioning.

**2.4 Kangaroo care (KC)**

Immediately after birth, a premature infant requires a significant level of medical attention in the NICU for its survival. This separation involves mothers the opportunity to begin the process of attachment. KC is one method for reuniting mothers in the NICU with their premature infants, and it improves the quality of health outcomes. This method is considered an effective and alternative way of caring for the neonate. Dr. Roy and Dr. Martinez first introduced the approach at the Maternal and Child Institute in Bogotá, Colombia, in 1979. Hence, it is good to encourage KC for the treatment of preterm infants. According to Ahn, Lee. & Jin Shin (2010), preterm infants receiving KC showed greater gains in body weight, and there was a beneficial effect on maternal attachment in the control group.

KC is defined as a special holding technique for preterm infants in the NICU which keeps the infant in an upright position. The infant wears only a diaper and a head cap and is in a position between the mother's breasts (mother's bare chest). The head is turned sideways

facing either right or left and both knees and elbows are bent to form a frog-like posture. During the procedure, the infant's head and back are covered from below the auricular lobule (earlobe) with the mother's clothing or a tube, ensuring the premature infant is in a safe and comfortable condition.

### 2.4.1 Studies on Kangaroo Care

KC is a unique method or technique of caring for a premature infant in which the infant is placed in chest-to-chest, skin-to-skin (ventral surface) contact from the umbilicus to the sternum so it is upright against the mother's ventral surface. The KC method fosters health and weight gain, promotes effective thermal control, increases breastfeeding rates, prevents infection, and enhances bonding between mother and infant, (Ludingtone-Hoe, et al.,1990, 2010, 2018; Charpak et al., 2010).

An observational study done by Singh, Amritanshu., & Mukherjee (2014) in the Department of Pediatrics from July 2011 to June 2014 at Katihar Medical College concluded that KC is a useful and realistic tool for LBW infants. Further research was carried out by the Mahboobeh et al. (2016) on the level of KC application and its barriers from the perspective of nurses working in NICUs in Isfahan, Iran. Two important and basic factors of KC, including the infant's age at which KC was initiated and its duration during 24 hours, were investigated. The findings revealed that KC was initiated at the age of 8 days among preterm infants with a mean weight of 1510 g and gestational age of 32 weeks, with an average period of 32 min once daily. According to Ahn, Lee, & Jin Shin (2010-), a South Korean study of over 20 pairs of mothers and infants of less than 36 weeks, who had ten sessions of 60 minutes KC for three weeks, demonstrated the beneficial effects of KC on Korean preterm infants' growth and their mothers' depression.

From another study by Suman, Rekha & Ruchi (2008) it was reported that KC was acceptable to most mothers and families. Most mothers reported happiness (71.5%), they performed KC effectively (75.5%), without assistance (80.39%), and believed their baby enjoyed KC (65%). The KC infants received KC for a cumulative mean of 33.78 + 15.12 days or 13.5 hours a day. However, there were a few mothers who had provided KC for almost 24 hours at home. In relation to this, Parmar, Kumar, Kaur, Parmar, Kaur, & Basu, (2009) conducted an assessment to identify the acceptability of KC to mothers, relatives, and healthcare professionals (no definition of acceptability was present). KC was provided by mother (n=60), father (n=40), mother-in - law (n=32) or close relative (n=21) to infants (n=135) with a mean birth weight of 1460g. A pre-specified questionnaire containing 15 questions (questions presented in the paper) and using a Likert scale was used to interview the KC providers. For the analysis, data were stratified into two subgroups (mother or other provider). Almost all mothers (96%) said they comprehended the KC technique very well, although 12 percent said they needed an extra training course. Even though half of the mothers were initially nervous about KC, nearly all (98%) managed to keep their baby in the KC position and claimed it was much more comfortable and less stressful than being away from their baby. Overall, 96% of mothers found increased confidence and emotions with KC; 94% believed they brought a positive commitment to the treatment of their infant, and 98% felt encouraged to continue with KC at home. The negative aspects of KC identified by mothers were that it was associated with daily living tasks like bathing (18%) and privacy issues (6%). KC was supported by a high proportion of other KC providers (husbands, 82.5%; mothers-in-law, 84%; other family members, 81%). Although the data from the mothers are presented in some detail in the paper, results from other KC providers are sparse. It would have been valuable to present comparative data for all groups of providers to

investigate whether differences in attitudes, beliefs and perceptions about KC existed between providers.

A study among healthcare workers by Parmar et al., (2009) involved 14 doctors and 16 nurses who were interviewed using a 17-items questionnaire. The data from both groups were pooled for analysis due to the similarity of their responses. Most healthcare workers (94%) believed KC to be a useful care technique for LBW infants, with a similar proportion (93%) believing it saved resources through a reduction in the use of heaters. However, while 79% reported that implementation of KC resulted in no increase in their workload, 18% were unsure. Perceived maternal benefits of KC were improved mood, increased confidence and better lactation (94%, 97%, 80%, respectively). Perceptions of premature infant benefits were more mixed, with 57% believing KC had a positive effect (e.g. fewer episodes of crying), while 37% were unsure and 7% perceived no effect. However, all healthcare workers agreed that premature infants who had prolonged episodes of KC gained weight more rapidly, had fewer infections, and were discharged early.

In addition, the attitudes of nurses working in the NICU were assessed using an 11-items questionnaire. All nurses believed KC to be a useful method of care for LBW infants which should be introduced in other hospitals. Over one third (33%) of nurses believed that KC had increased their workload and that it was taxing to implement it in the NICU, while 44% believed the supervision of KC interfered with the care of other neonates in the NICU. However, over half (56%) of the nurses perceived there to be no associated workload increase. All nurses believed that KC promoted bonding between mothers and premature infants, 78% thought that KC increased maternal lactation, and 78% perceived mothers to be happy with this method of care. Therefore, this shows that KC has benefits for both mothers and premature infants in increased clinical performance, breastfeeding rates and bonding. It increases weight gain, decreases hospital stay, increases and prolongs breastfeeding

prevalence, even though the research found that barriers to KC for premature infants may comprise a lack of evidence-based intervention practice for nursing staff, shortage of time, physical or psychological ill-health and inappropriate settings for mothers. Therefore, providing continuing education and support by the management will assist neonatal nurses to enhance their knowledge and empower mothers to carry out KC. Other than that, mothers also need input and encouragement to begin KC. In addition, KC education and guidance provided to neonatal nurses on the proper methods and procedures of KC treatment will increase their awareness and confidence to communicate information about the value of KC and share it on the basis of experience with the premature mothers in the NICU. Therefore, nurses can recognise issues and address maternal obstacles regarding the NICU 's adoption of KC and can continue until the infant is allowed to return home.

From January to April 2016, Almutairi & Ludington-Hoe (2016) conducted a cross-sectional study on KC knowledge, attitude and practice at three teaching hospitals in Nepal. The survey was carried out among doctors and nurses who were working in the Gynaecology, Neonatal, Paediatrics and Obstetrics wards using a pre-test questionnaire. The study revealed that the respondent rate for the survey was 65% for doctors and 95.3% for nurses. The survey showed that both doctors and nurses had knowledge about KC, but 37.7% of physicians and 48.8% of nurses felt KC was mainly used for premature infants with LBW (<2500grams) ($p$<0.013). However, just a quarter of the physicians and half of the nurses accepted that KC is routinely practiced in their ward ($p$<0.016), while 22.2% of respondents said that the key reason for not continually performing KC in their unit could be a lack of skill and knowledge. Thus, the knowledge and attitude of the majority of doctors and nurses regarding KC was actually good, but their practice was not uniform.

According to Almutairi & Ludington-Hoe (2016), KC is performed routinely in less than 20 percent of the 996 NICUs in the United States, and this is mainly because of the inadequate

knowledge and skills of the nurses. Education and training enhance knowledge and skills acquisition, however, the consequences of a KC certification program for the knowledge and confidence of nurses were unexplained. Therefore, Almutairi & Ludington-Hoe (2016) conducted research on the impact of KC training on the knowledge and skills of nurses in the United States. A pretest - posttest quasi-experimental design was used for this study. During a 2.5-day course on KC evidence and skills, the Kangaroo Care Knowledge and Skills Confidence Tool was distributed to 68 registered nurses. The study showed that the mean score for the nursing staff in posttest knowledge was (M= 88.54, SD= 6.13), significantly higher than their mean pretest score (M= 78.7, SD= 8.30), t[54]= -9.1, $p$<0.000), as was the highest confidence score for skills (pretest M= 32.06, SD= 3.49; posthest M= 26.80, SD= 5.22), t[53]= -8.459, $p$<0.000). The knowledge and skills of the nurses in relation to KC in the United States was significantly improved after continuing education, indicating the need for continuing education in this specific field.

Admission to a neonatal intensive care unit for a newborn infant usually indicates that the mother is physically separated from her infant. Therefore, KC is a neonatal care technique which continues to support the role of the mother as the biological parent and probably helps to reduce or eliminate the barrier to the unification of the mother–infant dyad. A retrospective design survey on 23 Swedish mothers' experience of continuous KC was carried out by Blomqvist & Nyqvist (2011) with the aim of examining the personal experiences of mothers with first babies receiving prolonged KC from birth at a Swedish neonatal intensive care unit until they were discharged. The relevant infant restrospective data was acquired from the medical records of the infants. A survey with a questionnaire on child care and KC was specifically designed for this study. Results for mothers with infants born at 31-41 weeks of gestational age, birth weight ranging from 1715-3700 g, showed strong acceptance of providing continuous KC during their infant's stay in the NICU. The evaluations of this

method by the mothers were predominantly positive. The negative feedback indicated a lack of knowledge about the technique being applied in practice. Mothers were well able to utilize this care approach if they had the help and support they required. The research further proposed that mothers whose infants are enrolled in the NICU in settings similar in appearance to those in the study must also be given the opportunity to be physically present and to provide their infants with KC, to the extent that they are able and willing to do so, as required by the diagnosis and treatment of their infant's health.

### 2.4.2 Kangaroo Care Studies in Proper Positioning of Head, Neck, And Body

Comparative research on the impact of supine and prone posture on cardiovascular and respiratory parameters and temperature regulation in preterm infants was performed by Heimann et al., (2010). This study controversially discussed and compared the influence of thermal regulation and cardiorespiratory parameters in relation to the standard positioning of premature infants: skin to skin care (SSC), prone position (PP) and supine position (SP) in the daily care of premature infants. The researchers compared SSC to PP, the position indicated for preterm infants, and SP, the most secure position for term infants. Among 18 of the premature infant's is breathing spontaneous; [median gestational 28 weeks (24–32); chronological age 36 days (7–64) and weight 1,543g (750–2,100)], heart and respiratory rate, breathing patterns, episodes of desaturation (< 85%, < 88% and < 80 %), oxygen saturation and rectal temperature were analyzed using polygraphy (Alice 3 ® and 3.5 ®) in a 6-hour measuring cycle of three continual series (120 min each in SP, SSC and PP) and compared (Wilcoxon test). The results showed no impact on thermal regulation and cardiorespiratory parameters. Other than that, during SSC, they found no significant increase in the number of apneic attacks and bradycardic episodes and no physiological difference in parameters: breathing pattern, oxygen saturation, respiratory rate, and desaturation compared to SP and PP. Episodes of désaturation were <85 but ≧80 and <80% more common in SP than in PP

($p$<0.0421 and $p$< 0.0319). In SSC and PP the heart rate increased compared with SP (154.86 bpm, SD 11.55, and 153.33 bpm, SD 15.95 vs. 150.25 bpm, SD 14.64; $p$< 0.0013 and p = 0.0346). The temperature level during SSC and PP was not significantly higher than in SP except that there was an increase between the start and the end of the 6-hour measuring phase (37.05°C, SD 0.2 vs. 37.30°C, SD 0.3; $p$< 0.0436). Consequently, the findings indicated that there were no significant SSC-mediated improvements in the quantity and consistency of desaturation and skin temperature in preterm infants compared with PP. The three aspects of safety with KC are: proper positioning, preventing falls and KC sleep. In proper positioning, as in the above study, whenever KC is being carried out, the premature infant should be elevated away from the horizontal to facilitate respiratory expansion (Bohnhort, 2010; Heinmannet al., 2010). The preterm infant's hands should be at the level of its shoulder so that it can raise its head and move it to avoid asphyxiation. Many studies on infant safety have been conducted, the most recent study being conducted by Kristoffersen, Stoen, Frances Hansen, Wilhelmsen & Bergseng (2016). The prospective quasi-experimental cohort study was conducted at three Norwegian research sites: at the NICUs and maternity wards. In accordance with hospital guidelines, 90 preterm infants (KC = 47; incubator = 43) who were delivered vaginally with a gestation of 32 weeks/0 days to 34 weeks/6 days were provided KC. For all infants at or older than 32 weeks one of the hospitals practiced SSC immediately after birth; the other two hospitals' prematures were taken to an incubator immediately after birth and the mothers visited every two hours. In the first hour after birth, both infants received their first feed by gavage or syringe.

### 2.4.3 Kangaroo Care Studies and Weight Gain

A prospective case-control study conducted by Biswas, Malpani & Ekka (2016) on newborns weighing less than 1.5kg in a tertiary level NICU at a teaching hospital in Central India,

found that the KC technique produced a daily weight gain of on average (23.99 vs.15.58g, $p<0.01$). A prospective study conducted on Kangaroo care (KC) showed it reduced neonatal deaths and neonatal sepsis, and enhanced growth outcomes in preterm infants. The study contrasted the efficacy of infant care using KC in the ward with the efficacy of infant care in Intermediate Intensive Care (IIC) in stable preterm infants (birth weight < 1100 g) to stimulate the growth velocity up to term age adjustment. When they reached a weight of 1150 g, one hundred and forty-one infants were randomized to KC in the ward (n=71) or IIC (n=70). Infants in the KC group were transferred directly after randomization to the Kangaroo ward care (KWC) and those in the IIC category were cared for in the IIC until they reached a weight of 1250 g when they were relocated to the KWC. In both groups the average weight gains as well as weight, length, and head circumference were comparable at term corrected age. In the KWC group, there was a significant decline in IIC post-randomization stay and a rise in weight gain prior to discharge. The frequency of apnea within the IIC group was significantly increased. Early KWC is just as effective as IIC in enhancing the growth outcomes of stable preterm infants (birth weight < 1100 g) at term gestation. Sharma, Murki & Pratap (2016) reported that KC had a positive and healthy effect on maternal care with stable premature infants weighing 1150g without adverse effects. Suman et al. (2008), however, found a significantly higher weight gain in the KC group compared to other studies, while Ramanathan et al. (2001) also reported a greater weight gain in the KC group during the first week of life than those in the control group (15,9±4,5 vs. 10,6±4,5 g / day).

Ghavane, Murki, Subramanian, Gaddam, Kandraju, & Thumalla, (2012) conducted an RCT study at one of the Hyderabad hospitals. The study compared the effect of KC and conventional care in a neonatal unit on growth and breastfeeding among VLBW infants at a corrected age of 40 weeks. One hundred and forty birth-weight neonates < 1500 g were randomized. The study found that the average weight gain (g / kg / day) from time of

randomization to term age outcomes revealed that the mean score for both groups was similar, during randomization with birth weight, age in days and weight. The average post-randomization weight gain (g / kg / day) (23.3 ± 8.7 g vs. 22.64 ± 9.1 g, $p > 0.67$) and the breastfeeding rate (85.9% vs. 87.0%) were comparable in terms of age. There was no significant difference in weight gain (g / kg / day) between the two groups from randomisation to hospital discharge (15.64 g vs 18.01 g, $p<0.12$). Equally distributed were morbidities and mortality, such as apnoea, hypothermia, hypoglycemia, sepsis, and length of hospital stay. On average, the KC group actually saved 11.5 days of intermediate treatment. Therefore, Ghavane et al. (2012) supported KC as an effective technique to be carried out in the neonatal unit, without any rise in morbidity or mortality among stable infants with very low birth weight (VLBW). Other recent studies include a mixed-methods survey undertaken in Uganda. WHO (2015) states that KC "should commence as early as newborns are clinically stable", while most deaths occur in unhealthy neonates. Therefore, the survey determined the rate of admission for neonates fulfilling the recommended instability criteria, evaluated the feasibility of providing KC to unstable infants, and examined the suitability of this approach for parents and healthcare professionals at the Jinja Regional Referral Hospital in Uganda.

In this study, the researcher included a sample of neonates that met the predetermined criteria for instability. The mothers were instructed to provide KC as early as possible, and the median duration of KC was measured for each episode every day. A semi-structured interview was carried out with parent-infant dyads and healthcare providers to explore the acceptability of KC. The researchers transcribed the original data, birth weight, chronological age, and clinical treatments, which were obtained from hospital records, and evaluated the percentage of clinically unstable neonates, defined in the first 48 hours as a need for medical care, and then analyzed the data using the thematic content approach. A total of 254 neonates

were included in the study, 10 samples in the feasibility sub-study and another 20 samples in the acceptability sub-study. The median length varied from 115 to 134 minutes for each KC episode. The median ranged from 4.5 to 9.7 hours in terms of daily duration. The results indicated that 75% of all those interviewed personally felt that KC could be used in neonates who were undergoing other medical treatment at the same time. Obstacles, however, included a lack of infrastructure (beds/room, monitoring devices), privacy concerns, insufficient training, and mothers (not?) being inspired to fully commit to KC. Recommendations usually involved counseling sessions for clients/peers, the working population, parents, and community. The destabilization conditions were solved easily as well, as 89% of the neonates had been identified as unstable in the audit. The median individual time for KC ranged from 115 to 134 minutes. The median daily duration was from 4.5 to 9.7 hours. Over 75 % of interviewees felt that KC could be used with neonates receiving other medical treatment at the same time. A reliable evidence-based approach remains necessary to continuously describe the stability requirements for KC in order to enhance the quality of neonatal care. Therefore, at Jinja Hospital in Uganda, the use of KC for unhealthy neonates weighing about 2000g was considered practical and acceptable.

### 2.4.3 Kangaroo Care Studies and Length of Hospitalization Stays (LOS)

A study on KC and LOS conducted by Biswas, Malpani & Ekka (2016) found that duration of stay was shorter among infants using the KC technique. This study revealed that infants in the KC group were released earlier than in the control groups (11.46±4.32 vs. 17.68±8.64 days) ($p$<0.05). Besides that, Ramanathan et al. (2008) also reported a decrease in length of hospitalization stay (16.6 vs. 20.7) in a KC group of premature infants. Similar results were found in various other studies about the shorter length of hospital stays (Hann, Malan, Kronson, Bergman & Huskisson, 1999; Charpak, Ruiz-Peláez, Charpak & Rey-Martinez, (1994).

The randomized controlled trial conducted by Rao and colleagues (2008) included time to discharge as one of the outcome measures in the study. Preterm infants were discharged when they showed a weight gain/day of (KC 23.99g vs. conventional care 15.58g; $p<0.001$), even though there was a difference between the time allowed for discharge between groups (KC 12.78 days versus conventional care 12.86 days; $p>0.93$).

### 2.4.4 Kangaroo Care Studies and Breastfeeding

An observational study carried out by Singh, Amritanshu & Mukherjee (2014) in the Department of Community Medicine at Katihar Medical College's Department of Pediatrics, among 100 infants with weights ranging from 1650 grams to 2000 grams, concluded that KC's other benefits are that it encourages exclusive breastfeeding and enhances the confidence of mothers in holding their small infants.

A further research on the beneficial impact of KC on breastfeeding was also conducted in Central India from November 2012 to September 2013 over an 11-month period. The researchers reported that breastfeeding was established in the KC group at 68.5%, as well as in the discharge control group at 34.2%, favoring the KC group ($p<0.05$). In addition to this, it was found that exclusive breastfeeding was more prevalent in the KC group than in the control group. The proportion of breastfeeding preterm infants was greater at 40 weeks (KC: 94.4%; control: 72.0% $p<0.002$), three months (KC: 89.6%; control: 62.2% $p<0.002$), and six months (KC: 84.6%; control: 55.5% $p<0.006$) post-conception age, the difference being statistically significant.

Breastfeeding Policy (NBP) in Malaysia suggests exclusive breastfeeding for the first six months and then continued breastfeeding for up to two years. Several programs to encourage breastfeeding have been introduced in this country since the 1990s. In response to assess the frequency of breastfeeding practice, a maximum of 2167 mothers or caregivers of children

under the age of 2 years were recruited in the 2006 Third National Health and Morbidity Survey (NHMS III), which represented 804,480 of the approximate total number of children under the age of 2 years in Malaysia. The participants were asked whether the infant was provided with various types of liquid or solid food at any point during the corresponding 24-hour period. The average prevalence of breastfeeding for infants under 12 months of age was 94.7% (CI: 93.0-95.9). The estimated prevalence of exclusive breastfeeding below 6 months was 14.5% (CI: 11.7-17.9). Timely initiation prevalence was 63.7% (CI: 61.4-65.9), and continued breastfeeding prevalence was 37.4% for up to two years (CI: 32.9-42.2). The findings indicated that the programs implemented in the last 10 years were beneficial in enhancing the prevalence of continuous breastfeeding, immediate commencement of breastfeeding and sustained breastfeeding for up to two years. However, the challenge is to strengthen the exclusive practice of breastfeeding, and long-term community-based initiatives need to be carried out in conjunction with the current health care system, with an emphasis on limiting the use of water and formula for infants, particularly in the first six months.

Hake-Brooks & Anderson (2008) conducted a randomized control trial (RCT) to assess KC's effect on breastfeeding success in postpartum to 18-month-old mother-infant dyads. The study showed that KC was freely available to the preterm infant and was not limited in any way. The mean daily level of KC contact was 4.47 hours. However, a key weakness was the lack of a description of the method of allocation of concealment, and infants were treated routinely in the control group. A total of 66 mother and preterm infant dyads were included in the study sample (birth weight of 1,300-3000 g), of those who had declared their intention to breastfeed. The KC mother-infant dyads were breastfeeding significantly longer than the conventional dyads (KC 5.08 months versus conventional 2.05 months; $p<0.003$) respectively. KC mother-infant dyads also breastfed more exclusively ($p<0.047$). The KC dyads were breastfeeding with full exclusivity (100: breast milk, breastfeeding status index

level 1 or 2) at discharge and at follow up at 1.5, 3, and 6 months. The broad range of birth weights of the study sample (up to 3000g), long periods of daily KC and small study sample limit the generalizeability of the study's findings, particularly with regards to preterm infants, and makes comparison with other research more difficult. However, what is apparent here is an association between KC and better breastfeeding outcomes for the premature infant, which should not be overlooked.

Another RCT study by Suman, Udani & Nanavati (2008) found that 98% of preterm infants who obtained KC for 13.5 hours a day were exclusively breastfed at the postpartum age of 40 weeks, in contrast to 76% of non-KC premature infants. The previously described multinational RCT of Cattaneo et al. (1998) among low birth weight infants included rates of exclusive breastfeeding at discharge and daily mean weight gain in infants as two of the outcome measures. Results from this study showed that rates of exclusive breastfeeding at discharge were slightly higher across all three countries e.g. Ethiopia, Indonesia, and Mexico, in premature infants who received KC, compared with those randomized to conventional care (88% vs. 70%). Even Mexico's findings showed a significant difference between the two groups. (KC vs. conventional care: 80% vs. 16%, p-value is not provided).

A prospective national cohort survey on exclusive breastfeeding factors among preterm infants in the NICU in Denmark was conducted by Ragnhild et al (2014). The comparison study was performed between September 2009 and December 2011, at a gestational age of between 24 and 36 weeks, with 1,221 mothers and their premature infants (1,488). The study was based on a survey and formal interviews over the telephone. The findings found that 68% of preterm infants had been breastfed entirely, 17% were partially breastfed and 15% were not breastfed at discharge. Some of the infants were fed with expressed breast milk from bottles. As a result, 77% had been exclusively breastfed, 15% were partially breastfed and 8 percent had essentially not been breastfed after discharge respectively. The exclusive

breastfeeding rate at discharge changed significantly amongst responding groups between 53% to 83% ($p < 0.01$). The rate for use of a nipple shield was 35% to 67% ($p < 0.01$), while the rate for use of a pacifier was from 60% to 100% ($p < 0.01$), and the use of the test-weighing from 0% to 87% ($p > 0.01$). When counting one infant per mother, 76% of infants whose weight was measured at most breastfeeding sessions were exclusively breastfed at discharge compared to 69% of infants whose weight was not measured at most breastfeeding sessions ($p<0.02$).

The corresponding proportions were measured one month after discharge and showed 59% and 57% respectively, with no statistically significant difference. From this survey, limiting the use of a pacifier and test-weighing seemed to have an effect on exclusive breastfeeding at discharge OR 0.6 (95% CI 0.4–0.8) and 0.4 (95% CI 0.3–0.6) respectively. The clinical practices associated with ineffective breastfeeding duration, started with breast milk expression at 12–24 hours (OR 1.6 (95% CI 1.0–2.4) and 24–48 hours (OR 1.8 (95% CI 1.0–3.1)) vs. 6 hours postpartum, and the use of nipple shields (OR 1.4 (95% CI 1.1–1.9). The survey revealed that early expressing of breast milk, before 12 hours postpartum, raised breastfeeding rates, and it indicated that the use of nipple shields should be restricted. Test-weighing and limiting the use of a pacifier may enhance the establishment of exclusive breastfeeding. However it should be noted most of the above studies are conducted more than five years ago.

Further research is thus necessary on how to encourage mothers to start exclusive breastfeeding as early as possible and continue exclusively after discharge. According to The Academy of Pediatrics, (2013) practicing KC for an uninterrupted 60 minutes during the first 12 weeks and continuously for the first 3 months of corrected age will naturally encourage the mother to not cease exclusive breastfeeding at least until 3 months of corrected age.

### 2.4.5 Kangaroo Care Studies on Perception, Knowledge, Perceived Barriers and Stress

Engler et al. (2002) carried out descriptive research to evaluate nurses' knowledge and skills regarding perceived barriers to and perceptions of KC. A non-validated questionnaire was sent to 1,133 nurse managers at all hospitals considered to provide neonatal intensive care services in the United States, asking that the questionnaire be completed by the nurse most familiar with KC. The response rate was 59%. A total of 82% of the respondents reported that they implemented KC, and they were equally concerned about this technique of care. Generally, those nurses who performed KC in the NICU usually had more favorable views of KC than those who did not perform KC.

The major barriers to implementing KC were identified as safety concerns and an unwillingness among other healthcare staff, mothers, or other relatives to engage in KC, as misinterpretations about KC were evident, with 40% of nurses assuming that low gestation or low preterm weight were contraindications to KC. The use of closed questions was a limitation of the questionnaire as it did not allow participants to freely express their views. The request by the study investigator that the questionnaire be completed by the nurse who was most familiar with KC opens up the potential for bias, since these nurses were likely to have the greatest levels of knowledge about KC. The response rate was only moderate. In the 1980s, as advances in medical technology enabled health care providers to keep premature infants alive and to save increasing numbers of preemies, the number of premature infants who entered the NICU grew dramatically. Accommodating a larger number of infants in the open bay design also exposed every infant to all of the noxious elements of the NICU environment. Therefore, the staff realized that the NICU was creating a lot of stress for the infants and that infants were losing sleep (Gottfried,1985). Therefore, in terms of survival, premature infants were found to have multiple long term sequelae related to their prematurity and residence in the busy, developmentally inappropriate NICU. In the late 1990s,

researchers showed that premature infants do much better and have a faster recovery in smaller rooms because smaller rooms minimize many of the deleterious effects of the NICU environment (Fajardo, et al.,1994). Generally, KC improves in smaller room environments as it is an individualized microenvironment in which the infant usually goes to sleep (Ludington-Hoe et al.,2006)

**a) Kangaroo Care Studies on Perception**

Perceptions of healthcare workers were assessed via a self-administered questionnaire, again validated by experts (response rate = 73.3%). Perceptions of KC were positive and included the belief that KC made the premature infant feel secure (21.2%) and made the mother feel more confident (45.6%) and satisfied (72.7%). The majority (60.1%) of healthcare workers felt that KC should be promoted more widely both in their own and other hospitals.

Nirmala et al. (2006) carried out a study to assess KC perceptions among healthcare staff, and mothers with neonates with a birth weight range of 1070g-2460 g. KC expectations were assessed in a survey of 45 mothers over a 6-week period (attrition rate = 8%) and 33 health-care staff. A checklist used for the interviews with mothers was previously checked by nine experts but this was not included in the report and the questions were not summarized. No feedback is available about interviewees or their interaction with participants in the study. All mothers, however, felt that KC had improved attachment and helped them feel useful, contented, and grateful to be contributing to their infant's care; 86.7 percent reported no difficulties providing KC to their infants, and 30% believed that their milk production had now increased. Nonetheless, 88% said they planned to start with KC at home. Evalotte & Gene (2015) conducted a study of three high-tech NICUs in Sweden, two level II NICUs, and one level III NICU mostly on the views of nurses. For preterm infants between 32 to 36 weeks, the study defined KC as a few hours a day or almost continuous KC. A qualitative

study design was used to illustrate the views of the nurses about continuous KC. The study comprised of 129 participants with 98.4% of the participants female, had a mean age of 42 (SD+11) years, and were employed part-time (59.2%). Most participants had been employed in the study setting for several years (< 1 year, 12%; 1-5 years, 28%; 6-10 years, 15%; > 10, 45%). This study contained three categories of licensed pediatric nurse: intensive care nurses, n = 25 (4-4.5 years of University); practical nurses, n = 57 (three years of High School); and registered nurses, n = 47 (three years of University). The findings showed that, although nurses were aware of continuous KMC 24/7 days a week for mother-infant dyads, it was not routinely practiced in their unit. The nurses explained that, if it were practiced continuously, it would end up a burden to the nurses and to the mother herself. The nurses were afraid they would not be able to provide adequate care to the mother-infant dyads. The nurses were also concerned about the mother's health due to the too high demands of KC. Therefore, the nurses explained that, if the goal was to implement KC, a new nursing policy must be provided before implementation in order for it to be respected and considered by both parties and to be beneficial for nurses, mothers and infants. Nonetheless, for each of the premature infants in the experimental group, the researchers would introduce KC for just 1 hour a day, or 4 to 5 hours a week. Mothers were advised to start KC until the infant reached 3 months old of corrected age. The Pediatric Academy, (2013) recommends that KC be performed as often as feasible during the postpartum period, for the first three months of lif**e.**

**b) Kangaroo Care Studies on Knowledge**

Flynn and Leahy-Warren, (2010) published a report on the views and knowledge of neonatal nurses about KC in Ireland. The study found that fifty-six neonatal nurses (90.3%) agreed

that the kangaroo care method was a secure approach to the stable development of premature infants, accepting its advantages for both infants and parents. Overall level of knowledge of the KC method among neonatal nurses varied from good to excellent and the lowest score was 35/51. The analysis revealed that nurses were not convinced about KC with intubated infants, who usually require blood pressure support, umbilical lines and phototherapy. This indicates the need to provide KC training to encourage the development of more positive thoughts and to increase staff information regarding possible adverse effects on infants.

**c) Kangaroo Care Studies on Practice**

Leonard et al. (2008) conducted a phenomenological study to determine the expectations of parents who performed KC with their premature infants. Data were collected through interview sessions, observation, and writing. Six parents (four mothers and two fathers) had in-depth interviews, and the data were analyzed using thematic analysis. Eight themes emerged from the data collected: (1) unpredictable, unexpected and unsure; (2) birth experience; depression and obstacles; (3) personal connection; (4) modifications, rights and responsibilities; (5) evaluating achievement; (6) encouraging and supporting networks; (7) existing-in difficulties; and (8) willing to live outside of the hospital with infants. The mothers reported feeling powerless after the birth of their premature infant and had been unable to hold their infant, which had interfered with the bonding process. They also found it difficult to put their trust in healthcare workers. While in the NICU, at first, the mothers felt completely incompetent. KC facilitated bonding and increased parental confidence despite early anxieties, though KC providers demonstrated the effort and responsibility associated with this process of care. Parents knew that their premature infant's effective care was mainly determined by the weight gain of their infant, and expressed feelings of pride when their infant responded to KC practice.

### d) Kangaroo Care Studies on Barriers

Mahboobeh et al.(2016) reported that 60% of nurses in their survey stated that the main barrier to KC was the inconsistent attendance of mothers in the ward. Other mother-related barriers were that mothers were also afraid of touching their premature infant, were afraid of ward devices or had twin or triple infants. The mean (SD) score for institutional barriers was 28.9 (13.4). This domain had three sub-domains including educational barriers, personal barriers, and equipment and space barriers. In the domain of educational barriers, the most important KC barrier was parents' inadequate education and understanding about the importance of KC. In the domain of personal barriers, the need for a physician's order for KC was the most important.

To identify perceived sources of resistance to the implementation of KC among healthcare professionals, mothers or other family members, Charpak and Ruiz-Pelaez (2001) conducted an e-mail survey using an open-ended questionnaire. The survey involved the co-ordinators of functioning KC programs in 15 developing countries. The researchers also made 15 site visits to institutions that had reported problems in establishing these programs. Four broad determinants for resistance were identified: (1) KC component against which resistance emerged (i.e. position, nutrition, early discharge, the intervention as a whole); (2) source of resistance (i.e. mother, other family member, healthcare professional); (3) concern or reason for this resistance and (4) frequency and location of a particular resistance factor.

#### i) Sources of Barriers

The same sources of resistance were experienced during the implementation of many KC programs. Sources of resistance among healthcare professionals included the almost universal

perception that KC is a substandard form of treatment, an alternative for poor men in developing countries, and a widely held belief that KC presents an extra workload. Resistance among both mothers and healthcare professionals was related to cultural perceptions that KC was 'unfit' or 'uncommon' as it was between a naked infant and the KC provider. However, this belief was only evident in societies where the physical expression of feelings is considered unacceptable and public expression of emotion inappropriate. There was also widespread resistance (albeit of varying strength) among both mothers and healthcare professionals pertaining to privacy during KC, with both groups expressing discomfort when mothers were exposed to unknown people while they were learning the KC method. Other sources of resistance included reluctance to promote the wearing of bonnets and caps by infants during KC, experienced primarily by healthcare providers in low-income countries with a warm climate; the refusal of husbands or other family members (e.g. mothers-in-law) to grant permission for the mother to provide KC; and reluctance among mothers and healthcare professionals to allow fathers to provide KC.

**ii) Recommendations to Overcome Barriers**

Charpak and Ruiz-Pelaez (2001) included recommendations for helping to overcome sources of resistance to KC. They recommended that, prior to the implementation of a KC program, an open discussion be held with health care professionals about the broad evidence base for KC, and examples presented illustrating its use in developed countries. It should be highlighted to healthcare professionals that training mothers well in the provision of KC will ease nurses' workload and that KC is an investment that is well worthwhile in terms of the broad direct and indirect benefits offered. Culturally rooted resistance should be addressed at the local level, for example, by identifying culturally-appropriate devices to assist mothers or other KC providers to carry out this method of care. It is generally accepted that training and education on KC is best conducted in an open group setting which allows for interaction in a

supportive and stimulating environment; however, it is also acknowledged that this situation provides little privacy and may be intimidating for some mothers, particular where KC providers are of mixed gender (e.g. mothers and fathers). The provision of screens or private rooms is recommended, and this can help to protect modesty, while some mothers feel more comfortable interacting with female healthcare workers.

**e) Kangaroo Care Studies On Parental and Relationship Related Stress**

The effects of KC on both preterm infants and their mothers in South Korea were observed by Ahn., Lee, & Shin, (2010). The findings showed that all mothers had moderate levels of anxiety before KC was introduced but, after three weeks, scores for anxiety decreased in both groups. KC mothers displayed higher bonding levels than control mothers ($p < 0.003$). KC gave confidence to mothers in caring for their preterm infants through the experience of holding their premature infants regardless of their health status.

The findings of this study could be transferable to similar settings in other countries, although it is not possible to give an opinion on the applicability of the findings, specifically to infants with a birth weight < 2000 g, because the birth weight of the preterm infants is not known.

Cho et al (2016) conducted a quasi-experimental design study with a nonequivalent control group. A pretest and posttest were used to investigate the effects of KC on the physiological response of preterm infants>33 weeks of corrected gestation hospitalized , maternal-infant attachment, and maternal stress from May 2011 to October 2011. For each experimental and control group, twenty infants were recruited equally. KC was conducted as an intervention for 30 minutes each session, for a total of 10 times, three times a week. The findings showed that the parameters in the post KC: respiratory rate were significantly different between the two groups ($F=5.701$, $p<.020$), although maternal-infancy attachment scores in the experimental group were increased after the test ($F=25.881$, $p<.001$), and mother stress scores ($F=47.320$, $p<.01$) were decreased in the control group. Hence, KC was shown to have

positive significant effects on physiological functions and normalized respiration rates, enhanced maternal-infant attachment and reduced maternal stress. Other than that, in order to stabilize the physiological functions of the preterm infant, KC can be one of the most successful nursing intervention strategies in the neonatal intensive care unit for the treatment of preterm infants.

**f) Studies on the effectiveness of a Structured Teaching Programme (STP) on kangaroo care among mothers.**

A study in Gujarat conducted by Gayathri, Sampada, Hiral, Manisha, Silvi & Yashvanthi (2016) assessed knowledge regarding KC among mothers of LBW babies at the Hospital in Rajkot District, Gujarat. A pre-experimental design with one group pretest was used. Thirty mothers were selected using the convenient sampling technique. A structured knowledge questionnaire was used to administer the pre-test, which was followed by a structured teaching programme,. The post-test was administered after seven days using the same structured knowledge questionnaire to test the effect of the STP on KC among mothers with low birth weight infants. The questionnaire scores were classified according to levels of knowledge, such as insufficient level of knowledge, moderate level of knowledge and satisfactory level of knowledge. The study revealed a marked increase in the overall post-test knowledge score compared to the pre-test, which indicated the efficacy of the STP ($t=3.04$; $p<0.005$). It was reported that STP was a successful way of delivering knowledge to upgrade KC for LBW infants and their mothers in Gujarat.

Chia, Sellick & Gan (2006) strongly supported the use of KC in the NICU in their review of the attitudes and practices of Australian nurse practitioners. While most nurses reported good attitude practices, they identified a number of theoretical and technical concerns that needed to be addressed in order to ensure that KC is effective and safe with low birth weight infants.

The study was carried out at a major public hospital in Melbourne, with a total of 34 nurses working in the NICU. The two-phase study design included a descriptive component, and four participants were then selected for the in-depth follow-up interview to explore issues related to promoting KC in more depth. Notable constraints for promoting KC in the NICU were found to be extreme staff burdens, lack of knowledge, lack of management resources, and absence of clear protocols, specifically for LBW infants.

Another study by Panchal &Ravindra (2016) found that a Planned Teaching Program (PTP) on KC was an effective method of educating the postnatal mother in Dhiraj Hospital, Vandodara. The study was conducted among 50 postnatal mothers, using the non-probability convenience sampling technique, in Dhiraj Hospital. The mothers were assessed through a pretest and posttest following a PTP on knowledge regarding KC in terms of its definition, benefits, preparation and position. The difference in knowledge between pretest and posttest scores was 18.87, which is more than 1.699 at the 0.05 level of significance. However, investigation of an association between participants' pretest and posttest knowledge scores and their socio-demographic variables revealed that there were no significant associations with age group, gender and economic condition but there was a significant association between place of residence and origin of participants' previous knowledge. However this study only focused on maternal outcomes. There is a need to evaluate KC on infants' outcomes.

### 2.5 Conceptual Framework

The conceptual framework for this study comes from the context of the Donabedian quality of care Framework. It is a conceptual model which provides a framework for evaluating health services and assessing health care quality. Quality of care explains the extent to which

personal and family health services improve the probability of desired health outcomes and are compatible with the existing knowledge of the professional (Institute of Medicine, 1990). Avedis Donabedian developed this model as a generally accepted framework for assessing the key dimensions of quality in healthcare (Bureau régional de l'Europe de l'organisation Mondiale de lasanté, 1998; Kelley and Hurst, 2006; Mullan, 2001). The model emerged from the research performed by Donabedian in terms of quality of health care and patient outcomes. The model's core definition describes the strengths of healthcare and healthcare services as systemic components, and focuses on particular initiatives or quality care activities that provide skilled healthcare. The outcomes are the health-care procedure test processes. This model indicates that each component has an impact or influence on the other components; structural characteristics (healthcare environment or healthcare provider) have a possible effect on both process and outcome, and outcomes will be affected by changing the efficiency (Donabedian 1996, 2005). In a recent study, the relational dimension of mothers, infants, and nurses was considered; a specific cognitive-behavioral and learning system and a nurse system were used to improve the process of assessing perception, knowledge, and practice that leads to the success of the KC technique and the involvement of mother-infant dyads and nurses.

According to the model, quality of care knowledge can be derived from three elements, which are structure, process, and outcomes. (The 1996 Donabedian, 2005). The following are the three components involve:.

### 2.5.1 Structure Components

The structure component refers to the relative characteristics of the caregiver and the setting where treatment is given. These characteristics include personnel, education, training, expertise, and certification. The contexts in which support is given are defined in terms of the

appropriateness of staffing, facilities, safety precautions, and the entire organization of the institution. The researcher applied the Donabedian structural component model in this study, which focuses on the characteristics of infants, mothers, nurses, and the organization. The structural aspect of the study includes only the characteristics of the mother-infant dyads and nurses, since the characteristics of the organization go beyond the research objectives. Infant attributes include personal and nutritional profiles. The personal data components include infant characteristics such as gender, race, weight at birth(g), weight at study initiation(g), gestational age at birth, gestational age when initiating KC, duration of KC, when it was commenced and when it was completed, and mode of feeding. While the mothers' characteristics include maternal age (years), race, religion, marital status, delivery type (spontaneous vertex delivery(SVD) or cesarean section(CS), parity (primipara or multipara), educational level, occupation, employment status, household income (Ringgit Malaysia), breastfeeding status and post-partum stress. Nursing characteristics include nurses' age, gender, race, educational level, nursing educational level, working experience (SRN), working experience in NICU, post-basic neonatology status, KC training and marital status.

Characteristics of mother-infant dyads and nurses have been reported in previous studies to affect the study process or outcomes. Studies have shown that experienced nurses have better knowledge on the KC technique than those with less experience. Successful implementation of the KC technique includes appropriate nursing education, training of mothers on the KC technique, monitoring of the application of KC by nurses, and arranging for a blend of staff with varying skill levels and experience of KC. It is also essential to address institution-specific barriers to KC application, and to develop institution-specific strategies to overcome these barriers (Wallin et al., 2005; Bergman & Jurisco, 1994; Cattaneo et al., 1998). This study aims to evaluate the outcomes in terms of premature infant weight gain, LOS and breast breastfeeding rates, while maternal outcomes include perception, knowledge, perception of

barriers in relation to KC and parental and relationship related stress after participation in a KC-EP. Nursing outcomes include perception, knowledge, confidence level in the initiation of KC with premature infants with monitoring devices, confidence level to initiate KC with premature infants with ventilator support and perceived barriers to KC after participation in a KC-EP at the NICU, UMMC in the Klang Valley. Demographic characteristics of mothers might influence the outcomes of mothers in this study such as age, race, religion, delivery type, parity of mother, educational level, occupation status, employment status, maternity leave, KC trainning and post-partum stress. Therefore, these factors are known as explanatory variables used as process parameters in the collection of mother-infant outcomes data.

### 2.5.2 Process Components

In The Donabedian model (1981), the process aspect relates to the training and practice of mothers and nurses. Nurses have a significant role to play in the measurement and transmission of knowledge and skills in order to enable the successful implementation of KC by mothers with preterm infants. For the successful implementation of KC, nurses need adequate knowledge and skills related to strategies for convincing mothers of the importance of KC for their infant's well-being. Feeley & Gardner, 2006; Guttormson et al., 2010; Walker & Gillen (2006) stated that educational programs are crucial for improving nurses' knowledge, skills and attitude so they can perform this role effectively and efficiently. However, in this study, the KC-EP is conducted to enhance nurses' perceptions, knowledge, and confidence level in relation to the initiation of KC with premature infants with monitoring devices, increase their confidence level in initiating KC with premature infants with ventilator support and overcome their perception barriers regarding KC implementation. KC is an opportunity to help premature infants live a better life. Thus, a specific agreement should be established between the mother-infant dyad and the nurses (and other health professionals) on this method of therapy (Wallin et al., 2005; Nirmala & Rekha, 2006). KC

will not be effective when mothers are not committed or do not agree with it. Thus, for successful implementation of KC in a healthcare facility, face-to-face facilitation between the mother and the nursing staff is necessary. Chia, Sellick & Gan (2006) maintain that it is crucial to inform both mothers and nursing personnel to ensure a significant decrease in infant mortality through the implementation of KC. Educational intervention is seen as being essential in order to upgrade the efficiency of practice, application, and compliance with evidence-based practices (Payen et al., 2007; Tanios et al., 2009; Weir & O'Neill, 2008).

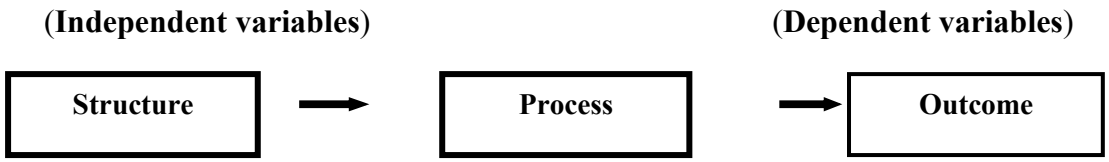
The unique strength for the implementation of KC is in the attitudes of the mother and nursing staff, as they contribute to the mother's commitment. A study conducted at Harare Central Hospital (Kambarami, Mutambirwa & Maramba, 2002) demonstrated the mothers' optimistic attitudes towards KC, and they recommended that KC be promoted through the media (television and radio) throughout the country. While KC can be performed at home (Quasem et al., 2003), and mothers are able to provide it (Quasem et al., 2003), it has been mentioned that even mothers experience discomfort when their infants grow bigger (Quasem et al.,2003). These factors may have a detrimental impact on the attitude of a mother towards KC continuing at home. In this current study setting, KC is not widely practiced and there is an absence of clear guidelines or protocol. It is predicted that mothers would change and nurses' knowledge and skills in relation to KC improve by conducting a KC-EP and having trained nurses; this would boost the level of treatment for preterm infants directly and indirectly. This present project thus focuses on the efficacy of the KC-EP in its effects on the outcomes of mother-infant dyads and nursing.The KC-EP is accepted as a process after pre-assessment is done. The structured KC-EP includes a theoretical and a practical session after pre-assessment is delivered to mother-infant dyads and nurses using the Kangaroo Care Questionnaire Survey (KCQs) as an assessment tool. The theoretical and practical sessions are aimed at enhancing mothers' and nurses' perception, knowledge and confidence level

regarding the initiation of KC with premature infants with monitoring devices, with premature infants with ventilator support, and overcoming perceived barriers, and improving skills and attitude in relation to KC implementation among preterm infants (28 to 36+ 6 weeks' of gestation). The practical session is intended to enable nurses and mothers to gain knowledge and skills related to the KC technique following the guidelines provided for premature infants. How the mothers and nurses perform is documented in the checklist provided at the posttest, but the skills are not evaluated as is beyond the scope of this study.

There are, however, factors relating to staff, patients, and doctors that have been highlighted as obstacles to the effective adoption of these techniques and algorithms (Miller et al., 2012; Tanios et al., 2009). Therefore, in this current study, these barriers must be identified to enhance the success of adoption and increase the willingness of mother-infant dyads and nurses to practice KC for premature infant quality of care.

### 2.5.3 Outcome Components

The results of the structure and the process are in the Donabedian model. Therapeutic options include outcomes as well as the beliefs, confidence, and knowledge of mothers and nurses related to health care (Donabedian, 1996, 2005). In this study, the effects of the KC-EP are measured at different phases of the study in relation to the outcomes of the mother-infant dyads and nurses. The results for mother-infant dyads and nurses will be measured by their personal satisfaction when attempting to implement KC, such as perception, knowledge, level of confidence regarding the initiation of KC with premature infants with monitoring devices, confidence level to initiate KC with premature infants with ventilator support and perceived barriers toward KC implementation which reflect personal beliefs, satisfaction, feelings and thoughts related to KC.



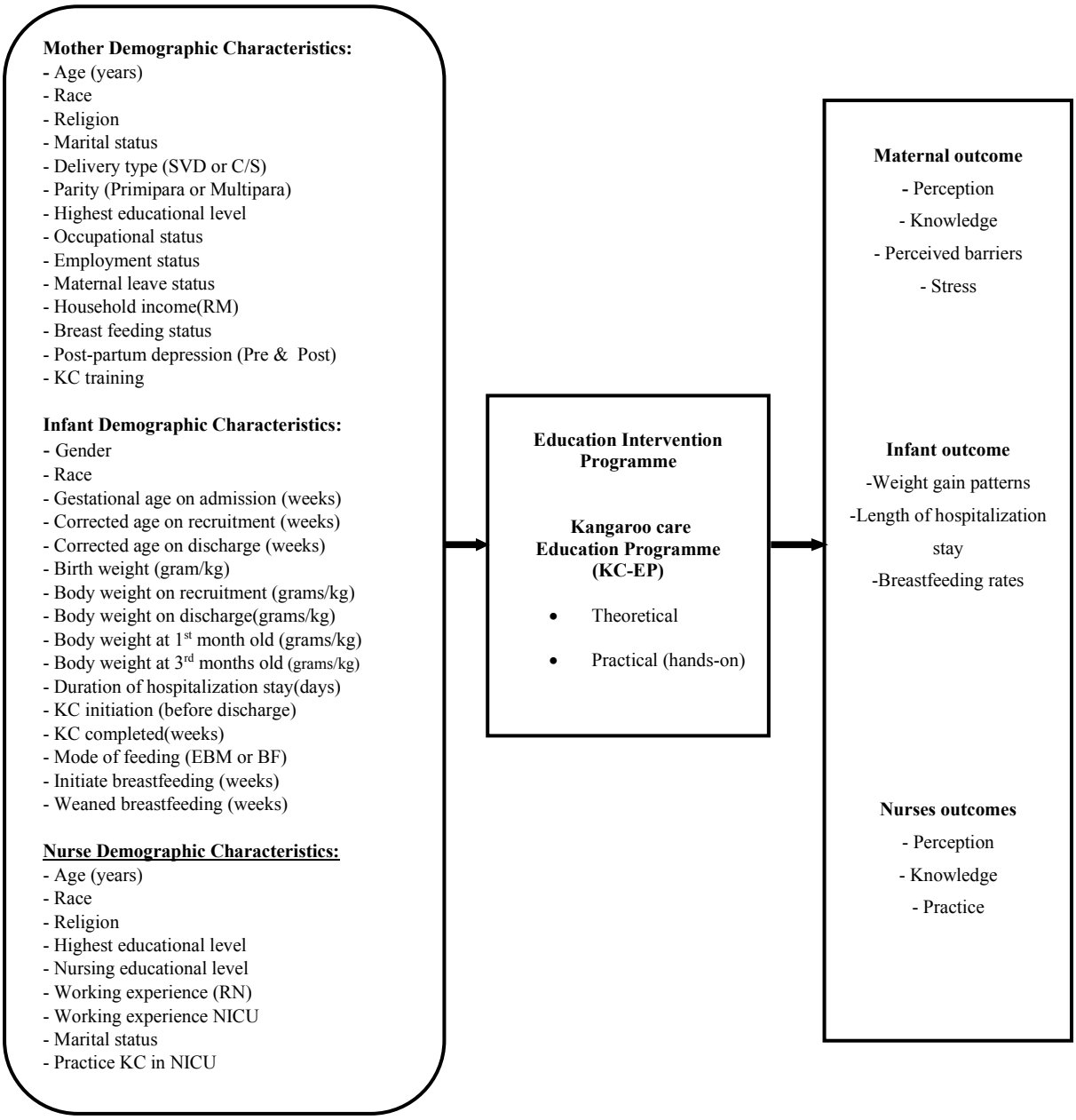



Figure 2.2: Conceptual Framework of Study from the Admission Day, Discharge And Follow–Up at 3 Months Old.

## 2.6 Conclusion

The literature suggests setting KC performance goals and using standardized guidelines and protocols for KC. However, to ensure success in the implementation of KC, the literature also emphasizes the need for the proper training of nurses and mothers.

Based on the literature review, it was noted the intervention studies focused on the outcomes measured in a unilateral manner, focusing on either mother, premature infant or nursing outcomes. No study has been found yet on measuring compliance with KC in order to improve the effectiveness of KC-EP according to weight gain, LOS, and breastfeeding rates at 3 months old for premature infants in Malaysia. Some of the studies also did not assess or report the adherence level to reflect the effectiveness of the intervention on outcomes.

Therefore, the focus of this study is aimed at introducing a KC-EP for mothers and nurses. The focus is on proper KC guidelines and protocols, and their benefits for the quality of care of premature infants. This is to enhance the effect of the KC-EP on mother and nursing outcomes. The study also aims to assess and explore mothers'and nurses' compliance rates in providing KC in order to make it a standardized and uniform practice in the NICU, which is then continued at home.

# CHAPTER 3: METHODOLOGY

## 3.1 Introduction

This chapter sets out the research methods used to discuss the present research questions of this study. It provides a detailed overview of the research design, study setting, population

and sampling method, research instruments, collecting data procedures, and data analysis plan.

### 3.2 Research design and methodology

Research is a systematic process aimed to identify the latest facts, ideas, or information and generate new findings about a specific phenomenon. Analysis methodology includes examining the assumptions, principles, and procedures of a specific investigative approach, and is characterized as the framework that applies to the whole research process (Cresswell, 2009). Research design is described as the total plan for acquiring or verifying new knowledge in such a way as to ensure that perhaps the answer(s) retrieved are relevant and truthful (Rebar, Gersch, Macnee & McCabe, 2011, p.175). The study design and methodology used in the present study are explained in the following sections below.

### 3.3 Study Design

This is a quasi-experimental(QED), longitudinal design study to collect data on the effectiveness of a kangaroo care education programmme (KC-EP) for mothers', nurses' and infants' outcomes. The QED is often described as a non-randomized, pre-post intervention study that is common in healthcare research when it is not logistically practicable or ethical to carry out a randomized control trial (Levin & Kate, 2007). This study met all four criteria of Harris, McGregor, Perencevich, Furuno, Zhu, Peterson, & Finkelstein (2006). Each reason is discussed below. In a human study, randomization in the intervention of known efficacy would not be allowed, unless the effectiveness is not known or doubtful. According to Jotzo, Martina & Christian (2005), psychological and mental support is required in critical circumstances, i.e. after premature birth. In the emotionally sensitive NICU environment, it seems unethical to provide some mothers with help, but other people oppose randomization for other reasons. A QED is an empirical instrument used to measure the causal effect of an

intervention on the basis of longitudinal evidence to decide whether the intervention has led to improvements in the outcomes of the target population. This study evaluated the effect of an educational programme on the outcomes of mothers, nurses, and preterm infants regarding KC techniques.

A QED design is considered an adequate technique for evaluating the causal and successful relationship between the independent and dependent variables found when a fully experimental or randomized control trial (RCT) design is not feasible (Harris et al., 2006). RCT is also not realistic for research into small-scale continuing education. Due to the aspect of non-random assignment to the control group or experimental group, a quasi-experimental research design was chosen as a multilevel intervention for the preterm infant. The experimental group participated in a structured training programme on evidence-based experience and skills: a KC-EP for mothers and nurses. The mother-infants dyad in the control group followed the standard unit practice, and both groups had homogeneous or similar characteristics.

### 3.3.1 Difficulty in randomizing the samples.

The NICU is a critical and intensive care unit. Randomization of the samples will be difficult, as admission can not be predicted and samples fulfilling the requirements will be limited.

### 3.3.2 Difficulty of randomization by study setting

The educational program can often not be randomized to individual environments because it is hard to prevent mothers from communicating with each other and from influencing the experimental groups, particularly if they are all in one ward. Thus data collection potentially masks the true effect.

### 3.3.3 Small available sample size

For situations where only a limited sample size is necessary to assess the feasibility of an intervention, randomization may not be adequate to achieve equilibrium (Levin & Kate, 2006). Finding an alternative design, though, is easier.

### 3.4 Study Setting

There are ten public hospitals and two teaching hospitals in the Klang Valley which provide neonatal care for preterm infants. Kuala Lumpur Hospital, Ampang Hospital, Selayang Hospital, Sungai Buloh Hospital, Tengku Ampuan Rahimah Hospital, Banting Hospital, Kajang Hospital, Serdang Hospital, Putrajaya Hospital, and Shah Alam Hospital are among the ten public hospitals. The two hospitals in the northern region are Hospital Besar Alor Setar and Hospital Besar Pulau Pinang. The University Malaya Medical Center (UMMC) and the University Kebangsaan Malaysia Medical Center (UKMMC) are both teaching hospitals. The researchers sought authorization to conduct the study at the above hospitals. Of these hospitals, only UMMC replied. The setting of this study was the neonatal intensive care unit (NICU) at UMMC. UMMC is a tertiary referral hospital that receives patients from all over Malaysia. It is also a research hospital, with a culture that is expected to support a study on the effectiveness of KC.In addition recent statistical data shows an increase in the percentage of premature births from (2.54%, n=140) in 2011 to (8.49%, n=450) in 2015.

The NICU unit is fully equipped and has trained staff to handle severely premature infants, as low as 22 weeks' gestational age. The NICU, UMMC currently has 39 admission beds and 12 incubators only. The beds are allocated as follows, namely beds 1 to 12 are provided for Intensive Care Unit (ICU) babies, while beds 13 to 25 are for High Dependency Unit (HDU) babies, and beds 26 to 39 are for the recovery unit. Statistically, over a month, about 38 to 40 infants are admitted to this unit. These infants will be nursed and treated according to their condition, some of them will be nursed under an open radiant warmer, in an incubator or bassinet. Occasionally, if the beds are fully occupied, those stable premature infants who

have attained a weight of 1.8 kg can be discharged. If this is not possible, the premature infant will be transferred to another ward, such as a pediatric ward i.e. Pediatric ward A(PA) or Pediatric ward B(PB), for the continuation of observation and treatment.

### 3.5 Ethical Consideration

This study has been approved by the Medical Research Ethics Committee of the University Malaya Medical Centre (UMMC). Research ID:201765-5310 (Appendix A). Letters to conduct research in the Neonatal Intensive Care Unit (NICU), UMMC, Klang Valley were obtained from the Hospital Director, Head of Pediatric Department, (Appendix B), Nursing Director in charge and Ward Manager in NICU (Appendix C). Approval was received via email from Susan Ludingtone-Hoe to use the Kangaroo Care Questionnaire Survey (KCQs) tool and from Margaret Miles to use the Parental Stressor Scale: Neonatal Intensive Care Unit, Parental and Relationship (PSS: NICU: P&R) scale only. Lastly, mothers and nurses were reassured that the study was confidential. Anonymity was established by using codes. After a clear and detailed explanation on the study, informed consent was obtained from the mothers and nurses (Appendix D & G).

### 3.6 Population and Sampling

A population is a group of individuals to whom the researchers want to generalize their findings (Gay & Airasian, 2003). A population is also a group of people with unique characteristics which differentiate it from other groups (Cresswell, 2002; Kerlinger & Lee, 2000). The population was comprised of all mothers who had preterm infants admitted to the University Malaya Medical Center (UMMC), neonatal intensive care unit (NICU). Furthermore, the nurses were working in the NICU, UMMC. The population was estimated as stated below.

The UMMC, as a referral center, recorded an average of five thousand four hundred and ninety four (5494) mothers giving birth in 2011 and five thousand two hundred ninety eight (5298) in 2015, respectively (Table 3.1).The average number of premature infants admitted to UMMC was about 450 - 500 admissions yearly. For this study, the population was all mothers whose premature infants were admitted to the NICU at UMMC during the study period and they were recruited non-randomly based on infant admission days.

Table 3.1: Total Newborn Births and Total Premature Births at UMMC from 2011 To 2015

(Source: UMMC, Patient Information Management Section, Statistics Department, 2017)

| Year | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|
| Total births | 5494 | 6275 | 6402 | 5497 | 5298 |
| Total premature births | 140 (2.54%) | 136 (2.16%) | 190 (2.98%) | 263 (4.78%) | 450 (8.49%) |

### 3.6.1 Target population

A target population is the total collection of people from whom a sample could be taken (Ary, Donald, Jacobs, Lucy Cheser, Razavieh, Asghar, & Sorensen, 2010). The target population in this research was mothers whose preterm infant's corrected age was between 28 to < 36 + 6 gestational weeks, and also nurses working in the NICU, UMMC.

## 3.7 Criteria for sampling

All mothers admitted to the NICU during the study period who had preterm infants were recruited according to the following criteria:

### 3.7.1 Inclusion and exclusion criteria

The decision to perform kangaroo care (KC) does not rely solely on the degree of neurodevelopment or postpartum age, but also on the stability of the infants. After birth, or within a few hours, days, or weeks, the baby can still be in an incubator or cradle as well as be clinically stable.

The selection of infants was based on the following criteria:

• premature infant at corrected age between 28 weeks to 36+6 weeks' gestation.

• infant clinically stable, eligible for KC, and admitted to the NICU.

The exclusion criteria for infants were:

• surgical infant i.e cleft lip, cleft palate, spina bifida, exomphalos and omphalocele.

• infant required medical treatment eg. prolonged phototherapy treatment.

• trisomy 21.

Mothers with preterm infants in the NICU who were able to perform the KC technique. Therefore, the selection criteria for mothers were as follows:

• all mother-premature infants with corrected age between 28 to 36+6 weeks of gestation.

• mothers who were older than 18 years old and were able to give their consent.

• mothers who could speak and read either English or Malay.

• mother had no medical or surgical condition which required medication which interfered with breastfeeding and was eligible to perform KC for her preterm infant.

The exclusion criteria for mothers were:

• mothers who had previous premature infants.

• mother of quadruplets or more

• mother who had any medical and surgical conditions that required medication which interfered with breastfeeding and was not eligible to perform KC for her premature infant

Nurses also play a significant role in caring for mothers and babies during the maternal, perinatal and postnatal phases. They need to have expertise and confidence in their skills to provide neonatal treatment. The target group of nurses was registered nurses employed in UMMC's NICU. They were all invited to participate in this analysis to ensure the sample size was sufficient.

### 3.7.2 Sample Size Calculation for Mother-Infant Dyads

The sample size for mother-infant dyads was calculated using the two-sample independent t-test. This was based on a previous study and this study's primary outcome (Rao, Udani, & Nanavati, 2006). The two-tailed comparison group was used in the sample size calculation using the formula below. The mean difference in weight gain was 8.41 (Rao et. al., 2006) pre and post-intervention, while 0.8 was the standard deviation. These values were applied in the formula based on the study done by Rao et., al (2006).

The formula, $n = \frac{2[Z\alpha/2 + Z\beta]^2 S^2}{(\mu 1 - \mu 2)^2}$

Thus, $Z\ \alpha/2 = 1.96 \quad Z\ \beta = 0.842$

$\mu 1 - \mu 2 = 0.54 \quad S = 0.8$

The formula, $n = \frac{2[1.96 + 0.84]^2\ [0.8]^2}{(0.54)^2}$

$n = \frac{2\ [\ 2.802]^2\ (0.64)}{0.29}$

$n = \frac{2\ [7.85]\ (0.64)}{0.29}$

$n = \frac{10.05}{0.29}$

Thus, n = 34.65 = 35 subjects for each group.

Additional 30% = 50 subjects for each group.

An additional 30% was added to the estimated sample size to account for possible missing values and non- responses. The final sample size calculated was 50 for the sample population, and 50 for the experimental group.

The two groups of preterm infant-mothers were recruited from those who were admitted to the NICU. The first set of samples ( n=50) was recruited from early February 2018 until July 2018.The preterm infant-mother dyads who were admitted within these months were allocated to the control group, while recruitment for the experimental group of preterm infant-mother dyads (n=48) was initiated from early September 2018 until April 2019, after completion of the intervention program for the nurses. In both groups, the sample size for the control group was (n=48) and the experimental group (n=48), for a total sample size of (n=96).

### 3.7.3 Sample Size Calculation for Nurses

The universal sampling method was used to recruit neonatal nurses in view of the small number of nurses available as the target population for this study. Therefore, all the available nurses i.e 46 nurses and 1 head nurse were invited to participate in the study on a voluntary basis.

## 3.8 Research Instrument

A questionnaire was the primary analysis instrument for data collection. A questionnaire is a well-established tool for social science research data collection (Dillman & Smyth, 2007). The measurement scale was chosen for this study from the review of the literature and from previous research. For this study, two sets of research tools were used to collect the mothers and nursing outcomes. Questionnaire I [Appendix E(a) & E(b)] was for the mothers and Questionnaire II (Appendix H) was for the nurses. Questionnaire I was provided in two major languages i.e. English and translated Malay version for better understanding for the mothers in Malaysia who is not well versed in English. Questionnaire II was available in

English, while the instrument for the premature infants was the Kangaroo Care Progress Record (KCPR) or booklet with English and Malay versions provided (Appendix I)

### 3.8 Mothers

#### 3.8.1 Questionnaire I

This questionnaire contained two sections: Section A, Mother's demographic characteristics and Section B, which consisted of four main parts: Parts I, II, III examined mothers' perception, knowledge, and perceived barriers related to the KC technique and Part IV measured their maternal stress levels when their premature infant was admitted to the NICU. There were 57 items**.** [Refer to Appendix E(a) and E(b)].

***Section A: Demographic Characteristics***

Section A collected the demographic characteristics of mothers in the NICU at UMMC. All fourteen (14) variables were designed to gather the baseline data and follow the study's objectives. The variables included in this study were maternal age (years), race, religion, marital status, delivery type: spontaneous vertex delivery (SVD) or caesarean section, parity of mother: primipara or multipara, highest educational level, occupational status, employment sector status, maternity leave status, household income (RM), breastfeeding status, post-partum stress status (pre and post) and KC training course. The rationale for using these data was to assess if the variables chosen had any effect on the perception, knowledge, perceived barriers, and level of stress of the participants.

***Section B: Perception, Knowledge, Perceived Barriers, And Stress.***

***a) Part I: Mother's Perception of Kangaroo Care***

Part I, the mother's perception of KC, was adapted from the original KCQs tool, developed by Arthur J Angler, & Eileen Brumbaugh., Ludingtone-Hoe et al. (2013). A similar questionnaire was used for the nurses' perception of KC. However, there were differences between nurses and mothers in the items in the informational needs questionnaire; each item

in the mothers' perception section was slightly modified according to the mothers' needs. For the nine (9) items that were modified refer to Appendix B. A 5-point Likert response format was adopted. The descriptor strongly disagree (1) was the lowest scale, followed by disagree (2), neither agree nor disagree (3), agree (4) and strongly agree (5). Out of 20 items there were five items (4,5,8,17,19) that were reversely rated. To identify the level of change in mother's perception regarding the KC technique, the perception scores were transformed into mean scores and then divided into two groups: high perception was below M=2.92 and low perception was above M=2.92.

***b) Part II: Mother's Knowledge on Kangaroo Care***

Part II of the mother's knowledge questionnaire was adapted from the original KCQs tool developed by Arthur J. Angler, & Eileen Brumbaugh, Ludingtone-Hoe, et al. (2013) with slight modifications so as to be relevant and meet the objectives of the mothers'outcomes. There were similar knowledge questionnaires for the mothers and nurses regarding their ability to implement KC. Mothers were requested to circle a number and indicate their opinion on their knowledge of KC. The scoring was from not sure (1) to false (2) and true (3). The items were worded in both positive and negative terms (Table 3.3). Positive items answered with 'true' were considered correct and incorrect if they were answered 'false' or 'not sure'. Out of 11 items, there were six positive statements, which were (1,2,4,6,7,8), and five negative statements, which were (1,2,3,5,11). A higher score indicated a higher level of knowledge with reference to the descriptors. Higher mean scores of M=2.03 and above-indicated mothers had a good level of knowledge regarding KC, while lower mean scores below M=2.03 indicated a poor level of knowledge on KC.

***c) Part III: Mother's Perceived Barriers Regarding Kangaroo Care***

In Part III, the mothers' perceived barrier subscales questionnaire was used, adapted from the original KCQ tool developed by Arthur J. Angler & Eileen Brumbaugh, Ludingtone-Hoe et al. (2013) with slight modifications made to meet the objectives of the mothers' outcomes. There were parallels between the nurses' and mothers' information on perceived barriers regarding their influence on implementing KC. The nineteen (19) items were modified, and this is shown in Table 3.4. Mothers were requested to circle a number to indicate important perceived barriers while implementing KC. A 5-point Likert response format was adopted. Descriptors were: not influential at all (1), not very influential (2), neither influential nor non-influential (3), somewhat influential (4), and very influential (5). With reference to the descriptors, the closer the score to 5, the higher the level of mothers' perceived barriers to KC implementation. Out of the nineteen (19) items, two (2) were negative statements, which were (16 &17). Those items were rated reversely. A higher score indicated a higher level of perceived barriers with reference to the descriptors. The perceived barrier scores were transformed to mean scores, then classified into two (2) groups. A mean score of M=2.42 and above indicated a high level of perceived barriers, and below M=2.42 indicated a low level of perceived barriers to KC implementation.

***d) Part IV: Mother's Stress regarding Parental Stressor Scale*: *(PSS: NICU P&R)***

Part IV of the questionnaire refers to knowledge from mothers about stressful experiences when their preterm infant is admitted to the NICU. The scale, developed by Miles et al. (1999) in a validated questionnaire to measure parental perceptions of the stressors encountered in the NICU, puts emphasis on reactions to long stays in the NICU. The PSS: NICU:P&R has been used extensively all over the world. It has been used by researchers in Malaysia (Swee Long et al., 2017); India (Chourasia et al.,2013); Hong Kong (Liu et al.,2010); Norway (Kaaresen et al., 2006); USA (Melnyk et al., 2010; Melnyk et al.,2006; Turan et al., 2008); Australia (Sweet & Mannix, 2012); and Canada (Zelkowitz et al.,2008).

The PSS scores reported in the NICU validation test ranged from 0.70 to 0.98. Miles' latest revision is a self-report scale of 26 items that measure parental stress related to three NICU situations: NICU sight and sound (5 items), baby appearance, behavior, and treatments (14 items), and alteration of relationship and parental roles (7 items). The researchers in this study have used the Parental Stressor Scale: Neonatal Intensive Care Unit (PSS: NICU: P&R). Confirmatory factor analysis (CFA) to confirm the appropriateness of this instrument for the current setting, statistical methods performed to test the reliability of this question is to evaluate through Cronbach's alpha in this section was carried out on this part of the questionnaire (PSS: NICU: P&R). All seven (7) items were positively and negatively worded as shown in (Appendix B). Out of seven items, there were five positive statements, which were (1,3,4,5,7), and two negative statements, which were (2 and 6). A 5-point response Likert scale was used: not stressful at all (1), a little stressful (2), moderately stressful (3), very stressful (4), and extremely stressful (5). In the current study, PSS:NICU:P&R scores were categorized based on Chourasia et al., 2013, who rated level of stress as high-level stress (4-5), moderate level stress (3-3.99) and low stress (1-2.99). Scoring was presented as a mean score. For the purpose of KC-EP and kangaroo care implementation, maternal level of stress was further categorized. A higher score showed a higher stress level with reference to the descriptors; a high level was (3-5) and a low level was (1-2.99). The stress scores were calculated and converted into mean scores, then categorized into two (2) groups. The highest mean scores of M=2.63 and below indicated a low level of stress while mean scores above M= 2.63 indicated a high level of stress related to preterm infant’s admission to NICU.

### 3.9 Premature Infants

The instrumentation for premature infants consisted of data from the KCPR or booklet provided. This comprised two sections; Section A for demographic characteristics and Section B for the data collection on preterm infant outcome variables at $T_0$, $T_1$, and $T_2$. The KCPR booklet contained the following:

***a) Section A: Infant's Demographic Characteristics***

Section A collected the premature infants' demographic characteristics data from both groups. All nine (9) variables were formatted to gain information on the baseline data of the infants. The variables included gender, race, birth weight (kg), gestational age at birth (weeks), corrected age on recruitment (weeks), corrected age on discharge (weeks), mode of feeding (tube feed, syringe-feed, cup-feed or breastfeed), type of milk, expressed breast milk (EBM) or breastfeeding, initiation of breastfeeding (weeks) and weaning from breastfeeding (week/month). The rationale for using these variables was to assess if the selected variables had an impact in terms of primary and secondary outcomes on the perception, awareness, perceived barriers and stress of the mothers.

***b) Section B: Infant's Kangaroo Care Progress Record (KCPR) or Data Sheet***

Section B assessed the progress of the premature infant in terms of primary and secondary outcomes. The primary outcome variables were weight gain and LOS, while the secondary outcomes were breastfeeding rate or feeding status. All nine (9) items were adapted from the original article by Singh, Amritanshu and Mukherjee, (2014) and Biswas, Malpani & Ekka, (2016) with a slight modification and format to satisfy the research goals relevant to the main and secondary monitoring requirements of the use of KC to assess outcomes. The variables consisted of baseline temperature, age of KC initiation (week/days), weight at KC initiation (g/days), weight gain velocity (g/days), duration of KC (in hour/day), duration of stay (days), types of milk (EBM or breastfeeding), initiation of breastfeeding (weeks) and weaning from breastfeeding (weeks) for both groups. The KCPR booklet was designed and presented to the

respective control and experimental groups. The difference in the KCPR booklet was the knowledge needed for the experimental group to get the input given to the control group for preterm infants (routine activities and standard care) and KC performance. The data for the preterm infants in the control group were documented according to standard practice care or routine practice in the NICU. [Please refer to Appendix F(a) and F(b)].

**3.10 Nurses**

**3.10.1 Questionnaire II**

Questionnaire II consisted of two sections: Section A comprised the demographic characteristics of the nurses and Section B included three (3) main subscales for nurses' personal beliefs related to KC implementation in Parts I, II and III. There were 56 items. (see Appendix H for further information).

***a) Section A: Demographic Characteristics***

Section A data were collected based on the demographic characteristics of the nurses in UMMC's NICU. All eight (8) variables were formatted to gather the baseline data and fulfill the study objectives. The variables included in this study were: age, race, marital status, working experience (RN), working experience in NICU, neonatal nursing certification, KC practice in NICU, and KC training experience. The rationale for measuring such data was to determine whether the selected variables had an effect on the perception, knowledge, and practices of the study participants in relation to KC.

***b) Section B: Kangaroo Care Questionnaire (KCQ)***

In section B, the researchers used the KCQs tool developed by Arthur J. Angler & Eileen Brumbaugh., Ludingtone-Hoe., et al. (2013) for nurses. The questionnaire was adopted and slightly modified according to the Malaysian context; permission to standardize the questionnaire was granted by the owners of the tool themselves via email. The tool was selected to evaluate the effectiveness of KC practice in the Malaysian setting. The KCQs

were chosen in comparison to other scales, due to their simplicity and excellent reliability and validity. This scale is well known and has previously been used nationally by the formulator of the KCQs and other researchers. Other than that, according to the author's emailed communication the tool has been used with perinatal nurses from the north eastern United States and National Association of Neonatal Nurses (NANN) with an initial data reliability of 0.79 – 0.90 for each of the parts. The Cronbach's alpha is similar to our study range of between 0.78 – 0.95 for mothers and 0.79 – 0.90 for nurses. Only 56 items were used for the quantitative data for this study, consisting of three main parts that measured personal beliefs regarding perception, knowledge, and practices (monitoring device support) in relation to KC implementation. In addition, seven (7) staff nurses, each of whom had at least eight years of neonatal nursing experience, reviewed and updated the KCQs for clarification and consistency (Ludington-Hoe et al., 2001).

***a) Part I: Nurses' Perception of Kangaroo Care***

Part I assessed nurses' perception of KC related to their personal beliefs and the experiences that they had in the NICU. All twenty-five (25) items were adapted from the original KCQ tool developed by Arthur J. Angler & Eileen Brumbaugh, Ludingtone-Hoe et al. (2013), with slight modifications to meet the objectives of the study. A 5-point Likert response format was adopted. Descriptors were: strongly disagree (1) as the lowest score, followed by disagree (2), neither agree nor disagree (3), agree (4) and strongly agree (5); descriptor 5 was the highest score. With reference to the descriptors, the closer the score was to 5, the greater the appropriateness of the item. The items were positively and negatively worded (Appendix G). Positive items answered as 'strongly agree' or 'agree' were considered correct and if answered as 'strongly disagree', 'disagree' and 'neither agree nor disagree' were considered incorrect. The negative items were reversely rated. Out of 25 items there were 15 positive statements, which were (1,2,8,9,10,13,15,16,17,18,20,21,22,24,25), and 10 negative

statements, which were (3,4,5,6,7,11,12,14,19,23). The perception scores were converted into mean scores and then categorized into two groups. Mean scores of M=2.77 and below indicated a high perception of KC, while mean scores above M=2.77 indicated a low perception related to KC implementation. Therefore, mean scores of above 2.77 indicated less experience of KC with preterm infants in the NICU.

***b) Part II: Nurses' Knowledge of Kangaroo care***

The Part II questionnaire was on nurses' knowledge, determined by 20 true-false items to assess nurses' knowledge pertaining to initiation of KC with preterm infants in the NICU setting. The items were adopted from the KCQ tool developed by Arthur J. Angler & Eileen Brumbaugh, Ludingtone-Hoe et al. (2013). Nurses had to grade their level of knowledge according to 'not sure' (1), 'false' (2) and 'true' (3). These items were selected because they contained sufficient information to evaluate or report on the KC-related knowledge of mothers and infants. The items were worded in a positive and negative way. Positive items answered as 'true' were considered correct and if answered 'false' or 'don't know' were considered incorrect. The negative items were reversely rated. Out of 20 items there were 11 positive statements, which were (4,6,7,8,9,10,13,14,15,18,19), and nine negative statements, which were (1,2,3,5,11,12,16,17,20). The scores for knowledge were converted into mean scores, and then classified into two parts. Higher mean scores of M=2.34 and above indicated good knowledge, while mean scores below M=2.34 indicated poor knowledge and experiences in relation to KC in the NICU.

***c) Part III: Nurses' Practice of Kangaroo Care***

Part III related to nurses' satisfaction in practicing KC with premature infants with various types of conditions or treatment in the NICU. The eleven (11) items were formulated by adopting the subscale for practices with monitoring devices. The items were adapted from the original KCQ tool developed by Arthur J. Angler & Eileen Brumbaugh, Ludingtone-Hoe et al. (2013) with minor changes to meet the study objectives and specifications. Nurses were requested to circle a number to indicate their confidence level and skills based on a 5-point Likert scale. The descriptors were: very uncomfortable (1), somewhat uncomfortable (2), neither comfortable (3), somewhat comfortable (4) and very comfortable (5). Out of 11 items, there were four positive statements, which were (1,2,5,6), and seven negative statements, which were (3,4,7,8,910,11) Table 3.11. The items were positively and negatively worded. Practice scores for the monitoring device were converted to mean scores and then divided into two categories. Mean scores of M= 2.26 and below indicated a high level of confidence and skills in initiating KC, while mean scores above M=2.26 indicated a low level of confidence and skills in initiating KC with monitoring devices in the NICU.

### 3.11 Kangaroo Care Educational Programme

Biswas, Malpani & Ekka, (2016) concluded that nurses with no formal training of KC were often limited in their KC practice. These components were also intended to improve the knowledge and skills of nurses in the appraisal of mother-infant dyads to help them achieve KC and to promote breastfeeding as the primary and secondary outcomes. Gayathri, Sampada, Hiral, Manisha, Silvi, & Yashvanthi, (2016) suggested that a structured teaching program (STP) would enhance KC knowledge among postnatal mothers with low birth weight infants. Subsequently, the structured kangaroo care education program (KC-EP) for mothers and nurses was conducted to enhance knowledge and skills related to KC's benefits and included a theory and a practical session.

This program was based on Knowles' adult learning theory, with the Andragogy model's five assumptions. According to Rogers (2001), a single motto-learner abides by the effective teaching of adult students. The program sought to acquire the cognitive (intellectual), affective (values, emotions, and feelings) and psychomotor (motor skills) competence that reflects the imperative of enhancing nursing education skills, knowledge, and attitudes (Anderson & Krathwohl, 2001; Huitt, 1992; Bloom et al., 1956). Munn stated that learning is more or less a permanent change in behavior as a result of observation, training and action, either in person or by teaching (Kahayon & Aquino, 1995). The informed consent, verbal and written, of all the study subjects was taken before the study started.

***i) Structured Kangaroo Care Educational Program for Mothers (KC-EP)***

The KC-EP for mothers is a special program designed to help preterm infant mothers admitted to the NICU share evidence of the benefits of KC and show them how they can perform KC. There are plenty of online reading and video resources available: blogs, books, magazines, newsletters or newspaper articles, on issues faced by preterm infant mothers admitted to the NICU and how they can reduce maternal stress during separation and improve their neonatal care capabilities related to the NICU. Most of the available materials are general and do not address specific guidelines and practice protocols for performing kangaroo care.

Therefore, a formal content module for mother-infant dyads was developed for the KC-EP. The KC-EP focused on the psychological and physical aspects related to the preparation for and implementation of the KC procedure (before, during, and after). Subsequently, proper handwashing techniques (before and after touching the premature infant) and KCPR booklet documentation were implemented. On the other hand, for interpersonal communication or interaction between mothers and neonatal nurses in the NICU and good relations were established. In addition, mothers were also encouraged to participate in some tasks that were

usually carried out by current ward staff for their premature infants in the NICU, i.e. changing diapers, feeding tube or cup feeding and breastfeeding. In other words, for mothers, the KC-EP was more formal, simplified and based on contextualizing the needs of the regional culture in Malaysia. The positive point is that these short notes, such as flipcharts and leaflets in both languages, could be used to illustrate points for the premature infant mothers and as a quick reference for the neonatal nurses.

This program (KC-EP) had the general objective of ensuring the intervention with the mother-infant dyads was effective and possibly at no cost. The specific aims were to:

a. Provide mothers with educational information related to KC to ensure the quality of premature infant care at the hospital and after returning home.
b. Assist mothers in situations, and with facilities, and routine care in the NICU during their premature infant's hospitalization in the NICU.
c. Develop interpersonal communication and interaction between mothers and neonatal nurses.
d. Support mothers regarding the psychological aspects of their premature infants.
e. Advocate for mothers to perform kangaroo care at least 1 hour a day and accumulate to 4 to 5 hours a week until 3 months of age. Evidenced by Kangaroo Care practice.

**i) Contents Module Theory (30 minutes)**

1. *Introduction : Kangaroo care .*

   Kangaroo care (KC) started in Bogota, Colombia approximately 30 years ago. According to WHO ( 2014) KC is in Africa - Benin, Burkina Faso, Ethiopia, Mali and Malawi ; in Asia - India, Indonesia and the Philippines (Recent study, 1990, 2012); and in Europe - France, Denmark, Belgium,

Netherlands, Italy, Spain, the United Kingdom and Sweden, (Spanish research survey, 2013). Evidence suggests that visiting, holding, talking and skin-to-skin contact are linked to positive outcomes for infants and parents during and after hospitalization (Feeley, Genest, Niela-Vilïn, Charbonneau, & Axelin, 2016)

KC improves cerebral blood flow (CBF), thus influencing the structure and encouraging the development of the brain of the premature infant. (Korraa, El Nagger, Mohamed, & Helmy, 2014).

KC can be used to promote emotional bonding between mothers and infants and to regulate a premature infant's physiological functions, and is perhaps one of the NICU's most effective nursing interventions for premature infants and their mothers (Cho et al.,2016).

Evidenced: Doctors and nurses have been trained on KC theory and skills procedure in NICU, UMMC.

2. 1) Definition of KC

*What is kangaroo care?*

It is a special method of caring for a premature infant in which the baby is positioned for at least 1 hour a day in an upright skin-to-skin and chest-to-chest contact with its mother. This is started by moms in the NICU and continues at home for the first three months.

Ludingtone-Hoe,et al.,(1990;2013&2018)

3. State the benefits of kangaroo care to infant-mother dyads.

*Why should I perform Kangaroo Care?*

Babies and mothers get a lot of benefits:

*3.1 For infants*;

i) Increases the sleep of infants, which can enhance weight and brain development.

ii) Controls temperature, heart rate, and respiration for infants.

iii) Supports successful breastfeeding sessions and reduces infection.

iv) Shortens the length of hospital stay.

*3.2 For mothers;*

i) Increases confidence in ability to care for babies.

ii) Enhances bonding, feeling of closeness with babies.

iii) Improves mothers' milk production.

iv) Creates more nurturing interactions.

4) Explain the kangaroo care technique.

*Who can perform Kangaroo Care?*

Mums should do it. Every medical situation at NICU, however, is different. So ask your nurse, if your infant is a successful candidate indeed. If you can't do KC or don't feel confident, don't worry. But there are plenty of ways to help and take care of your infant. Speak to your nurse.

*When can I perform Kangaroo Care?*

You can perform at any time between 90 to 120 minutes after feeding. Schedule a suitable time with your nurse and set aside at least 1 hour or 60 minutes a day, and plan to sit 4 to 5 hours a week with your baby. Please feel free to ask a member of the NICU team for further information.

5) State the preparation before, during and after the KC procedure.

*How do I perform Kangaroo Care?*

You're going to dress your baby up in a diaper and head cap. Your baby should be positioned upright between your breasts. Have its tummy against

your chest. Head turned to one side, arms and legs in a bent position. Support your baby's head, back and buttocks. [Please refer to Appendix O (a) and O(b)].

Ludingtone-Hoe,et al.(1990,2013,2018) & Nqyist,(2010)

**ii) Contents module for the practical session (30 minutes)**

Objective

1. Reinforce mothers with proper hand-washing techniques. Wash hands each time when entering and leaving NICU, after diaper changes, personal hygiene and feeds. (Appendix N)

   *How do I wash my hands correctly?*

   Using the steps below, washing your hands properly requires about as long as you sing Happy Birthday twice.

   - Wet hands with water
   - Apply enough soup to cover all hand surfaces
   - Rub hands palm to palm
   - Right palm over left dorsum with interlaced fingers and vice versa.
   - Palm to palm with fingers interlaced.
   - Back of fingers to opposing palms with fingers interlocked
   - Rotational rubbing of left thumb clasped in right palm and vice versa
   - Rotational rubbing backwards and forwards with clasped fingers of the right hand in left palm and vice versa
   - Rinse hands with water
   - Dry through with a single-use towel

- Use a towel to turn off the faucet
- And your hands are safe.

(WHO,2020)

**2.** List the equipment for kangaroo care procedure;

*2.1 Infant*

- Infant thermometer
- Woollen head cap & woollen booties
- Diaper & receiving baby napkin
- Baby blanket

*2.2 Mother*

- Chair
- Blouse open in front
- Small mirror

**3.** Demonstrate and return-demonstrate

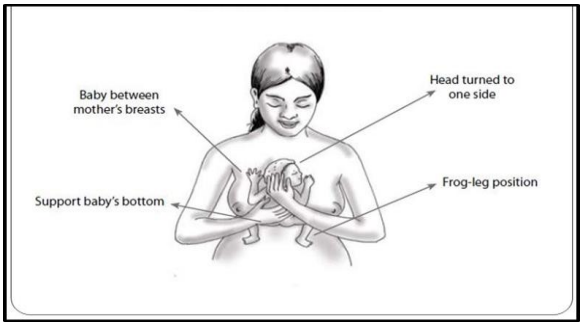



Figure 3.1: Shows the kangaroo care position

a) Greet mother, introduce yourself, and explain the purpose of the procedure.

Rational(R): Mother understands the correct KC position for the infant;(head midline, well flexed, nares/mouth visible)

b) Prepare the mother's and infant's equipment & screen mother and infant for

privacy.

R: Mother is comfortable and able to sit for a minimum of 60 minutes per day. The mother should remove the bra and wear a blouse or robe that opens in front or tube. The mother eliminates the need to disrupt the KC session bowels opened (BO) and passed urine (PU).

c) Position the KC chair at the side of the incubator door.

R: To prevent unnecessary tension on the lines during transfer.

d) Assist the mother to sit on the chair next to the incubator with her blouse/shirt open or robe.

R: Ready to receive the infant for KC and ensure the entire body over the naked chest and abdomen is covered.

e) Monitor infant vital signs, such as temperature, respiration and heart rate; 15-30 minutes before and after KC.

R: To monitor baseline temperature, respiration and heart rate.

f) Place the infant in the supine position with receiving napkin/blanket underneath the head and torso / back of the infant.

R: To avoid heat loss.

g) Take off the infant's clothes and dress the infant in a diaper and head cap only.

R: To check if BO or PU and prepare for KC.

h) Cover the ends of the blanket to cover arms, legs, intravenous (IV) lines, and lead wires around the infant.

R: To prevent heat loss and dislodging all the lines.

i) Pick up the infant with the hand under head and buttocks close to your chest.

R: To support and stabilize the infant during transfer.

j) Place the infant prone on the chest of the mother, and pull the ends of the blanket

over.

R: To assure proper chest-to-chest; skin to skin contact.

k) Assure proper, safe positioning of the infant; head midline, neck straight, nares and mouth visible, arms and legs in a bent position.

R: To get the advantages of the KC effect.

l) Instruct mother to fold her arm across infant's back (non-dominant hand) and buttocks (dominant hand)

R: To prevent slipping down from her chest.

m) Place an additional folded blanket or wrap across the infant's back. Advise mother to cover her body or wear the blouse open in front (button) on top of the premature infant.

R: To keep baby warm.

n) Advise mother to be in KC position not less than 1 hour. Accumulatively continue KC for 4 to 5 hours a week and until the infant is 3 months old.

R: To complete the cycle of sleep.

o) Help the mother to initiate breastfeeding after the baby shows readiness and signs of feeding cues; moving tongue and mouth, licking the mother's skin during KC procedure.

R: To encourage partial or exclusive breastfeeding.

p) Tidy up the mother and equipment.

R: For comfort and cleanliness.

(United States Institute of Kangaroo Care, 2018)

4. *Documentation in kangaroo care record progress (KCPR) booklet.*

- Record the date, time, temperature, duration from time KC commences until

completion of the session, weight gain, and type of feeding intake daily in the KCRP booklet provided.

R: To monitor the frequency of KC, weight gain, and breastfeeding rates.

**3.12 The process of delivery and how and who to conduct the KC-EP**

Face-to-face or direct contact is the best adult teaching method for nursing care, as there is no research available to determine whether different modes of delivery can produce better outcomes (Aranda, 2008). The delivery mode will determine how the intervention is exposed, the different methods used and the magnitude of the intervention in spite of similar intervention material. In this research, face-to-face or interpersonal communication has been identified as the delivery method for the KC-EP post-literature review.

Throughout their premature infant's hospitalization in the NICU, preterm infant mothers may face uncertainty about the progress of their preterm infant but may wait and rely on the knowledge, support, and advice of health professionals (Tandberg, Bente Silnes, Sandtrø,Hege Pettersen,Vardal, Mari, Ronnestad & Arild, 2013). Good communication skills, such as integrity, respect, and practice of two-way communication, are key points for effective clinical interaction (Reid et al 2007). Subsequently, in order to ensure that mothers benefit from communication, all verbal details and knowledge communicated should be replicated and validated in written notes, as mothers under stressful conditions may not recall all information provided (Lee,Wang, Lin, Kao, 2013). Empowerment has been described as a nurturing mechanism that improves well-being through increased maternal knowledge, awareness, and skills, and reduces difficulties (Lee et al., 2013,Liu, Chao, Huang, Wei, &Chien, 2010). With the knowledge obtained, mothers will be confidently involved in taking care of their preterm infants in the NICU, which may enhance mother-infant dyad bonding, and reduce stress and anxiety among mothers (Liu et al., 2010). The above paragraph addresses the delivery method of KC-EP and the use of the empowerment concept

(partnership, participation, and collaboration) in implementing KC-EP. The researchers provided educational information and suggested that, with the kangaroo care strategy, mothers should care for their premature infants. The participation and cooperation of mothers was stepped up from time to time through meetings (first meeting and follow-up) and conversations between mothers and researchers in the WhatsApp group (face to face and one to one). The mothers were encouraged to ask and answer any questions or problems during meetings or telephone conversations, but the confidentiality of the contact was still maintained.

### 3.13 When, Where and How Much Will KC-EP be Delivered

The question "When" refers to the timing, in particular the best time for the intervention program to be implemented and the question "How much" refers to the intervention's intensity in terms of the amount, duration and period of time needed to implement the intervention (Feeley, Nancy, Zelkowitz, Phyllis, Shrier, Ian, 2011). Timing and strength are two important aspects to be considered in the implementation of a nursing intervention. The duration and strength of the KC-EP implementation were agreed upon after analysis of literature review findings regarding mothers who were slightly more depressed at the beginning of enrolment. In the first week, the mothers were less stressed (Tandberg et al., 2013), and in the week after birth and the week after discharge, the mothers were most stressed and worried (Gennaro, York, & Brooten, 1990).

In this study, 48 hours after the admission of the premature infant to the NICU, or after the clinical stabilization of the infant, the expected intervention program was started, and the mother was able to perform KC. Within 48 hours post-admission, a specific orientation (reinforcement) and the first meeting were conducted. The second set of data was collected at the premature infant’s age of 1 month (44 weeks). The duration and frequency of KC-EP

implementation were based on the guidelines (USIKC, 2018). Moreover, the Guidelines on Kangaroo Care, which was published by WHO (2003), was derived from Davanzo, Brovedani, Travan, Kennedy, Crocetta, Sanesi, Strajn., & De Cunto (2013). The duration or frequency of KC-EP implementation was also based on the Bakermans-Kranenburg, Van Ijzendoorn, and Juffer (2003) studies. Meta-analysis results from Bakermans-Kranenburg et al. (2003) found that the most effective intervention consisted of less than 16 sessions, and that less than 5 sessions (d=0.33) were as effective as a 5-16 session intervention (d=0.36). Accordingly, after consideration of these findings by Bakermans-Kranenburg et al. (2003) the expert panel decided in this study to limit the number of sessions to the minimum possible in practice.

The KC-EP's design for mothers was based on the above discussion and consisted of two (2) sessions (first meeting and subsequent meeting), ten (10) short messages and reminder updates, and three (3) telephone follow-ups, and the program started immediately within 24 to 48 hours of admission. The sessions included an overview or welcoming meeting with the mother during the admission of her premature baby to the NICU (10 to 15 minutes), followed by two more meetings (first 60-minute meeting and subsequent 15 to 20-minute meeting).

### 3.14 Intervention

Phase III required KC-EP intervention with premature infant mothers. During the admission, the researcher obtained demographic data and scheduled the KC-EP sessions. The researcher carried out the implementation to ensure consistency and equity in the delivery of KC-EP; this would allow the researcher to understand better the problems or difficulties of the mothers. The study appointed one senior staff nurse (working office hours) to assist the researcher to arrange the intervention process for the benefit of implementation.

#### 3.14.1 Meeting Place for the KC-EP Activities

The conference room was chosen as it was quiet, and away from the noisy NICU environment.The mothers were never left alone during the answering session, where the researcher would always be available to offer the mothers some assistance. Sometimes the meeting place was also contingent on the condition of the mother. If the mother preferred to have the meeting elsewhere, alternate locations could be used, such as the breastfeeding room. If the mothers were able to carry out kangaroo care, the meeting would be held in the room arranged for them.

Mothers of premature infants admitted to the NICU face challenges, such as difficulties in accessing information regarding premature infant complications, and lack of experience in caring for their premature infants (Charchuk & Simpson, 2005). Therefore, in the current KC-EP, the senior staff nurse in charge was given the responsibility of explaining the aim of the intervention program to the mothers during their first visit, developing a supporting relationship with and showing concern for the mother, answering any simple questions asked by the mother and choosing an appropriate time for the intervention session based on the timetables (Appendix L&M). The average time for the mother's first visit to the NICU was between 1 and 3 hours depending on the conditions of any complications and the date of delivery. If the mother underwent a lower segment caesarean surgery it would take longer. In this study, the mothers' baseline data were collected within 48 hours of admission to give the mothers time to settle down and adapt to the new situation. The KC-EP maternal care time schedule, the mothers, premature infants and instruments used are shown in Table 3.2 (a) & (b).

### 3.14.2 The First Meeting

In the first meeting, which was held within 48 hours of NICU admission, information was given to the mothers about preterm infants admitted to the NICU as well as the KC technique

to ensure they had knowledge of KC during 30 minutes of theory and 30 minutes of practical session. Based on the established KC-EP, the researcher went through the educational information. During this meeting, the researcher and the mother discussed openly any concerns or issues faced with regard to the implementation of KC and breastfeeding status. Any questions from the mother were answered accordingly. The mother was taught about the KC technique in theory and how to practice KC-EP based KC in order to develop her maternal responsibilities, knowledge, and skills in caring for her premature infant. The researcher gave the KCRP booklet to the mother and went through it with her to emphasize the booklet's importance. The researcher also sent reminders to the mother through WhatsApp in the form of short notes to ensure that the mother read and understood from time to time the prepared booklet. Meanwhile, the mother was asked to remind the nurse in charge of her next visit (reconfirmation of the date of the following meeting) so that the researcher could plan accordingly.

### 3.14.3 The Kangaroo Care Progress Record (KCPR) booklet.

The creation of this booklet was based on the results of Phase I and adapted from the original article by Singh, Amritanshu, & Mukherjee (2014) and Biswas, Malpani & Ekka (2016) to fulfill the study's objectives. This was to ensure that the booklet for KCRP was suitable for mothers in the local context. The KCPR booklet was prepared in English and Malay language, with a table for date, time, length of KC, weight gain, and mode of breastfeeding. It also helped the mothers to gain information about the KC technique and its benefits. This KCPR booklet provided a motivational resource, particularly for mothers who were unable to visit the NICU on a daily basis and who were thus able to prepare for their next visit to provide KC for their premature infant so as to maximize KC implementation to between four (4) to five (5) hours in a week. The following information was included in the KCPR booklet.

In addition, premature infant mothers need to learn about the KC technique, the effects of KC, the average implementation of hours of KC per day, the devices used by the premature infant for the kangaroo care technique, premature infant growth, and premature infant nutrition up to the first 3 months. The KCPR booklet was limited to 30 pages in order to avoid information overload. Upon amendment, consent was given by all meeting committees, which consisted of two (2) senior nursing lecturers, one (1) matron in charge of the department and one (1) sister. The KC-EP for the mothers in the experimental group and the KCPR booklet were then sent to one neonatologist and one matron in charge of verification. The neonatologist and the matron in charge were invited to ensure that the module contents designed were compatible with the clinical and institutional needs. The KC-EP developed for mothers and the KCPR booklet were then given to four (4) mothers whose preterm infants were admitted to the NICU and five (5) NICU nurses who were not directly involved in the development of the KC-EP in order to verify the readiness of the KCPR booklet. There were no major issues raised by the two neonatologists and the matrons. The evaluation results showed that the evaluators, the four (4) mothers and five (5) nurses, could understand the contents of the KCPR booklet.

**3.14.4 Subsequent Meeting**

A subsequent meeting of 15 to 30 minutes was conducted on the 4$^{th}$ day of admission depending on the condition, willingness, and tolerance of the mother. The goal of the subsequent meeting or bedside teaching was to improve the therapeutic relationship between the mother and the researcher which had been established at the time of admission and to recognize any problems faced by the mother in performing the technique of KC. The interaction between the researcher and the mother was aimed at improving the mother's well-being. The strong interactions between the nurses (professional) and the mothers enhanced the mothers' knowledge, particularly on issues related to the KC technique and their infant’s

admission to NICU. During the meetings, the mother was allowed to ask about and discuss any concerns or issues via telephone or WhatsApp conversation. Throughout the KC-EP activities, the researchers demonstrated a caring attitude, were knowledgeable about issues related to premature infant admission to the NICU, and had good listening skills. The meeting also highlighted and discussed the information found during Phase III.

### 3.14.5 Telephone call and short message via WhatsApp.

To ensure continuity of the KC technique and quality of premature infant care, the researchers performed a follow-up through WhatsApp, sending a short message to the mother. This was a reminder about providing updates on the premature infant's performance of KC, the condition of the premature infant; i.e. body weight of preterm infant on discharge, at 1 month and 3 months corrected age, breastfeeding status every 2 weeks post-admission until 40 weeks post-admission. In addition, this continued every 4 weeks at 44 weeks, 48 weeks and 52 weeks of premature infant age [Table 3.2(a) & (b)]. The researchers also made three (3) telephone calls via WhatsApp during the program of which the first call was at 40 weeks post-admission, the second call was at 44 weeks (1 month) post-admission and the last call was at 52 weeks (3 months) post-admission. The purpose of the call was to find out if the mother had any doubts or had any problems linked to the objectives of the study at home and to advise the mother to contact the researcher at any time if she had any problems with KC and her premature infant's condition. All of the conversations were conducted using a very careful approach to ensure that the mothers were openly sharing their feelings and their appreciation of KC.

The program aimed to educate mothers on how to carry out KC and reduce their stress levels and how to strengthen their ability to breastfeed their premature infants. The nurses' workload in the NICU is generally very high, and nurses do not have enough time to assist

the mothers. Therefore, the entire program was allocated only 1 hour and 30 minutes. The experimental group had four sessions prepared and designed for the mothers, the specifics are set out in Appendix L and M. The program was administered in one session with between two (2) or four (4) mothers per group and one or two nurses involved at the first meeting. This was to ensure the nurses and mothers were given the same information , skills and shared attitudes.

The refresher meeting on how to give psychological support to the mothers on handwashing, KC, breastfeeding education, briefing on the KCPR booklet and the KC-EP was conducted by the researcher. The implementation of KC and the purposes of all the questionnaires were carefully explained during the meeting. Through this training, the nurses would get a clearer understanding of the intervention and the value of reporting in the KCPR booklet. Nonetheless, one of the senior nurses working office hours was not directly involved in the implementation of the KC-EP; she was responsible for tracking any new admission that met the study criteria, accurately recording the demographic data of the mother and premature infant, informing the researcher about any new admission, scheduling and verifying the date of the first meeting (48 hours post-admission), notifying the researcher on every new admission and collecting the post-intervention data on discharge (body weight, weeks and date of discharge). It was the responsibility of the researcher to assure that the KC-EP was appropriate and given equally to all mothers, and to collect the data at the first meeting.

**Table 3.2(a): Schedule for Intervention and Instrument (KC-EP) for the Mothers' in Control and Experimental Groups**

| Days/ Weeks | Control Group | | | Experimental Group | | Person in charge |
|---|---|---|---|---|---|---|
| | Activities | | Instrument | Activities | Instrument | |
| Admission Day | Routine NICU practice | Brief NICU orientation | Review (Medical Report) | Brief NICU orientation | Review (Medical Report) | Nurse |
| Day 1 (PI: Week 28) | | | | | | |
| Day 2 | | Breastfeeding Support, Hand Washing | KCQ (QI) & PSS: NICU:P&R KCPR Booklet | Simple ward orientation, First meeting | KCQs (QI) & PSS: NICU:P&R KCPR Booklet | Researcher |
| Day 3 | | Breastfeeding Support + Attending mother whenever are approach by mother ad hoc | | Short Message: WhatsApp (1) | | Researcher |
| Day 4 | | | | Subsequent Meeting | | Researcher |
| Day 5 | | | | | | |
| Day 6 | | | | | | |
| Day 7 (PI: Weeks 29) | | | | Short Message: WhatsApp (2) | | Researcher |
| Day 8 | | | | | | |
| Day 9 | | | | | | |
| Day 10 - Day 13 | | | | | | |
| Day 14 (PI: Week 30) | | | | Short Message: WhatsApp (3) | | Researcher |

*PI=Premature Infant; NICU=Neonatal Intensive Care Unit; KCRP Booklet=Kangaroo Care Progress Record Booklet;*

**Table 3.2(b): Schedule for Intervention and Instrument (KC-EP) for the Mothers' in Control and Experimental Groups (Continued)**

<table>
<tr><th rowspan="2">Days/ Weeks/ Months</th><th colspan="3">Control Group</th><th colspan="2">Experimental Group</th><th rowspan="2">Person in charge</th></tr>
<tr><th colspan="2">Activities</th><th>Instrument</th><th>Activities</th><th>Instrument</th></tr>
<tr><td>PI: Week 32</td><td rowspan="9">Routine NICU practice</td><td rowspan="9">Breastfeeding Support<br>+<br>Attending mother whenever are approach by mother ad hoc</td><td></td><td>Short Message: WhatsApp (4)</td><td></td><td>Researcher</td></tr>
<tr><td>PI: Week 34</td><td></td><td>Short Message: WhatsApp (5)</td><td></td><td>Researcher</td></tr>
<tr><td>PI: Week 36</td><td></td><td>Short Message: WhatsApp (6)</td><td></td><td>Researcher</td></tr>
<tr><td>PI: Week 38</td><td></td><td>Short Message: WhatsApp (7)</td><td></td><td>Researcher</td></tr>
<tr><td>PI: Week 40</td><td></td><td>Telephone Follow-up (1)</td><td></td><td>Researcher</td></tr>
<tr><td>PI:Week 44 (1st month)</td><td>KCQs & PSS: NICU:P&R (QI)</td><td>Short Message: WhatsApp (8)<br>Telephone Follow-up (2)</td><td>KCQs & PSS: NICU:P&R (QI)</td><td>Researcher</td></tr>
<tr><td>PI: Week 48 (2nd months)</td><td></td><td>Short Message: WhatsApp (9)</td><td></td><td>Researcher</td></tr>
<tr><td>PI: Week 52 (3rd months)</td><td>KCQs & PSS:NICU:P&R (QI)</td><td>Short Message: WhatsApp (10)<br>Telephone Follow-up (3)</td><td>KCQs & PSS:NICU:P&R (QI)</td><td>Researcher</td></tr>
</table>

*PI= Premature Infant; NICU=Neonatal Intensive Care Unit; KCQ=Kangaroo care questionnaire; PSS: NICU=Parental Stress Scale: Neonatal Intensive Care Unit.*

### 3.15 Nurses' Kangaroo Care Education Program (KC-EP)

The KC-EP for nurses is a special program developed to assist nurses in sharing evidence about the benefits of KC that can be received by the mother of a preterm infant. Most of the available materials are generally used to address specific guidelines and practice protocols for NICU nurses to perform KC. Therefore, a special standardized content module in terms of KC's advantages for mother-infant dyads was formulated. The KC-EP focused on the psychological and physical aspects related to the preparation and implementation of the KC procedure (before, during, and after). On the other hand, the interpersonal communication or interaction between the nurses and the mothers in the NICU was developed for the psychological benefits and to foster good relationships between mothers and nurses. In other words, the KC-EP for nurses was more structured in terms of contextualization of the needs of Malaysia's regional culture. The positive point was that these prepared short notes, such as flipcharts and flyers in both languages, could be used as a quick reference for nurses to illustrate kangaroo care techniques to premature infant mothers. The general purpose of this program (KC-EP) was to ensure that the intervention with the mother-infant dyads was successful, and no cost was necessary. The practical goals were to:

a. Provide nurses with educational information related to KC for the quality of premature infant care in the hospital and after returning home.

b. Assist mothers during their premature infant's hospitalization in terms of situation and environment, facilities, and routine care in the NICU.

c. Develop interpersonal communication and interaction between neonatal nurses and mothers.

d. Support mothers with respect to psychological aspects following the birth of their premature infant.

e. Advocate for mothers to carry out at least 1 hour of KC per day and achieve 4 to 5 hours a week within the first 3 months.

**i) Contents Module Theory and Practical (8 hour)**

Module contents were organized to meet the objectives of this study. Purposes included the definition of KC, method of KC, benefits of KC, indication and contraindication of KC, guidelines and protocol for KC, recognized signs and symptoms of deterioration during and after the KC procedure, preparation of premature infant-mothers and equipment before, during and after the KC procedure, and showing how to record the infants' outcomes data for both groups in the KCPR booklet provided. The nurse should have been able to get a clear understanding of the programme and of the physiology and benefits of KC in detail and demonstrate the technique as well [Appendix P, Q(a)& Q(b)].

1) To define the term and amount of KC.

2) To explain the physiology and method of KC.

3) To state the benefits of KC to mother-infant dyads.

4) To state the indication and contraindication for kangaroo care and eligibility criteria for mothers and premature infants.

5) To state the guidelines and protocols before, during, and after the kangaroo care method.

6) To recognize signs and symptoms of deterioration among premature infants before, during , and after the method.

7) To state the preparation before, during and after the kangaroo care method

8) To list the equipment for kangaroo care method ;

8.1 For infants

8.2 For mothers

9) To educate and guide on recording in the KCPR booklet.

10) To demonstrate and return-demonstrate the KC method.

### 3.15.1 The process of delivery and how and who to conduct the KC-EP for nurses.

Face-to-face or direct contact is the best adult teaching method for neonatal care since there is no existing research to determine if different delivery modes can produce better results (Aranda, 2008). The delivery method must evaluate the effectiveness of the intervention programme, the different methods used, and the magnitude of an intervention despite similar intervention material. Face-to-face or interpersonal communication was identified as the delivery method for KC-EP in this study after a literature review.

With the knowledge they have learned, nurses will be confidently active in advocating for the mother to carry out kangaroo care for their premature infants in the NICU, which can improve mother-infant dyad bonding, and reduce stress and anxiety among mothers (Liu et al., 2010). The above statement addresses the delivery method of KC-EP and the use of the empowerment concept (partnership, participation, and collaboration) in implementing KC-EP. The researchers distributed educational information and suggested that nurses should be aware of the kangaroo treatment method. The involvement and cooperation of nurses (first meeting and 7$^{th}$ day after intervention) and WhatsApp group discussions between nurses and researchers (face-to-face and one-to-one) were strengthened. Nurses were allowed to ask and discuss any questions or issues during meetings but to maintain the confidentiality of the conversations.

### 3.15.2 When, Where and How Much Will KC-EP be Delivered

Bakermans-Kranenburg et al., (2003) also found that the psychological support received by non-professional interveners (d=0.42) was greater than the professional interveners (d=20). Professional intervener Bakermans-Kranenburg et al., (2003) refers to a trained clinical psychologist or counselor, whereas non-professional interveners refer to nurses performing many roles such as caregivers or supporters. This is likely because mothers meet more often

with nurses, and nurses can have a particular effect on the mother's care for her premature infant (Griffin, Wishba, Kavanaugh, 1988). Thus, nurses were the main interveners in this research.

On the basis of the above discussion, the program designed for the nurse's KC-EP consisted of two (2) sessions (first and posttest after the 7$^{th}$ day intervention program), one (1) short message reminder and an update. The program was started immediately after the pretest. The program included theory (4 hour) and practice (4 hour) during the nurses' shift in NICU.

### 3.15.3 Intervention for nurses

The purpose of this program was to ensure all nurses(n=47) gained knowledge and experience on the KC technique, and promoted KC and breastfeeding to the mothers in the NICU for at least the first 3 months of their premature infant's life (corrected age). Pre-intervention test data (pretest) were collected by the researcher during the first meeting before conducting the intervention program (KC-EP). The implementation was carried out by the researcher to ensure consistency and equality in the delivery of KC-EP, this would enable the researcher to obtain a better understanding of the problems or difficulties that the nurses faced. For implementation purposes, this study appointed one senior staff nurse (working office hours) to assist the researcher in organizing the intervention process.

### 3.15.4 Meeting Place for the KC-EP Activities

The meeting environment was comfortable, away from the noisy NICU environment. In the current KC-EP, the senior staff nurse in charge was given the responsibility of providing the nurses with the brief aim of the intervention program and choosing an appropriate time for the intervention session based on the schedules (Appendix J&K). The KC-EP time schedule for nurses' meetings and the instruments used for nurses are shown in Table 3.3.

### 3.15.5 The First Meeting

The first meeting was held with the nurses to ensure that they had some perception, knowledge, and practice of KC. The researcher went through the educational information based on the developed KC-EP. The implementation of the KC-EP and the purpose of all the questionnaires were carefully explained during the first meeting. Nonetheless, one of the senior nurses who was working office hours was not directly involved in the implementation of the KC-EP; she was responsible for planning, scheduling, and verifying the date of the first meeting and notifying the researcher for post-intervention schedule. It was the role of the researcher to ensure that the KC-EP provided was accurate and given equally to all nurses, and to collect the data at the first meeting and then post-intervention (Table 3.3). During this meeting, the researcher and the nurses discussed openly any matters or problems faced by the nurses regarding KC implementation and how to promote breastfeeding. All of the nurses' inquiries were addressed accordingly. The nurses were taught about the theory of the KC technique and how to perform KC based on the KC-EP in order toto increase the mother's role, knowledge and skills in caring for her premature. The KC-EP session involved 47 nurses working in rotating shifts. However, full-day sessions were conducted over the weekend. Each session involved 12 to 15 nurses, depending on their availability and shift duty. This was for the nurses to acquire similar awareness, knowledge, skills and attitudes before being taken to the mothers. The theory was delivered in four sessions and conducted twice a week (Friday and Sunday). All nurses on the evening shift were advised to participate in the morning session from 8.00 am till 12.00 noon, while those on the afternoon shift were advised to join in the afternoon session from 2.00 pm to 6.00 pm. The practical session was conducted every Monday, Wednesday, Thursday and Saturday from 8.00 am to 5.00 pm. The practical sessions encompassed all aspects of the data collection process, including obtaining informed consent, and enhancing usual communication activities between mothers and nurses. Premature baby mannequins were used as a teaching aid to demonstrate the KC

procedures until the nurses were skillful enough to perform proper KC gently, safely and effectively for all the skill steps required. A video on the KC procedure (standing and sitting transfers of KC) was played to guide the nurses in demonstrating the sitting and standing transfers. The researcher explained the KCPR booklet to the nurses and went through the booklet with them to emphasize its significance. A checklist was prepared by the researchers to evaluate the KC skill steps and the explanations on KC benefits before the procedure was implemented. Learning materials, such as leaflets and flip charts (English and Malay versions), were prepared by the researchers as teaching aids.

The entire program was allocated only 8 hours per session due to the nurses' workload. The researcher also sent reminders in the form of short notes to the nurses through WhatApps ($4^{th}$ day) to ensure the nurses were alerted about sitting for the posttest on the $7^{th}$ day post-intervention according to their schedule.

**3.15.6 Short Message Via WhatsApp.**

To ensure each nurse's awareness of KC implementation and the date of the post-intervention test, the researcher sent a short message via WhatsApp to the nurses. This was a reminder for the nurses to perform return demonstrations of the KC (standing and sitting transfers) program goals to build up their personal beliefs and educate them on how to carry out KC and how to encourage breastfeeding for premature infants.

**Table 3.3: Schedule for Intervention and Instrument (KC-EP) for the Nurses**

<table>
<tr><th rowspan="2">Days/ Weeks</th><th colspan="2">Pre - Intervention</th><th colspan="2">Post - Intervention</th><th>Person in charge</th></tr>
<tr><th>Instrument</th><th>Activities</th><th>Instrument</th><th>Activities</th><th></th></tr>
<tr><td>Day 1</td><td>Simple Orientation<br>+<br>KCQs (QII)</td><td>First Meeting<br>KC-EP<br>(Theoretical Session)</td><td></td><td></td><td>Researcher</td></tr>
<tr><td>Day 2</td><td rowspan="6">Routine Ward Activities</td><td></td><td rowspan="5">Practice on KC skills with the checklist provided for each of the procedure steps for all the nurses.<br>i) standing &<br>ii) sitting transfers</td><td></td><td></td></tr>
<tr><td>Day 3</td><td></td><td></td><td></td></tr>
<tr><td>Day 4</td><td></td><td>Short Message: WhatApps</td><td>Researcher</td></tr>
<tr><td>Day 5</td><td></td><td></td><td></td></tr>
<tr><td>Day 6</td><td></td><td></td><td></td></tr>
<tr><td>Day 7</td><td></td><td>KCQs(QII)</td><td>Second Meeting (Practical Session) Demonstration on KC</td><td>Researcher</td></tr>
</table>

*KCQ=Kangaroo CareQuestionnaire; QII=Questionnaire for nurses; KC-EP=Kangaroo Care Educational Programme; KC=Kangaroo care.*

### 3.16 Data Collection Method

There were three phases to this study: Phase I, Phase II, and Phase III. Phases included:

i)In phase, I, the data ($T_0$, $T_1$, and $T_2$) for the control group of mother-infant dyads was collected within six months until the data met the requirements of the study. Data collection for the control group's mother-infant dyads started in early February 2018, and continued until the end of July 2018. Assessment of function in routine clinical practices in the control group of mother-infant dyads and outcomes of premature infants was recorded in the KCPR booklet provided for the control group of mothers within the stipulated time and then analysed.

ii)In phase II, one group pretest-posttest for nurses' data collection process was conducted 2 months after the control group of mothers' data collection was completed. The data collection for nurses and the intervention commenced in early August 2018 and continued to the end of September 2018. Quantitative data (Questionnaire II) were collected at pretest, and one week after the structured KC-EP was conducted for nurses the posttest data were analyzed. The structured KC-EP for nurses included knowledge, skills, and attitude prior to KC guidelines and protocol. The specific aims were to educate nurses in the content areas noted above. The reasons for implementing a neonatal KC protocol for mother-infant dyads were generally considered in terms of the method of holding the premature infant directly, breastfeeding rates and looking at the effects of KC outcomes.

iii) In phase III, the data ($T_0$, $T_1$, and $T_2$) for the experimental group of mother and premature infant were collected within seven months. In the experimental group, data collection for mother-infant dyads began in early October 2018 and was completed by the end of April 2019. The KC-EP for mothers was conducted by the nurses in the NICU for them to implement KC with their premature infants. The structured KC-EP was comprised of theory and practical sessions to fulfill the objectives of this study. The post-intervention assessment

of quantitative data (Questionnaire I) on mother-infant dyad compliance and outcomes of KC implementation (KCPR) commenced from the premature infant's recruitment day. The data was plotted to begin from the inclusion criteria age until 3-months-old corrected age.

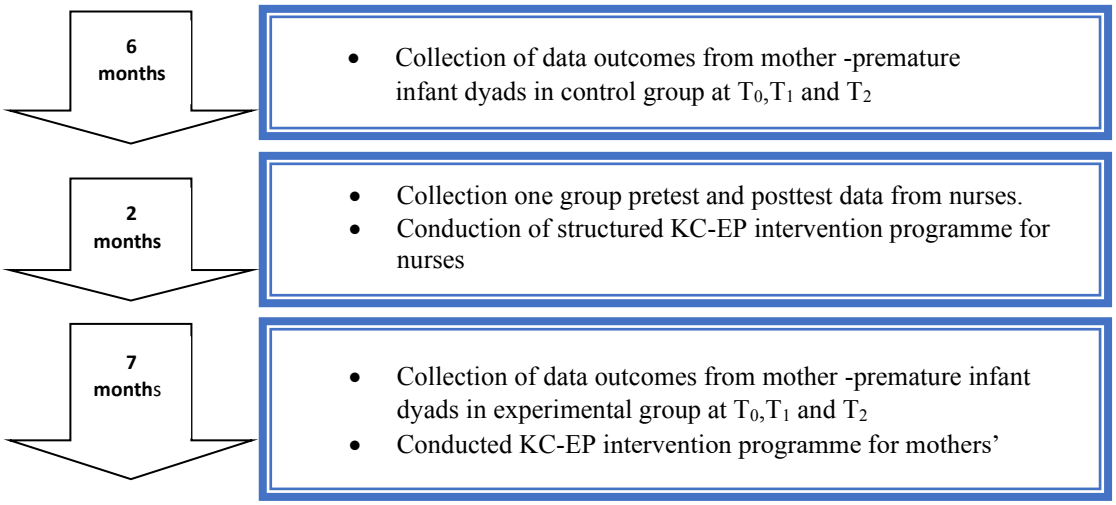



Figure 3.2: Flow Chart Showing the Three Phases of Data Collection

### 3.16.1 Data Collection Method for Mothers in the Control Group

Based on the day of the preterm infant's admission to the NICU, the researcher screened and recruited its mother into the control group. The mothers and premature infants were medically and surgically stable. The researchers chose mothers who were ready and returned after 48 hours to meet those who were interested to participate in the study. The selection was determined according to the mother's and premature infant's condition (clinically stable and eligible to perform KC), while the length of gestation had to be between 28 to 36/6 weeks. The study samples were selected from early February 2018 to the end of July 2018, within six months of the mothers in the control group. An average of two to four mothers was recruited per week. Mothers had to fill out a consent form. Consent was obtained from all mothers before they were recruited. The researchers contacted the participants in order to give an explanation of what was involved.

Questionnaire I for mothers was provided in an English and bahasa Melayu version. All mothers were given the same questionnaire in three phases ; $T_0$, $T_1$, and $T_2$. At $T_0$, all mothers were given the questionnaire on a voluntary basis to determine their perspectives on the implementation of KC as a baseline. The researchers created an identification code number for each of the mothers to be placed on the envelopes. Thus, mothers' answers could be matched for the $T_0$, $T_1$, and $T_2$ questionnaires. The identification code started from MCG01 (mother control group 01). After a welcome speech and briefing (10 to 15 minutes), the questionnaires were given to the mothers to fill in and then collected. The mothers in the control group were also given a Kangaroo Care Progress Record (KCPR) booklet to record weight gain, feeding status, the routine practice of KC in the clinical setting and after discharge until 3 months old but without any information or input related to KC.

The control group mothers came for visits and saw their preterm infants once a day for 30 minutes to 1 hour, and exercised KC if they were interested. This was the NICU's routine practice. The control group of mothers continued routine ward practice and standard hospital care. Mothers who declined to participate during the time of the study were excluded. For participation in the study, a small token gift was given to (n=48) mother-infant dyads at the control group.

Upon their premature infant's discharge from the hospital, the mothers were reminded to answer the same standardized questionnaire (QI) for $T_0$, $T_1$, and $T_2$. The following posttest questionnaires (Questionnaire I: enclosed in the envelope) were given to the mothers at the NICU or the Pediatrics Clinic on the 1$^{st}$ and 3$^{rd}$ month, when they came for their premature infant's follow-up, and were returned the same day. Consequently, some of the data were collected and sent by email if the mothers could not keep to the time (received on the same day).

### 3.16.2 Data Collection Method for Mothers in the Experimental Group

The recruitment of the experimental group of mothers was based on premature infant's day of admission to the NICU after data collection from the nurses was completed. This was done to keep mothers in the experimental group from being exposed to the control group during their hospital stay. Both mothers and premature infants were medically and surgically stable, and mothers were willing to perform KC. For the experimental group of mothers, data collection was carried out over seven months from early October 2018 to the end of April 2019, after the nursing intervention program for nurses (KC-EP) had been completed. An average of two to four mothers was recruited per week.

The mother-infant dyads were recruited within 48 hours, as soon as they were clinically stable and eligible to perform KC. Samples were selected by the researcher, who returned after 48 hours to meet mothers interested in the study and agreed to complete the consent form. Prior to recruitment, consent was sought on a voluntary basis from all (n=48) mothers (Appendix B). The researchers explained to the mothers how to answer the questions (Questionnaire I) provided in English and Bahasa Malaysia. At $T_0$, the questionnaire was given to all participants before the KC-EP was conducted. Each mother had her own identification code number put on the outside of the envelope to match Questionnaire I at $T_0$, $T_1$, and $T_2$ accordingly. The identification numbers started from MEG01(mother experimental group 01).

In addition, signs of readiness to suckle, characterized by moving the tongue and mouth, and the desire for sucking, such as sucking fingers or mother's skin, were observed. As mentioned by Nyqvist (2012), early sucking competence is only observed from 29 weeks postpartum age onward, with the attainment of full breastfeeding as early as 32 weeks postpartum age. Those premature infants born before 32 weeks were given intravenous or nasogastric feeding.

The experimental group, comprised of mother-infant dyads, received a detailed verbal explanation on KC-EP. The contents of the module were verified by health care

professionals, including two neonatalogists, a nursing professor, a nursing lecturer, and three head nurses who specialized in neonatal nursing. The contents of the KC module were: the meaning of the term KC, benefits of KC, precautions against any abnormality in parameters (temperature, respiratory rate (Sao2), heart rate perfusion (color), and tolerating feeding well in the 24 hours before performing KC. The program included the showing of videos on the KC procedure (standing and sitting transfers). The mothers were prepared with a KC information handout and a leaflet on KC associated with the KCPR. The booklet was developed based on research articles and health-care professional modules on KC in relation to physical, emotional and verbal support, on encouraging mothers to hold their premature infant in the right position for KC and on performing KC for the benefit of their premature infant. KC was started once the preterm infant had been deemed clinically stable. Baby pouches and diapers were provided to all mothers in the experimental group. The researcher developed a personal goal setting self-motivation routine to help mothers achieve the potential best practice of KC for their preterm infants. Self-motivation is a vital part of emotional intelligence and something that is needed by any mother involved in doing KC. It keeps mothers motivated to undertake KC with a minimum period of 1 hour a day during day and night, accumulating to 4 to 5 hours per week. For preterm infants undergoing intravenous fluid therapy, mothers were expected to sit in a comfortable chair near the incubator or cradle of the preterm infant (to facilitate sustained KC).

Data on weight gain (body weight in grams), KC duration in a week (hour/per week), and breastfeeding status (weeks) were collected from $T_0$ to $T_2$. Additionally, the experimental group of mothers maintained documentation of the outcomes of their preterm infant from the day of recruitment until the infant was 3 months old. The diaries provided information on the prospective longitudinal progress outcomes of the premature infants. Each KCPR booklet was labeled as an experimental group progress record and included the identification code

number of the mother-infant dyad. However, if the mother was unable to record the data, she instructed a close family member to help at home.

Lastly, the same quantitative data was collected from the mothers at $T_1$ and $T_2$ post structured KC-EP. In order to assess the mothers' perspectives on KC performance, perception, knowledge, perceived barriers, and stress were determined. The program was constructed for the introduction of KC into the NICU as a standard care procedure. Therefore, after the return home or at least for the first 3 months of the preterm infant's life, KC should be continued.

### 3.16.3 Mothers' Outcome Variables

Quantitative data on mothers' data were obtained in Phase I and Phase III. The outcome variables were perception, knowledge, perceived barriers in relation to KC, and stress related to admission of preterm infant to the NICU. These variables were assessed three times from $T_0$, $T_1$ to $T_2$. The mothers were instructed to complete Questionnaire I within 10 to 15 minutes without any reference to resources. Firstly, Questionnaire I was delivered at T0; before the KC-EP for mothers started. Next, the mothers were instructed to answer the same structured set of questions in Questionnaire I at $T_1$ and $T_2$ for the post-intervention data. Monitoring the level of personal belief regarding KC at $T_0$, $T_1$ and $T_2$, helps mothers to maintain compliance with KC until their premature infant is 3 months old corrected age. KC, together with breastfeeding, may continue until the infant is 6 months old and breastfeeding combined with solid foods until the infant is 2 years old.

### 3.16.4 Method of Data Collection for Infants

The researcher recruited the control group of premature infants first and then the experimental group after the nursing intervention program had been completed. The preterm infants in both groups were recruited based on infant admission days and according to mother-infant dyad condition. Firstly, all preterm infants between 28 and 36 + 6 days of gestation (n=48) were recruited by the researchers to participate in the study. The first

recruitment was assigned to the control group. The second recruitment of preterm infants who conformed to the inclusion criteria, i.e. clinically stable and ready to perform KC, was assigned to the experimental group (n=48) after written consent was given by their mothers. Those whose mothers refused to participate were excluded from the study. In the experimental group, data from the preterm infants were collected from the recruitment day until they reached 3 months old. A total of 48 newborn preterm infants from the same setting were given routine care (under servo-controlled radiant warmer or in a cradle with room heaters or blankets) and matched by corrected age. Feeding mode at admission to either group was monitored and jotted down, according to the route of feeding: tube feed, spoon-feed or breastfeeding. Before allocation to a group, it was ensured that the preterm infant was tolerating enteral feeds (over 24 hours) and had no regurgitation at age 28 to 36+6 day weeks of gestation. Corrected age was calculated using the Premature Baby Corrected Age Formula and classified between 28 to 36+6 days weeks of gestation. The baseline weight was calculated from the birth weight and weight on recruitment at $T_0$, and outcome weight gain calculated from the weight on discharge, $T_1$, and $T_2$; this was recorded in the KCPR booklet provided. The body weight of the preterm infant was documented, after removing its clothes, using an electronic weighing scale with an accuracy of 5g at least 2 hours after the last feed and twice a week on Tuesdays and Saturdays according to the hospital protocol for weighing babies. Body weight was measured using a T- scale machine and recorded in grams (g).

After the preterm infants were allocated to the control group or experimental group, they were observed daily, and all observations related to the outcomes of the study were documented in the KCPR booklet i.e. velocity of weight, temperature before, during and after, mode of feeding, type of milk taken and duration of KC provided (in hours/day/week), date of admission and date of discharge in days. In the study by Biswas, Malpani & Ekka, (2016) temperature measurement was taken 10 minutes after KC. However, in this study the

temperature measurement was taken 10 minutes before, 20 to 30 minutes during KC and 10 minutes after the implementation of KC and a regular clinical examination was given in a minimal period of time to avoid hypothermia and cold stress. In the experimental group, duration of KC (in an hour/day) was measured from an accumulated daily 1 hour per day, 4 to 5 hours a week. However, according to Ludington-Hoe, Susan, Morgan, K. & Abouelfettoh (2008), KC is best provided 1 hour a day and 7 days a week until discharge. KC was continued until the premature infant was 3 months old, according to the study requirements. If any problems were detected during KC, they were either rectified or the preterm infant was disqualified from the study. Premature infants were discharged when they showed a good sucking reflex with breast or bottle feeding and had been gaining weight of more than 15g/day to 20g/day for at least three successive days and had achieved a predetermined weight of 1.7kg, in accordance with hospital protocol. On discharge, the nurses routinely advised mothers to come for follow-up until their infant had reached a weight of 2500 grams and to continue breastfeeding. For primary and secondary outcomes, the data from both groups were collected at $T_0$, $T_1$, and $T_2$. The premature infants were followed-up until they were discharged. Conversations and communication between mothers and researchers continued through telephone calls or Whatsapp chat groups accordingly. All related information on KC was shared through the WhatsApp chat group among mothers in the experimental group so that they would remain KC compliant and continue KC at home.

a) Infant Outcome Variables Data

In Phase I and Phase III, the outcome data were collected from the control group and experimental group of infants. The outcome data were recorded continuously from the day of recruitment at the corrected age of between 28 to 36/6 weeks of gestation in the NICU until the infants reached 3 months old after discharge. At any stage, if a premature infant in the experimental group did not meet the requirements for research (e.g. deteriorated during KC

or needed phototherapy treatment for jaundice), the infant was excluded from the study. During the two phases, similar outcome variables and confounding variables were obtained. The outcome variables reflected the outcomes of the premature infants. Specifically:

i) KC implementation duration in hours (in hours; 24 hours = 1 day); The duration of KC in the intensive care unit measures the number of hours the infant was attached to or bonded with their mother. According to the posttest it was measured in hours and days per week. According to the World Health Organization (2003), each KC session should ideally last at least 1 hour, in order to get the physiological effects and for brain development and maturation. In this study, the researcher decided to practice accumulative 1 hour per day and accumulative 4 to 5 hours per week (KC duration).

ii)Weight gain of the infant in daily weight (in a day;1 day = 24 hours)

The weight gain of the premature infant represents the amount the infant's weight increased or decreased in a day. 1 day equal to 24 hours.

iii) The decrease in hospitalization stay or Length of hospitalization stay (LOS) in the NICU (in a day;1 day =24 hours);

The length of stay at the NICU measures the number of days the preterm infant was admitted to the intensive care unit and was treated in a day, 1 day equivalent to 24 hours. iv) Confounding variables

All standard demographic and clinical measures assessed by preterm infants with critical care were collected, including:

- demographic data: gestation, age, gender, ethnicity and weight gain for infants;
- type of milk (breastfeeding or formula milk)
- duration of feeding status i.e. week started and week discontinued breastfeeding and mode of feeding, bottle, or spoon-feeding.

**3.17 Method of Data Collection for Nurses**

The nurses were screened and recruited based on universal sampling. Method of data collection for nurses was similar to that for mothers, whereby, prior to the KC-EP for nurses, pretest data on nurses' perception, knowledge, and practice were collected using the KCQ tool in Questionnaire II. The data for nurses were collected within a 2 month period from 1st August 2018 to 30th September 2018 for the pretest-posttest groups of nurses. The researchers briefed the nurses and encouraged them to take part in the study by presenting verbally brief information to the head nurse in charge of the unit, with two forms of consent given to the nurses on the same day as the pretest program. All nurses who attended were recorded with their name, identification code number, date of attendance and signature in order to plan the date for their following posttest. To ensure confidentiality and privacy, each returning questionnaire was assigned an identification code number. The consent form together with the questionnaire was stamped, starting with nurse 01(N01), with the code number in the top right corner. If the nurses refused to continue with the study, they were instructed to notify the researcher and ask for a withdrawal. Upon receiving an application for withdrawal from the study, the researcher found and destroyed the questionnaire, which was submitted based on the code number. The pretest (Questionnaire II) was given to all nurses before the KC-EP was administered to them. The nurses were instructed to complete Questionnaire II, which took approximately 15 to 20 minutes to complete, without reference to any resources before the KC-EP session for nurses was conducted. Nurses were asked to return the questionnaires upon completion, with one copy of the informed consent. All nurses were advised to keep one copy of the informed consent for their records. Following the completion of the KC-EP, the nurses were told of the posttest sit after the 7th day of the pre-test and intervention program. The same structured Questionnaire II was administered to the nurses at the posttest. Data collection among nurses was conducted within the stipulated time.

All 47 nurses needed to demonstrate KC skills, attitudes, and knowledge for practical evaluation and assessment. The knowledge, skills, and attitudes of nurses towards the implementation of KC were observed during the practical return-demonstration session to improve the quality care of preterm infants. The current research attempted to determine whether the nurses were more likely to support KC for the mother of a preterm infant. The marks were classified as pass or fail. The nurses received one (1) accredited certificate related to the KC course upon completion of the structured KC-EP course evaluations. A 6-point Continuous Professional Development (CPD) certificate recognized by the Malaysian Nursing Board was issued to all nurses attending the KC-EP; the KC-EP on knowledge, attitude, and skills was passed successfully. Examples of the KC-EP schedules for nurses are shown in (Appendix I & J). All of the data collected at the pretest was intended to assess nurses' previous knowledge on KC before they were introduced to the KC technique in the NICU setting. The questionnaire was collected before the KC-EP was delivered. The posttest for nurses was conducted on the 7$^{th}$ day after the KC intervention program(KC-EP). The nurses also answered the same set of questions in Questionnaire II and demonstrated their skills in relation to KC procedure: standing and sitting transfers with a checklist provided to evaluate their knowledge, skills and attitude regarding encouraging mothers to perform KC and continue breastfeeding,

### 3.17.1 Nursing Outcome Variables

The data for nursing outcomes were collected in Phase II, historical control data were collected through a retrospective nurse audit of knowledge and skills in relation to KC management practices and assessing data on KC implementation techniques among mothers with premature infants. The nurses' perception, knowledge, and practice in relation to KC implementation were assessed using a set of structured questions, Questionnaire I for nurses, via a pre-test and then reassessed in a 7$^{th}$ day post-test following the program.

The researcher briefed the nurses and invited them, through a verbal briefing to the head nurse in charge of the selected unit, to participate in the study. On the same day as the pre-test, the Questionnaire I was given to the nurses, with two consent forms. Name, identification code number and date of attendance of the nurses who attended were recorded in order to plan the follow-up date for the post-test. The returned questionnaire was given an identification code number to ensure confidentiality and privacy. The consent form, including the questionnaire, was stamped in the right top corner with the code number, starting with nurse 01(N01). When nurses declined to continue the study, they were told to contact the researcher to ask for a withdrawal. Upon receiving an application for withdrawal from the study, the researcher destroyed the questionnaire, which was submitted based on the code number. All nurses were instructed to sit for the post-test on the 7$^{th}$ day after the pretest. The nurses were instructed to complete Questionnaire I for the pretest, which took about 15 to 20 minutes to complete, without referring to any resources before the KC-EP for nurses was conducted. Nurses were asked to return the questionnaires upon completion, together with one copy of the informed consent document. All nurses were expected to keep one copy of the informed consent form in their records. On the 7$^{th}$ day, the nurses were told to answer the same set of questions that had been used in the pretest. It was anticipated that an interval of 7 days would enable the posttest group nurses to translate their theoretical expertise into action and gain experience in evaluating, managing, and promoting the implementation of KC and also breastfeeding for mother-infant dyads through hands-on practice in the NICU environment.

### 3.18 Data Collection Procedures

The ethical review was approved by the Medical Research Ethics Committee (MREC) with registered no: 201765-5310 before the study began. Formal permission was given by the management of UMMC, where the study was conducted, following a letter of request to

conduct research. Once permission was obtained, the unit managers were approached for permission to conduct the study in their respective units. The participants were assured their confidentiality and safety would be maintained and that there would be no exploitation of human rights or discrimination of any type based on the information given. After permission was granted, the researchers began selecting the participants (infant-mother dyads and nurses) based on the requirements of the inclusion and exclusion criteria. The researcher introduced herself and informed each of the participants about the nature of the study to ensure greater cooperation and to establish effective documentation throughout the data collection process. The researcher approached each participant individually and explained the study's purpose and how it would benefit them. Participants who showed a willingness to participate were selected as samples for this study. Each participant had a coding number assigned to ensure the anonymity and confidentiality of the information provided, and written informed consent was obtained. Two copies of the consent forms were given to both mothers with premature infants and nurses on the same recruitment day to obtain their consent to participate in the study. All participants were advised to keep in their records a copy of the informed consent form. The nurse participants were selected to be samples in this study using the universal sampling technique, which means the sample would represent the population of nurses in the NICU, while the infant-mother dyad participants were recruited based on infant-mother admission to the control group, or to the experimental group.

Firstly, the researcher collected a group of participants from the infant-mother dyads for the control group and made them comfortable. An orientation to the study was given before administering Questionnaire II, which required approximately 10 to 15 minutes to complete. All mothers were instructed not to interact or communicate while answering the questionnaire. On the same day, participants were asked to return the completed questionnaires to the researcher. An identification code number was provided for each

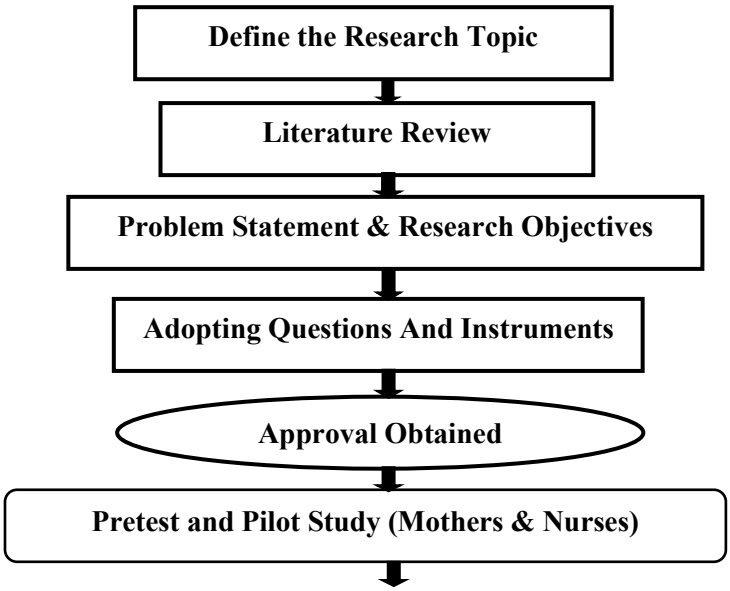
returned questionnaire to ensure confidentiality and privacy. The consent form and the questionnaire were stamped at the top right corner with the code number, for each set of questionnaires ($T_0$, $T_1$ and $T_2$), starting with control group 01 (CG01) for the control group of mother-infant dyads. The pretest and posttest used the same structured Questionnaire II for baseline data from the mother-infant dyads in the control group. However, this group did not receive any special education program or any input related to KC from the researcher. All mothers were informed to answer the post-test questionnaire within the stipulated time of 1 month and 3 months after the discharge of their infant from the NICU. The collection of data from the control group of mothers was completed within six months, starting from early February 2018 to the end of July 2018.

Next, the researcher collected the group of participants from among the nurses, made them comfortable, and orientated them to the study. She then administered the structured quantitative-based Questionnaire II for nurses. All nurses were instructed not to interact with each other, and their doubts were clarified. The questionnaire took 10 to 15 minutes to complete; after completion the researcher asked the nurses to return the pre-test questionnaires as well as a copy of the informed consent form. All nurses were instructed to keep one copy of the informed consent form for their records. On the same day, nurses were asked to return the completed questionnaire to the researcher. Each questionnaire returned was given an identification code number to ensure confidentiality and privacy. For each set of questionnaires (pretest and post-test), the consent form and the questionnaire were labeled with a code number, beginning with N01 for the nurses, at the right top corner. The nurses' baseline data were gathered on demographic characteristics and KCQ tools (perception, knowledge and practice) regarding the KC technique. After the pre-test phase, the structured kangaroo care educational program (KC-EP) for nurses was conducted within two weeks for all n=47 nurses. The program was delivered in English for the theory, and the practical

session included the showing of videos related to the KC transferring technique by the researcher. All nurses were informed to sit for the required post-test on the 7th day after the pretest phase and the KC-EP teaching module. The same structured Questionnaire I was administered at the post-test, and nurses were required to demonstrate the KC standing and sitting procedure. A checklist was provided for each nurse to assess her confidence and skills in relation to the KC technique. The collection of nurses' data lasted from 1st of August 2018 until the 30th of September 2018.

Finally, the researcher recruited a group of mothers with premature infants for the experimental group, returning to them in 48 hours. The researcher orientated the mothers to the nature of the study and administered Questionnaire I for the pretest, which required 10 to 15 minutes to complete. All mothers were instructed to not share or discuss anything with other group members and if discussion took place their were disqualified to continue the study. Once the questionnaires were completed they were collected by the researcher; the mothers required 10 to 15 minutes to complete Questionnaire I. The infant-mother participants' baseline data were gathered regarding demographic characteristics and KCQs tool (perception, knowledge, perceived barrier and stress level) for the pretest on KC technique. After the pretest, the mothers in the experimental group obtained information on KC in a group of two to four participants via the face to face teaching method; each group was accompanied by two of the nurses who were available in the NICU at that period of time. The KC-EP for mothers was conducted by the researcher and included a theory and practical session. The mothers were requested to answer the posttest at the 1st month and 3rd month of their premature infant's life after their discharge from the hospital. The same Questionnaire I was provided to the mothers for the posttest data. The collection of data from the mothers

was carried out within the stipulated time. After the data gathering process, the researchers thanked all the study participants as well as the authorities for their cooperation.



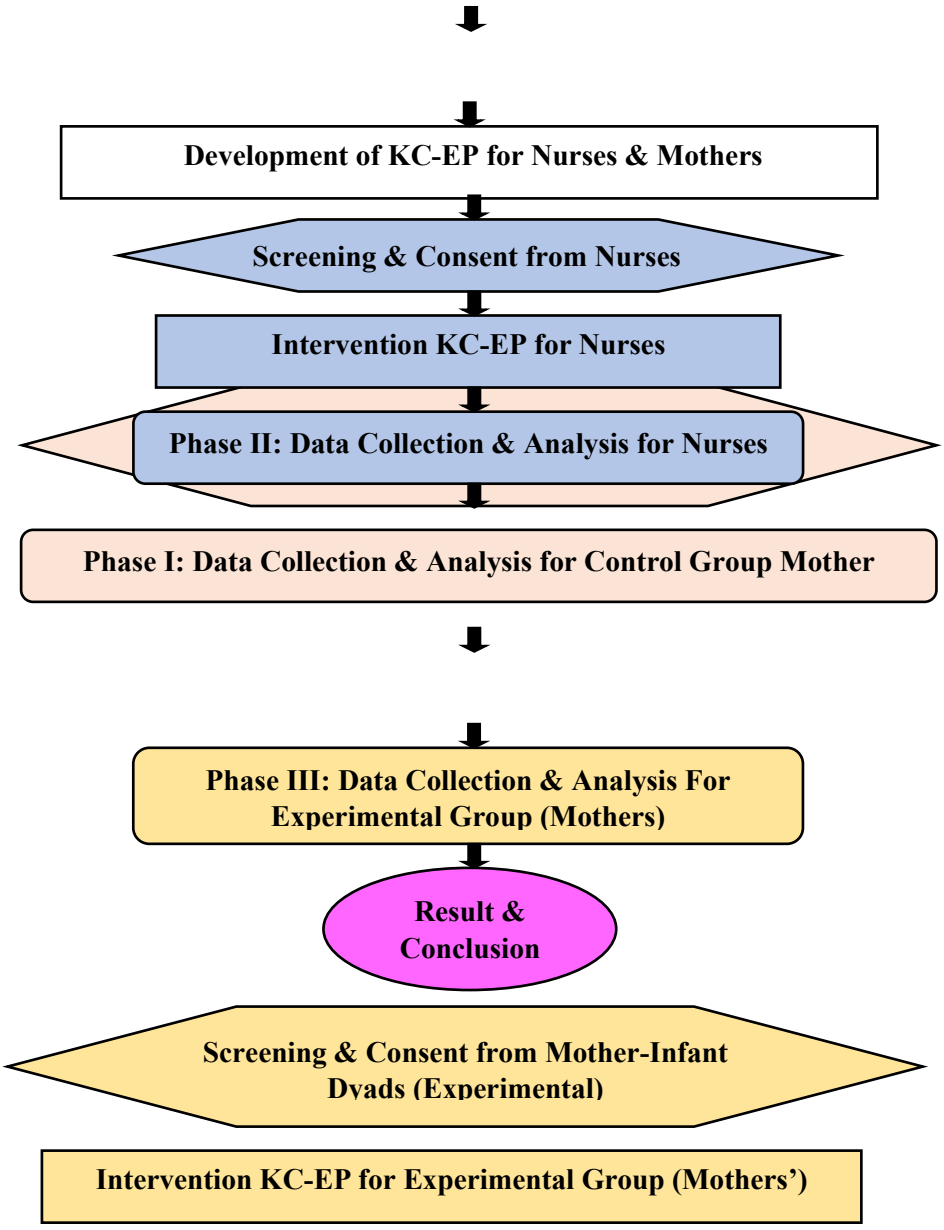



Figure 3.3: Flow Chart for Data Collection

### 3.19 Data Analysis

Analytical processes used to address the research questions and the quantitative data are presented below.

### 3.19.1 Analysis of Quantitative Data

Graduate Package 23.0 of the Statistical Package for Social Sciences (SPSS) provided tools to analyze the data required to achieve the research objectives:

In the pretest of dependent variables, data from the mothers and infants were evaluated for homogeneity, normality, variability, and data normality in the pretest. Nevertheless, the variance test for the nurses' data was not homogeneous since we were dealing with the same group, the data were normally distributed and the variances between the groups were equal, and the sample size was acceptable (no less than 30 cases per group). The number and proportion were stated as continuous variables and categorical variables. Continuous variables were compared for normally distributed variables ('mothers' and 'infants') using the independent t-test and variance analysis (ANOVA/ANCOVA). Pearson's chi-square test was used because the independent variables were nominal categorical variables. The Chi-square test was applied with normally distributed data to establish associations between independent variables, such as age, years of service as RN, years of working in NICU and educational qualification level, and dependent variables: perception, knowledge and outcomes improvement: weight gain, length of hospitalization stay and breastfeeding rates. In addition, the Shapiro-Wilk test was used to test data normality for both the pre and post-test, as the sample was below 50 per arm. To assess the effect of the structured kangaroo care educational program (KC-EP) on mothers', infants' and nurses' outcomes, for the data on mothers, infants and nurses, the general linear model (GLM) univariate analysis of variance and covariance analysis was used. GLM and repeated measures were used to analyze the main effects and interaction effects of KC outcome variables, and to examine the hypotheses of the outcomes.

Table 3.4: Summary of Statistical Analysis of Quantitative Data Plan

| No. | Objectives | Measurement Variables | Statistical analysis |
|---|---|---|---|
| 1. | Are there any statistically significant differences in mothers' perception, knowledge, perceived barriers regarding KC, and stress related to 'premature infants admission to NICU after participation in the KC-EP? | Perception, knowledge, perceived barriers and stress related to premature infants' admission to NICU mean scores<br>Effect of KC-EP<br>KC performance<br>(Ordinal data) | Descriptive - mean, SD, skewness and kurtosis<br>Chi-square test,<br>GLM,<br>repeated measure (RM) & Pearson Eta Squared. |
| 2. | Does kangaroo care improve weight gain patterns in premature infants between control and experimental groups at $T_0$, $T_1$, and $T_2$? | Weight gain patterns (grams) mean score<br>KC compliance<br>Duration (hours/weeks)<br>Frequency and Percentage<br>(Continuous data) | Descriptive – mean, SD, skewness and kurtosis<br>Chi-square test,<br>GLM and t-test. |
| 3. | Does kangaroo care decrease the length of hospitalization stay for premature infants between control and experimental groups? | Length of hospitalization stay<br>Frequency and percentage<br>(Continuous data) | Descriptive – mean, SD, skewness and kurtosis<br>Chi-square test,<br>GLM and test |
| 4. | Does kangaroo care improve breastfeeding rates for premature infants between control and experimental groups? | Breastfeeding rates<br>KC compliance<br>Frequency and percentage<br>(Continuous data) | Descriptive – mean, SD, skewness and kurtosis<br>Chi-square test,<br>GLM and t-test. |
| 5. | Are there any statistically significant differences in nurses' perception, knowledge, and practice regarding KC before and after participation in the KC-EP? | Perception, knowledge, practice mean scores<br>Effect of KC-EP<br>(Ordinal data) | Descriptive - mean, SD, skewness and kurtosis<br>Independent t-test<br>GLM, RM & Pearson Eta Squared. |

The key influence of an explanatory variable is its direct effect on the outcome variables (Field, 2011). Additionally, the effects of covariate and covariate interaction with KC can be included in GLM univariate analysis. This covariance analysis is an extension of the variance analysis to include a covariate/confounder component (Field, 2011). This covariance is linearly related to the dependent variable, and its inclusion in the analysis will minimize the error associated with the covariance analysis (Field, 2011). The test is appropriate since

categorical variables are both independent and dependent variables. Therefore, covariance analysis was used to correct the observed effects on the outcome variables of potential confounders. The summary of the statistical analysis used for all research questions is outlined in Table 3.14. Each of the statistical tests is two-tailed. A p-value below 0.05 was assumed to show statistical significance.

### 3.19.2 Pre-testing

Pre-testing of the instrument is an important stage since pre-testing results will indicate whether the survey can meet the study's objectives (DeMaio, Bates, Ingold, & Willimark, 2006). Pre-testing was performed in this study to verify the accuracy of the directions and items in the questionnaire. The objectives of the questionnaire pre-test were:

- To detect the uncertainties, misinterpretation, or other inadequacies in the questionnaire.
- To estimate the time required to answer the various items in the questionnaire.
- To ensure the time required to answer the various items in the questionnaire.
- To ensure that it does not contain any sensitive questions.
- To improve the reliability, quality and validity of the instrument and
- To identify any weakness in structure and instrumentation (Cooper,Schindler, & Sun,2003)

There was one panel of experts, which included two neonatologist consultants and two senior nurses lecturers with a Ph.D. In Nursing, 3 neonatal nurses were required to check the content and face validity of the KCQ and PSS questionnaires: NICU: P&R questionnaire; the leaflet and booklet were checked and vetted for spelling errors, grammatical structure, unclear instructions or items, time taken for completion and the reliability estimation.

### 3.19.3 Validity

Validity refers to how well the measuring instrument measures the test principles of a research study (Burn & Grove, 2009). The first set of questionnaires was adapted from a validated questionnaire developed by Ludingtone-Hoe et al., (1999); Angler & Brumbaugh et al., (2013). An expert panel examined, reviewed and judged the contents and face-validity of the instruments. The panel, consisting of seven health professionals with expertise in neonatology care and including two neonatologists, two senior nursing lecturers and three senior staff nurses certified in neonatology, reviewed and commented on the consistency, accuracy, and relevance of the instrument to clinical practice, validity, and comprehensiveness of content. As recommended by the experts, revisions were made: items were reworded, and improvements were made to the sentence structure. Nevertheless, this study used only 80 items from the quantitative questionnaire.

The second set of instruments was adapted from a validation tool developed by Miles et al., (1992). Revisions were made as proposed by the panel of experts which consist of a neonatologist, and two nursing lecturers ( one with neonatal nursing certificate) . Items were rephrased and the sentence structure was improved, although a few variables were introduced on demographic characteristics. After Questionnaire II (for nurses) and Questionnaire I (for mothers) had been validated, it was translated into Malay, as the national language, so that participants can understand the questionnaire. Content, face validity, forward and backward translation were done to ensure the semantic equivalence of the instruments; flip charts (English and Malay versions), the leaflet and the KCPR booklet were also validated by an expert panel consisting of seven persons, five from the neonatal unit, in a teaching hospital and two from the Nursing Department, University Malaya. The panel reviewed and commented on the instruments' relevance to clinical setting practices.

### 3.19.4 Reliability

The reliability of the instrument was measured by its stability and equivalence. The reliability of the content and construction of the questionnaire in this study were tested during the pilot study. A pilot study was conducted on 30 mothers and 50 nurses to test the reliability for the total population. The sample of mothers was collected from respondents in the NICU at UMMC. The same set of questionnaires was used twice to assess perception, knowledge, perceived barriers and stress. Cronbach's alpha (α) was 0.813 for the perception subscale; 0.873 for the perceived barriers subscale; 0.951 for the sub-scale of stress. Furthermore, KR20 for the knowledge subscale was 0.785. The researchers assumed that the translated KCQs and PSS: NICU: P&R instruments were reliable during the internal consistency test. The Content Validity Index of the KCQs Malay version was 0.95, which was considered acceptable. Reliability ensures an instrument has consistent and dependable scores (Creswell, 2005). In reliability values, the indicators to be measured are Cronbach alpha (α) value, person reliability value, individual measurement, and relevant responses (Azrilah Abdul Aziz, 2010). Fraenkel and Wallen (1996) reported that the reliability of an item would be accepted if the alpha is between 0.70 and 0.99, while Kubiszyn and Borich (2000) indicated that an α value within the range between 0.80 and 0.90 should be acceptable.

The data was analyzed using descriptive statistics, The frequency for continuous data, general linear model, and repeated measure was used for categorical data and mean (standard deviation). The statistical analysis was carried out using version 23.0 of the SPSS. The participants were assured of confidentiality and that the safety of the mothers and premature infants was maintained. Care was taken that there was no exploitation of human rights, humanity or discrimination of any type. Ethical clearance from the teaching hospital's ethical committee was also granted before the study began.

### 3.20 Pilot Testing

There were two pilot tests conducted: one to test the questionnaire's validity and reliability, and the other to determine the study's feasibility in the actual clinical setting. A pilot study was also carried out to test the reliability of the KCQs tool Malay version. For the perception section the Cronbach's α was 0.813 to 0.880, the knowledge section 0.793 to 0.785, the practice section 0.841, the barriers section 0.873, and the stress section 0.951. The researchers concluded that the translated KCQs were reliable during the internal consistency test. The Content Validity Index of the KCQ's Malay version was 0.970, which was deemed acceptable.

#### 3.20.1 Pilot Test One (Mothers)

The mothers' research instruments were piloted with a group of 30 mothers with preterm infants in the NICU using the convenience sampling approach to determine the appropriateness and consistency of the questions. The questionnaire was provided in both languages, English and Malay, for better understanding in the Malaysian cultural setting. The pilot test also provided details about the approximate time needed to complete the survey. Participants were separated from the actual analysis so as to minimize the bias of measured effect. The data collected from the pilot test were not included in the final analysis of the study. The survey instruments were distributed to the respondents, with an explanatory note defining the aim of the research, and after a four-week interval, a repeat survey was conducted. This was to test instrument reliability and the KC booklet through a test-retest procedure.

The survey contained a blank space for feedback from the participants about clarification and the importance of the experimental group questions. Participants were questioned according to the items in the questionnaire, and after the pilot no significant changes were made. During

the interview all questions were read out in exactly the same way to all respondents. Then a teaching session was provided, primarily to test comprehension and clarity of content, and the information was evaluated. The return for the pilot test was 100% (n=30). On the basis of comments and feedback from the respondents, minor adjustments were made to rephrase the sentence structure in order to avoid ambiguities and misleading participants in responding to the knowledge items. Reliability was demonstrated, and construct and face validity was established.

The pilot study also included comments on the KCPR booklet for the control and experimental groups in order to assess the depth of understanding of the documentation provided after the instrument pilot was completed. The booklet was used as a form of self-observation for mothers in both groups on KC duration, weight gain and frequency of breastfeeding. The aim of this pilot study was to assess the feasibility of using the validated KCPR booklet to evaluate knowledge on understanding how to document daily KC duration and weight gain. This study also aimed to examine the efficacy of KC's structured standard evaluation method in relation to preterm infant outcomes, in particular, the duration of KC performance, breastfeeding rates, and length of hospitalization (LOS). Data from 30 mothers who met the study criteria were collected from November 2017 to January 2018. Based on comments from the pilot study and feedback on outcomes, the instructions on the duration of KC, to be performed 1 hour per day and 4 to 5 hours per week (16 to 20 hours per month) were simplified. Therefore, compliance with the duration of KC was classified according to groups in relation to the amount of KC performed. The groups for KC duration were classified into Group 1 (did not provide KC), Group II (1 hour to 5 hours per week), Group III (6 hours to 10 hours per week), Group IV (11 hours to 15 hours per week), Group V (16 hours to 20 hours per week) and Group VI (more than 20 hours per week). Other than that, the KC guidelines and protocol were simplified in the flip chart provided, with the aim of

increasing mothers' understanding of the benefits of KC and the quality of premature infant care practice. The alpha reliability was calculated with Cronbach's Alpha, which was between 0.78 - 0.95 for each of the four constructs as displayed in Table 3.16. The Content Validity Index of the KCQ Bahasa Malaysia version was 0.95, which was considered appropriate. The final versions of the instruments are set out in Appendices A and B.

Table 3.5: Cronbach's Alpha and KR20 Measure Reliability for Mothers' Instruments.

| Items | Alpha values | Number of items |
|---|---|---|
| a) Perception | 0.813 | 20 |
| b) Knowledge | 0.785 | 11 |
| c) Barriers | 0.873 | 19 |
| d) Stress | 0.951 | 7 |

### 3.20.2 Pilot Test Two (Nurses)

A group of 50 nurses was chosen, using the convenient sampling method, as the pilot test for the research instrument from 23rd of November 2017 until the 26th of November 2017 during a continuous education program at the KL International Neonatology Conference (KLINC) in Kuala Lumpur to assess questionnaire appropriateness and clarity. The pilot test also provided details about the approximate time required to complete the surveys. Participants were excluded from the real study to reduce the bias of measured effect, and data obtained from the pilot study were not included in the final analysis. The survey instruments were distributed to the respondents, together with an information sheet describing the purpose of the study. A blank space was provided for feedback from participants on the clarification and quality of the questions for the experimental group. Interviewees were questionned according to the items in the questionnaire, and after the pilot no significant changes were made.

During the interview sessions the questionnaires were read out to all participants in precisely the same manner. The teaching session was provided once, mainly to evaluate comprehension and clarity of content, and testing of knowledge and compliance was conducted. The pilot test return was 100% (n=50). Based on the results of the pilot study and feedback from the nurses, minor changes were made to redo the sentence construction to prevent misunderstandings and misleading participants in responding to the items on knowledge and ventilators. More detailed instructions concerning the provision of the experimental group remained unchanged, as reliability was demonstrated and constructed, and face validity was established. Other than that, the steps in the procedure for sitting and standing transfers in the KC guidelines were simplified, with the aim of increasing nurses' understanding of KC procedure and the skills to be practiced. The data, presented in Table 3.15, were collected and there was a Cronbach's Alpha reliability of between 0.79 - 0.90 for each of the five constructs as follows:

Table 3.6: Cronbach's Alpha and KR20 Measure Reliability For Nurses' Instruments.

| Items | Alpha values | Number of items |
|---|---|---|
| a) Perception | 0.880 | 25 |
| b) Knowledge | 0.793 | 20 |
| c) Practice | 0.841 | 11 |

### 3.20.3 Measure

The researchers used Arthur J. Angler & Eileen Brumbaugh et al., (2013)'s modified Kangaroo Care Questionnaire Survey (KCQs) and adopted the Parental Stress Scale: Neonatal Intensive Care Unit (PSS: NICU: P&R) from Mile et al., (1999). The questionnaire consisted of 14 basic characteristics of mothers with premature infants and a total of 57 items to assess mothers' perception, knowledge, and perceived barriers in relation to kangaroo care

and their stress levels. Blind forward and backward translation of the questionnaire from English to Bahasa Malaysia was carried out. Both the forward and backward translated data were checked against the original questionnaire to see if any inconsistencies would require further review (Jones, 2001; Wild, 2005).

The researchers used the modified Kangaroo Care Questionnaire (KCQ) established by Arthur J. Angler & Eileen Brumbaugh et al., (2013) for the nurses. The questionnaire consisted of nine participant characteristics and a total of 56 items to evaluate the perception, knowledge, and practice of KC among nurses. Both forward and backward translated questionnaires were checked against the initial questionnaire to see if any differences needed further verification (Jones, 2001; Wild, 2005).

### 3.21 Summary

This chapter provides explanations of the methods and design used in this study to respond to the research questions. Also presented were explanations of the research principles, samples, settings, instruments, procedures, and statistical analysis. The next chapter will discuss the study's findings.

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## Appendix A: Ethical Approval


**UNIVERSITY MALAYA MEDICAL CENTER**
**LEMBAH PANTAI**
**59100 KUALA LUMPUR, MALAYSIA**
Telephone : 603-7949 2110
Fax.No : 603-7949 2048

| Received From:<br>AZANNA BINTI AHMAD KAMAR | **OFFICIAL RECEIPT**<br>No. : CC201760001<br>Date : 8/6/2017<br>Payment Type : CREDIT CARD<br>Reference No. : 7403260154260001<br>Transaction ID : CC001213<br>MREC ID No. : 201765-5310<br>Payment Category : New Study |
|---|---|
| Malaysian Ringgit (MYR):<br>Three Hundred Only. | MYR 300.00 |
| Payment For:<br>MREC | |

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## Appendix B: Letter for Approval (Head of Pediatric Department)

27hb Julai 2017.

Pengarah,
Pusat Perubatan Universiti Malaya,
Lembah Pantai,
59100, Kuala Lumpur.

Professor Madya Dr. Muhammad Yazid Bin Jalaludin,
Ketua,
Jabatan Paediatrik,
Pusat Perubatan Universiti Malaya,
Lembah Pantai,
59100, Kuala Lumpur.

Melalui: Professor Madya Dr. Katijah Lim Abdullah
Ketua,
Jabatan Sains Kejururawatan.

Tuan,

**PER: PERMOHONAN KEBENARAN UNTUK MENJALANKAN PENYELIDIKKAN KEJURURAWATAN DI NEONATAL INTENSIVE CARE UNIT (NICU), JABATAN PAEDIATRIK, PUSAT PERUBATAN UNIVERSITI MALAYA**

Perkara di atas adalah dirujuk.Sehubungan dengan perkara tersebut di atas, saya Sharmiza Binti Samsudin, pelajar Phd dari Jabatan Sains Kejururawatan Universiti Malaya ingin memohon kebenaran untuk menjalankan penyelidikkan di hospital tuan.

2. Tujuan penyelidikkan adalah untuk memenuhi keperluan pengijazahan program Doktor Falsafah, Universiti Malaya.

3. Berikut adalah butir-butir mengenai penyelidikkan yang akan dijalankan:

| | |
|---|---|
| 3.1 Tajuk | : The Effectiveness of Kangaroo Mother Care Among Mother With Premature Infant in NICU. |
| 3.2 Tujuan | : The purpose of the study is to evaluate whether a specific teaching program on Kangaroo Care (KC) has significant effects for the infant and the mother. |
| 3.3 Metod kajian | : A quasi-experimental and longitudinal design study (Intervention and questionnaire based) |
| 3.4 Target populasi | : The mother – infant dyads and all nurses in NICU,UMMC. |
| 3.5 Masa kajian | : August 2017 till September 2019 |
| 3.6 Supervisor | : Dr. Azanna Bt Ahmad Kamar (Clinical Supervisor) |
| | : Assc. Prof.(Dr.) Katijah Lim Binti Abdullah (Supervisor Nursing Aspect) |
| | : Dr. Ping Lei Chui (Supervisor Methodology Aspect) |

4.Bersama-sama ini, disertakan satu salinan surat kebenaran daipada Ethics Committee untuk semakkan pihak tuan.Segala pertimbangan dan kerjasama daripada pihak tuan amatlah saya hargai dan didahului dengan ucapan ribuan terima kasih. Sekian.

Yang benar,

…… ……

**(SHARMIZA BT SAMSUDIN)**
Pelajar PhD,
Fakulti Perubatan,
Jabatan Sains Kejururawatan,
Universiti Malaya.

## Appendix C : Letter for Approval from Head of Nursing (NICU)

27hb Julai 2017.

Pengarah,
Pusat Perubatan Universiti Malaya,
Lembah Pantai,
59100, Kuala Lumpur.

Ketua Jururawat,
Neonatal Intensive Care Unit (NICU),
Pusat Perubatan Universiti Malaya,
Lembah Pantai,
59100, Kuala Lumpur.

Melalui: Professor Madya Dr Katijah Lim Abdullah
Ketua,
Jabatan Sains Kejururawatan.

Tuan,

**PER: PERMOHONAN KEBENARAN UNTUK MENJALANKAN PENYELIDIKKAN KEJURURAWATAN DI NEONATAL INTENSIVE CARE UNIT (NICU), JABATAN PAEDIATRIK, PUSAT PERUBATAN UNIVERSITI MALAYA**

Perkara di atas adalah dirujuk.
Sehubungan dengan perkara tersebut di atas, saya Sharmiza Binti Samsudin, pelajar Phd dari Jabatan Sains Kejururawatan Universiti Malaya ingin memohon kebenaran untuk menjalankan penyelidikkan di hospital tuan.
2. Tujuan penyelidikkan adalah untuk memenuhi keperluan pengijazahan program Doktor Falsafah, Universiti Malaya.
3. Berikut adalah butir-butir mengenai penyelidikkan yang akan dijalankan:
   - 3.1 Tajuk : The Effectiveness of Kangaroo Care Among Mother With Premature Infant in NICU.
   - 3.2 Tujuan : The purpose of the study is to evaluate whether a specific teaching program on Kangaroo Care (KC) has significant effects for the infant and the mother.
   - 3.3 Metod kajian : A quasi-experimental and longitudinal design study (Intervention and questionnaire based)
   - 3.4 Target populasi: The mother – infant dyads and all nurses in NICU,UMMC.
   - 3.5 Masa kajian : August 2017 till September 2019
   - 3.6 Supervisor : Dr. Azanna Bt Ahmad Kamar (Clinical Supervisor)
     : Professor Madya Dr. Katijah Lim Binti Abdullah (Supervisor Nursing Aspect)
     : Dr. Ping Lei Chui (Supervisor Methodology Aspect)
4. Bersama-sama ini, disertakan satu salinan surat kebenaran daripada Ethics Committee untuk semakkan pihak tuan. Segala pertimbangan dan kerjasama daripada pihak tuan amatlah saya hargai dan didahului dengan ucapan ribuan terima kasih. Sekian.

Yang benar,

(**SHARMIZA BT SAMSUDIN**)
Pelajar PhD,
Fakulti Perubatan,
Jabatan Sains Kejururawatan,
Universiti Malaya.

## Appendix D: Mothers' Consent Form


**Mothers' Consent Form**

You are invited to participate in a research study entitled "The effectiveness of Kangaroo care on low birth weight infants in Neonatal Intensive Care Units." The aim of this intervention study is to evaluate the effect of KC for infants, mother and nursing outcomes of implementing a quasi-experimental and longitudinal study to evaluate the effectiveness of KC in low birth weight infants in one hospital in Klang Valley, Malaysia: University Malaya Medical Centre.

The participation in this study is **voluntary** and you have the right to **refuse** to participate or **withdraw** at any time without affecting your medical care. Your identity and records as a participant in this study will remain confidential with respect to any publications/reporting of the results of this study. Your records in connection with this study will be kept confidential to the extent permitted by the law.

With your permission, we will contact you by telephone/whatsapp when your baby are three and six months old.

I confirm that I agree to the following;

| | |
|---|---|
| I acknowledge that I have read, or it had been explained to me in a language that I understand, the attached Research Participant Information Sheet. | |
| I understand that this study is not intended to be of any direct therapeutic or financial benefits to me. | |
| I understand that I am free to withdraw this authorization and to discontinue participation in this study at any time. | |
| I understand that such withdrawal will not affect my medical care. | |
| I confirm that I have read, or had read to me, the forexperimental groupoing authorization | |
| I give consent to be contacted by the researcher, by telephone, when my baby are three and 6 months old. | |

**Participant:**

Name: _____ Date: _____

Signature: _____

Please write down your telephone number: (below)

.....

**Researcher or her representative:**

Name: _____ Date: _____

Signature: _____

**Appendix E(a) : Mother's Questionnaire**


**(English version)**
**QUESTIONNAIRE I : MOTHER**

Dear Madam,

Thank you for agreeing to participate in the research.

The purpose of this research is to evaluate the effectiveness of Kangaroo Care (KC) among mother with premature infant in NICU.

The questionnaire consists of:

Section A : Demographic Characteristic

Section B : Part I - Perception on KC
Part II - Knowledge on KC
Part III - Barrier on KC
Part IV - Parenteral Stress Scale: Neonatal Intensive Care Unit

Please answer **ALL** the questions to the best of your ability and as honestly as possible.
Thank you for your cooperation and support in this research.

**CONSENT FOR PARTICIPANT IN RESEARCH ACTIVITIES**

1. Ms. Sharmiza bt Samsudin has requested my participation in this research.
2. I understand the purpose of this research.
3. I understand that the information obtained is to be used solely for academic purposes. I have also been assured of the confidentiality of the information obtained.
4. I understand that I am not forced to participate and it is my right to refuse to take part in this research. I may withdraw from the research at any time without penalty or prejudice.
5. I hereby give my informed and free consent to be a participant in this research.

Signature :_____

Date :_____

**SECTION A : Demographic Characteristic**

**Instruction**: Please √ to your response.

**1. Age**_____ *(Please fill in the blank)*

**2. Race**
01. Malay ◯ 02. Chinese ◯ 03. Indian ◯ 04.Others_____*(please specify)*

**3. Religion**
01. Islam ◯ 02. Buddha ◯ 03. Hindu ◯
04. Others_____*(please specify)*

**4. Marital Status**
01. Married ◯ 02. Single ◯ 03. Divorced ◯ 04. Widowed ◯ 05. Engaged ◯

**5. Delivery type**
01. SVD ◯ 02. Caesarean section (CS) ◯

**6. Parity of mother**
01. Primipara ◯ 02. Multipara ◯

**7. Highest Educational Level**
01. Primary ◯ 02. Secondary ◯ 03. Tertiary ◯

**8. Occupation status**
01. Working ◯ 02. Not working ◯

**9. Employment sector status**
01. Government ◯ 02. Private ◯

**10. Maternity leave status**
01. 60 consecutive days ◯ 02. 30 consecutive days ◯

**11. Household income (RM)**
01. 500 – 999 ◯ 02. 1000 – 1499 ◯ 03. 1500 – 1999 ◯ 04. 2000 – 2499 ◯
05. 2500 – 2999 ◯ 06. ≥ 3000 ◯ 07. ≥ 4000 ◯

**2. Breast feeding status**
Do you breast fed or express breast milk (EBM) for your baby?
01. Yes ◯ 02. No ◯

**13. Post-partum stress status (pre-post)**
01. Yes ◯ 02. No ◯

14.Kangaroo care knowledge
01. Yes ◯ 02. No ◯ If Yes;……If No:……

Before you bexperimental groupin completing the survey, please answer the following question, then go on to the Section B

Do you practice KC in NICU? (Circle your response)

1 - NO

2 - YES

**SECTION B**: **Kangaroo Care (KC) Survey**

**Instruction**: Please answer the following questions. Use the following scale for your responses.

5 = Strongly Agree
4 = Agree
3 = Neither Agree Nor Disagree
2 = Disagree
1 = Strongly Disagree

## Part I: Mother's Perception of KC

| No | Statement | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|
| 1 | All preterm babies should be allowed to participate in KC reardless of age. | | | | | |
| 2 | All preterm babies should be allowed to participate in KC regardless of weight. | | | | | |
| 3 | Babies receiving IV fluids should **NOT** be allowed to participate in KC. | | | | | |
| 4 | KC encourages the parenting role. | | | | | |
| 5 | KC enhances the attachment process between mother and baby. | | | | | |
| 6 | KC interrupts babies care giving. | | | | | |
| 7 | KC should be available only to breastfeeding mothers. | | | | | |
| 8 | KC is **NOT** feasible with some babies. | | | | | |
| 9 | KC keeps mothers too tied to the bedside. | | | | | |
| 10 | KC should be offered to all mothers in the NICU. | | | | | |
| 11 | KC will benefit preterm babies. | | | | | |
| 12 | KC will help mothers feel more confident in caring for their preterm babies. | | | | | |
| 13 | KC will improve the baby's outcome. | | | | | |
| 14 | KC will interfere with the completion of my tasks. | | | | | |
| 15 | Learning about KC will help me be a better mother. | | | | | |
| 16 | Nurses look forward to introducing KC to a new mother. | | | | | |
| 17 | My babies have adequate time for mother-baby contact without the use of KC. | | | | | |
| 18 | The increased amount of time required to prepare a baby for a KC session is out of proportion to the benefits. | | | | | |
| 19 | The teamwork required between nurses and mothers when doing KC is worth the effort. | | | | | |
| 20 | There is **NOT** enough flexibility in the NICU to allow mothers extended visits (more than 1 hour) for KC. | | | | | |

**Part II: Knowledge on KC**

**Instruction:** Please answer the following questions to the best of your ability based on your own personal knowledge of KC, **NOT** on its practice. Circle your response that best represents to knowledge of KC. Use the following scale for your responses:

3 = True
2 = False
1 = Don't know

| No | Statement | True | False | Not sure |
|---|---|---|---|---|
| 1 | Babies appear to be satisfied in KC. | 3 | 2 | 1 |
| 2 | Babies on phototherapy can participate in KC. | 3 | 2 | 1 |
| 3 | Babies typically decrease heart rate during KC. | 3 | 2 | 1 |
| 4 | Babies with peripheral IVs can participate in KC. | 3 | 2 | 1 |
| 5 | KC has been shown to improve breathing patterns in preterm babies. | 3 | 2 | 1 |
| 6 | KC is contraindicated in premature babies. | 3 | 2 | 1 |
| 7 | KC is contraindicated in babies weighing less than 1000 grams. | 3 | 2 | 1 |
| 8 | KC is now considered safe as an alternative approach to care for preterm babies. | 3 | 2 | 1 |
| 9 | Most babies experience a decrease in temperature during KC. | 3 | 2 | 1 |
| 10 | KC increase risk of infection in premature babies. | 3 | 2 | 1 |
| 11 | KC cause more stress with heart problem babies. | 3 | 2 | 1 |

**Part III: Perceived Barriers on KC**

**Instruction**: Please indicate a very important perceived barrier of KC. Use the following scale for your responses:

5 = Very Influential
4 = Somewhat Influential
3 = Neither Influential Nor Non-Influential
2 = Not Very Influential
1 = Not Influential at All

| No | Statement | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|
| 1 | Mothers' reluctance to allow KC. | | | | | |
| 2 | Mothers' belief that technology (e.g., incubators) is more beneficial to premature babies than care a mother can provide. | | | | | |
| 3 | Mothers' felt no privacy during KC. | | | | | |
| 4 | Mothers' difficult to assess baby's readiness for KC. | | | | | |
| 5 | Mothers' reluctance to initiate KC. | | | | | |
| 6 | Mothers' reluctance to participate in KC. | | | | | |
| 7 | Mothers' is frequently unavailable to do KC. | | | | | |
| 8 | Mothers' fear of safety for babies below a certain weight. | | | | | |
| 9 | Mothers' fear of low temperature during KC. | | | | | |
| 10 | Mothers' fear of baby's does not breastfeed during KC. | | | | | |
| 11 | Mothers' feel inability to provide adequate time to other children during KC. | | | | | |
| 12 | Mothers' belief that KMC is used for babies who are **NOT** developmentally well. | | | | | |
| 13 | Mothers' discomfort with exposing their chest during KC. | | | | | |
| 14 | Mothers' belief that will be much disturbance to the baby during KC. | | | | | |
| 15 | Mothers' unable to come to visit the baby for a long period of time. | | | | | |
| 16 | Mothers' felt nursing staff reluctance to participate in KC. | | | | | |
| 17 | Mothers' feel that KC adds a burden to nurses, inadequate time due to working commitment. | | | | | |
| 18 | Mothers' felt that KC makes it difficult to nurses to administer care. | | | | | |
| 19 | Mothers' felt the nursing staff's lack of exposure for mothers participating in KC. | | | | | |

## Part IV: PARENTAL STRESS SCALE: NEONATAL INTENSIVE CARE UNIT

**Instruction**: On the questionnaire, circle the single number that best expresses how stressful each experience has been for you. The numbers indicate the following levels of stress:

5 = Extremely stressful
4 = Very stressful
3 = Moderately stressful
2 = A little stressful
1 = Not at all stressful the experience did not cause you to feel upset, tense, or anxious

| No | Items | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|
| 1. | Being separated from my baby | 5 | 4 | 3 | 2 | 1 |
| 2. | Not feeding my baby myself | 5 | 4 | 3 | 2 | 1 |
| 3. | Not being able to care for my baby myself (for example, diapering, bathing) | 5 | 4 | 3 | 2 | 1 |
| 4. | Not being able to hold my baby when I want | 5 | 4 | 3 | 2 | 1 |
| 5. | Feeling helpless and unable to protect my baby from pain and painful procedures | 5 | 4 | 3 | 2 | 1 |
| 6. | Feeling helpless about how to help my baby during this time | 5 | 4 | 3 | 2 | 1 |
| 7. | Not having time alone with my baby | 5 | 4 | 3 | 2 | 1 |

_____Thank you for your participating in this study _____

**Appendix E (b): Questionnaire Mother (Malay Version)**

University of Malaya

## SOAL SELIDIK II: IBU

Puan yang dihormati,

Terima kasih kerana bersetuju untuk mengambil bahagian di dalam kajian ini.

Tujuan kajian ini adalah untuk menilai keberkesanan Kangaroo Care (KC) di kalangan ibu dengan bayi pra-matang di NICU.

Soal selidik ini terdiri daripada:

Bahagian A : Ciri-ciri demografi

Bahagian B : Bahagian I - Persepsi terhadap KC

Bahagian II - Pengetahuan terhadap KC

Bahagian III - Halangan terhadap KC

Bahagian IV - Skala Stres Parenteral : Unit Rawatan Rapi Neonatal

Sila jawab ***SEMUA*** soalan dengan jujur dan paling tepat.Terima kasih diatas kerjasama dan sokongan anda dalam kajian ini.

**KEBENARAN UNTUK MENYERTAI DALAM AKTIVITI PENYELIDIKAN**

1. Puan Sharmiza bt Samsudin telah memohon penyertaan saya didalam kajian ini.
2. Saya memahami tujuan kajian ini.
3. Saya faham bahawa maklumat yang diperoleh hanya boleh digunakan untuk tujuan akademik. Saya juga telah dijamin kerahsiaan maklumat yang diperoleh.
4. Saya faham bahawa saya tidak dipaksa untuk mengambil bahagian dan adalah hak saya untuk menolak untuk mengambil bahagian dalam penyelidikan ini. Saya boleh menarik diri dari penyelidikan pada bila-bila masa tanpa hukuman atau prejudis.
5. Dengan ini saya memberikan kebenaran dan maklumat percuma saya untuk menjadi peserta dalam penyelidikan ini.

Tandatangan :_____

Tarikh :_____

**Seksyen A : Ciri-ciri Demograpik**
**Arahan** : Sila tandakan √ pada respon anda.

1. **Umur**_____ (*sila isi tempat kosong)*

2. **Bangsa**

01. Melayu ◯ 02. Cina ◯ 03. India ◯ 04. Lain-lain _____ (*sila nyatakan)*

3. **Agama**

01. Islam ◯ 02. Buddha ◯ 03. Hindu ◯ 04. Lain-lain _____ (*sila nyatakan*)

4. **Status Perkahwinan**

01. Berkahwin ◯ 02. Belum berkahwin ◯ 03. Bercerai ◯ 04. Janda ◯ 05. Bertunang ◯

5. **Kelahiran secara**

01. Normal ◯ 02. Pembedahan ◯

6. **Status kelahiran ibu**

01. Kelahiran pertama kali ◯ 02. Kelahiran lebih dari satu kali ◯

7. **Tahap Akademik**

01. Sekolah Rendah ◯ 02. Sekolah Menengah ◯ 03. Universiti ◯

8. **Status pekerjaan**

01. Bekerja ◯ 02. Tidak bekerja ◯

9. **Status sektor pekerjaan**

01. Kerajaan ◯ 02. Swasta ◯

10. **Status cuti bersalin**

01. 60 hari berturut-turut ◯ 02. 30 hari berturut-turut ◯ 03. 90 hari berturut -turut

11. **Pendapatan isi rumah (RM)**

01. 500-999 ◯ 02. 1000-1499 ◯ 03. 1500-1999 ◯ 04. 2000-2499 ◯

05. 2500-2999 ◯ 06. ≥ 3000 ◯ 07. ≥ 4000 ◯

12. **Status penyusuan susu badan**.

Adakah anda menyusu atau memerah susu (EBM) untuk bayi anda?

01. Ya ◯ 02.Tidak ◯

13**. Status stres selepas bersalin (pre-pos)**

01. Ya ◯ 02. Tidak ◯

Sebelum anda mula melengkapkan soal kaji selidik ini, sila jawab soalan berikut, kemudian pergi ke Seksyen B.

Pernahkah anda mengamalkan KC ? (Bulatkan jawapan anda)

1 - YA 2 - TIDAK

**SEKSYEN B : Kangaroo Care (KC) Survey**

**Arahan** : Sila jawab soalan-soalan berikut. Gunakan skala berikut untuk jawapan anda.

5 = Sangat Setuju
4 = Setuju
3 = Berkecuali
2 = Tidak setuju
1 = Sangat Tidak Setuju

## Bahagian I : Persepsi terhadap KC

| No | Statemen | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|
| 1 | Semua bayi pramatang harus dibenarkan untuk mengambil bahagian dalam KC tanpa mengira usia. | | | | | |
| 2 | Semua bayi pramatang harus dibenarkan untuk mengambil bahagian dalam KC tanpa mengira berat badan. | | | | | |
| 3 | Bayi yang menerima cecair Intra Vena **TIDAK** harus dibenarkan untuk mengambil bahagian dalam KC. | | | | | |
| 4 | KC menggalakkan peranan keibubapaan. | | | | | |
| 5 | KC meningkatkan proses sayang antara ibu dan bayi. | | | | | |
| 6 | KC mengganggu penjagaan bayi. | | | | | |
| 7 | KC hanya perlu diberi kepada ibu-ibu yang menyusukan anak sahaja. | | | | | |
| 8 | KC **TIDAK** dilaksanakan kepada sesetengah bayi. | | | | | |
| 9 | KC menyebabkan ibu perlu sentiasa terikat berada disisi bayi. | | | | | |
| 10 | KC perlu ditawarkan kepada semua ibu-ibu di NICU. | | | | | |
| 11 | KC akan memberi manfaat kepada bayi pramatang. | | | | | |
| 12 | KC akan membentu ibu berasa lebih yakin dalam menjaga bayi pramatang mereka. | | | | | |
| 13 | KC meningkatkan pertumbuhan yang baik kepada bayi. | | | | | |
| 14 | KC akan mengganggu saya menyelesaikan tugas-tugas saya. | | | | | |
| 15 | Belajar mengenai KC akan membantu saya menjadi ibu yang lebih baik. | | | | | |
| 16 | Diharap jururawat dapat memperkenalkan KC untuk ibu yang baru. | | | | | |
| 17 | Bayi saya mempunyai masa yang mencukupi untuk bersentuhan diantara ibu dan bayi tanpa menggunakan KC. | | | | | |
| 18 | Jumlah masa yang diperlukan untuk menyediakan bayi bagi sesi KC tidak setanding dengan faedah. | | | | | |
| 19 | Kerja berpasukan amat diperlukan diantara jururawat dan ibu apabila melakukan KC. | | | | | |
| 20 | Tidak ada fleksibiliti masa yang cukup dalam NICU untuk membenarkan para ibu dilanjutkan masa (lebih daripada 1 jam) untuk KC. | | | | | |

**Bahagian II : Pengetahuan terhadap KC**

**Arahan** **:** Sila jawab soalan-soalan berikut dengan tepat mengikut kemampuan anda berdasarkan pengetahuan peribadi anda sendiri mengenai KC, **TIDAK** pada amalannya. Bulatkan jawapan yang terbaik untuk mewakili pengetahuan KC anda. Gunakan skala berikut untuk jawapan anda:

3 = Benar
2 = Salah
1 = Tidak pasti

| No | Statemen | Betul | Salah | Tidak Pasti |
|---|---|---|---|---|
| 1 | Bayi kelihatan berpuas hati dengan KC. | 3 | 2 | 1 |
| 2 | Bayi dengan rawatan fototerapi boleh mengambil bahagian dalam KC. | 3 | 2 | 1 |
| 3 | Bayi biasanya mengurangkan kadar jantung ketika KC. | 3 | 2 | 1 |
| 4 | Bayi dengan Intra periferal boleh mengambil bahagian dalam KC. | 3 | 2 | 1 |
| 5 | KC telah membuktikan dapat membantu kadar pernafasan pada bayi pramatang. | 3 | 2 | 1 |
| 6 | KC tidak sesuai pada bayi pramatang. | 3 | 2 | 1 |
| 7 | KC tidak sesuai pada bayi yang berat kurang daripada 1000 gram. | 3 | 2 | 1 |
| 8 | KC kini dianggap selamat sebagai pendekatan alternatif untuk menjaga bayi pramatang. | 3 | 2 | 1 |
| 9 | Kebanyakan bayi mengalami penurunan suhu semasa KC. | 3 | 2 | 1 |
| 10 | KC adalah peningkatan risiko jangkitan pada bayi pramatang. | 3 | 2 | 1 |
| 11 | KC tidak sesuai untuk bayi yang mempunyai masalah jantung. | 3 | 2 | 1 |

**Bahagian III : Halangan terhadap KC**

**Arahan** : Sila nyatakan halangan yang dilihat sangat penting dalam KC. Gunakan skala berikut untuk jawapan anda:

5 = Sangat Penting
4 = Agak Penting
3 = Tidak Penting Nor Tidak Penting
2 = Tidak Sangat Penting
1 = Tidak Penting Lansung

| No | Statemen | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|
| 1 | Ibu enggan untuk melakukan KC. | | | | | |
| 2 | Ibu percaya bahawa teknologi (contohnya, inkubator) adalah lebih bermanfaat untuk bayi pra-matang daripada jagaan yang disediakan oleh seorang ibu. | | | | | |
| 3 | Ibu merasakan tiada privasi semasa melakukan KC. | | | | | |
| 4 | Ibu sukar untuk menilai kesediaan bayi untuk KC. | | | | | |
| 5 | Ibu enggan untuk memulakan KC. | | | | | |
| 6 | Ibu enggan untuk terlibat dalam KC. | | | | | |
| 7 | Ibu sering tidak tersedia untuk melakukan KC. | | | | | |
| 8 | Ibu takut akan keselamatan bayi pada berat badan yang tertentu untuk memulakan KC. | | | | | |
| 9 | Ibu takut bayi kesejukkan semasa KC. | | | | | |
| 10 | Ibu takut bayi tidak menyusu semasa KC. | | | | | |
| 11 | Ibu merasa tidak mempunyai masa yang cukup untuk diberi kepada anak-anak lain semasa KC. | | | | | |
| 12 | Ibu percaya yang KC hanya diberi kepada bayi yang mempunyai masalah perkembangan. | | | | | |
| 13 | Ibu merasa tidak selesa bahagian dada mereka terdedah semasa KC. | | | | | |
| 14 | Ibu percaya bahawa akan banyak mengganggu bayi semasa KC. | | | | | |
| 15 | Ibu tidak dapat datang untuk melawat bayi untuk tempoh masa yang lama. | | | | | |
| 16 | Ibu merasa jururawat enggan membantu semasa mengambil bahagian dalam KC. | | | | | |
| 17 | Ibu percaya bahawa KC akan menambah kerja dan komitmen jururawat kerana kesuntukan masa. | | | | | |
| 18 | Ibu percaya KC akan menyukarkan tugas jururawat dalam memberi penjagaan dan rawatan kepada bayi. | | | | | |
| 19 | Ibu berasa jururawat kurang diberi pendedahan tentang KC untuk ibu-ibu yang mengambil bahagian di dalam KC. | | | | | |

**Bahagian IV: SKALA PARENTAL STRES : UNIT JAGAAN INTENSIVE NEONATAL**

**Arahan** : Sila bulatkan nombor berikut untuk menyatakan bagaimana pengalaman tekanan anda ketika bayi berada di NICU. Nombor berikut menunjukkan tahap tekanan tersebut:

5 = Sangat tertekan
4 = Sangat tertekan
3 = Agak tertekan
2 = Sedikit tertekan
1 = Tidak sama sekali tertekan pengalaman tidak menyebabkan anda berasa kecewa, texperimental groupang, atau cemas

| No | Item | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|
| 1. | Dipisahkan daripada bayi saya. | | | | | |
| 2. | Tidak memberi makan bayi saya sendiri | | | | | |
| 3. | Tidak mampu untuk menjaga bayi saya sendiri (contohnya, menukar lampin dan mandi) | | | | | |
| 4. | Tidak dapat memexperimental groupang bayi saya apabila saya mahu. | | | | | |
| 5. | Rasa tidak berdaya dan tidak dapat melindungi bayi saya dari prosedur sakit dan menyakitkan. | | | | | |
| 6. | Rasa tidak berdaya tentang bagaimana untuk membantu bayi saya pada masa ini. | | | | | |
| 7. | Tidak mempunyai masa untuk bersama dengan bayi saya. | | | | | |

_____ Terima kasih kerana menyertai dalam kajian ini _____

**Appendix F(a): Infant' (English version)**

University of Malaya

E

**Instrument : INFANT**

Dear Madam,

Thank you for agreeing to participate in the research.

The purpose of this research is to evaluate the effectiveness of Kangaroo Care (KC) among mother with premature infant in NICU.

The questionnaire consists of:

Part I : Demographic Characteristic

Part II : Infant Progress Data Sheet (KCRP Booklet)

Please answer **ALL** the questions of your ability and as honestly as possible. Thank you for your cooperation and support in this research.

**CONSENT FOR PARTICIPANT IN RESEARCH ACTIVITIES**

1. Ms. Sharmiza bt Samsudin has requested my participation in this research.
2. I understand the purpose of this research.
3. I understand that the information obtained is to be used solely for academic purposes. I have also been assured of the confidentiality of the information obtained.
4. I understand that I am not forced to participate and it is my right to refuse to take part in this research. I may withdraw from the research at any time without penalty or prejudice.

I hereby give my informed and free consent to be a participant in this research.

Date :…….

_____

Consent Signature of Participant

**Part I : Demographic Characteristic**

1. Gender
01. Male ○ 02. Female ○

2. Race
01. Malay ○ 02. Chinese ○ 03. Indian ○
04.Other_____(*please specify)*

3. Post-natal age (days) _____*(please specify)*

4. Gestation age at birth (weeks) _____*(please specify)*

5. Birth weight(kg)_____ *(please specify)*

6. Mode of feeding status
01. Tube feeding ○ 02.Spoon-feed ○ 03.Breastfeeding ○

7. Type of milk
01. Express Breast Milk (EBM) ○ 02. Breastfeeding ○ 03. Formula milk ○

8. Initiate breastfeeding (weeks) _____*(please specify)*

9. Discharge on breastfeeding (weeks)_____*(please specify)*

10. Weaned exclusive breastfeeding (months)_____ *(please specify)*

C

**Appendix F(b) : Infant's (Infant KCRP Booklet)**

**Instrument : INFANT (English Version )**

University of Malaya

Dear Madam,

Thank you for agreeing to participate in the research.

The purpose of this research is to evaluate the effectiveness of Kangaroo Care (KC) among mother with premature infant in NICU.

The questionnaire consists of:

Part I : Demographic Characteristic

Part II : Infant Progress Data Sheet (KC Booklet)

Please answer **ALL** the questions of your ability and as honestly as possible. Thank you for your cooperation and support in this research.

**CONSENT FOR PARTICIPANT IN RESEARCH ACTIVITIES**

1. Ms. Sharmiza bt Samsudin has requested my participation in this research.
2. I understand the purpose of this research.
3. I understand that the information obtained is to be used solely for academic purposes. I have also been assured of the confidentiality of the information obtained.
4. I understand that I am not forced to participate and it is my right to refuse to take part in this research. I may withdraw from the research at any time without penalty or prejudice.

I hereby give my informed and free consent to be a participant in this research.

Date :

_____

Consent Signature of Participant

**Part I : Demographic Characteristic**

1. Gender
01. Male ○ 02. Female ○

2. Race
01. Malay ○ 02. Chinese ○ 03. Indian ○
04.Other_____(please specify)

3. Post-natal age (days) _____(please specify)

4. Gestation age at birth (weeks) _____(please specify)

5. Birth weight(kg)_____ (please specify)

6. Mode of feeding status
01. Tube feeding ○ 02.Spoon-feed ○ 03.Breastfeeding ○

7. Type of milk
01. Express Breast Milk (EBM) ○ 02. Breastfeeding ○ 03. Formula milk ○

8. Initiate breastfeeding (weeks) _____(please specify)

9. Discharge on breastfeeding (weeks)_____(please specify)

10. Weaned exclusive breastfeeding (months)_____ (please specify)

**Part II : Infant progress data sheet for experimental group**

| Day (D) | D0 | D1 | D2 | D3 | D4 | D5 | D6 | D7 | D8 | D9 | D10 Till discharge | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Infant number : _____ | | | | | | | | | | | | |
| Temperature (Pre/Post) KC | | | | | | | | | | | | |
| KC (in minutes or hours/day) | | | | | | | | | | | | |
| Weight gain velocity (g/days) | | | | | | | | | | | | |
| Feeding (EBM or Breastfeeding) | | | | | | | | | | | | |
| Wean BF (weeks) | | | | | | | | | | | | |

D = Day, 0 = Birth, KMC = Kangaroo Mother Care, ↑= Increase & ↓=Decrease and Breastfeeding, EBM = Express Breast Milk

## Appendix G : Nurses' Consent Form


**Nurses' Consent Form**

You are invited to participate in a research study entitled "The effectiveness of Kangaroo care on low birth weight infants in Neonatal Intensive Care Units." The aim of this intervention study is to evaluate the effect of KC for infants, mother and nursing outcomes of implementing a quasi-experimental and longitudinal study to evaluate the effectiveness of KC in low birth weight infants in one hospital in Klang Valley, Malaysia: University Malaya Medical Centre.

The participation in this study is voluntary and you have the right to refuse to participate or withdraw at any time without affecting your medical care. Your identity and records as a participant in this study will remain confidential with respect to any publications/reporting of the results of this study. Your records in connection with this study will be kept confidential to the extent permitted by the law.

With your permission, I will contact you by telephone/whatsapp at first and three month period of time after educational intervention for participating in post-test intervention study.

I confirm that, I am informed the following information:

| | |
|---|---|
| I acknowledge that I have read, or it had been explained to me in a language that I understand, the attached Research Participant Information Sheet. | |
| I understand that this study is not intended to be of any direct financial benefits to me. | |
| I understand that I am free to withdraw this authorization and to discontinue participation in this study at any time. | |
| I have had the opportunity to ask questions. | |
| I confirm that I have read, or had read to me, the forexperimental groupoing authorization. | |
| I give consent to be contacted by the researcher, by telephone/whatsapp at first and three month after educational intervention for participating in post-test intervention study. | |

**Participant**:

Name: _____ Date: _____

Signature: _____

Please write down your telephone number: (below)

.....

Name: _____ Date: _____

Signature: _____

**Appendix H : Nurse's Questionnaire**


**QUESTIONNAIRE II : NURSES**

Dear Nurses,

Thank you for agreeing to participate in the research.

The purpose of this research is to evaluate the effectiveness of Kangaroo Care (KC) among mother with premature infant in NICU.

The questionnaire consists of:

Section A : Demographic Characteristic
Section B : Part I - Perception on KC
Part II - Knowledge on KC
Part III - Practice on KC

Please answer **ALL** the questions to the best of your ability and as honestly as possible.
Thank you for your cooperation and support in this research.

**CONSENT FOR PARTICIPANT IN RESEARCH ACTIVITIES**

1. Ms. Sharmiza bt Samsudin has requested my participation in this research.
2. I understand the purpose of this research.
3. I understand that the information obtained is to be used solely for academic purposes. I have also been assured of the confidentiality of the information obtained.
4. I understand that I am not forced to participate and it is my right to refuse to take part in this research. I may withdraw from the research at any time without penalty or prejudice.

I hereby give my informed and free consent to be a participant in this research.

Date :

_____
Consent Signature of Participant

**Section A : Demographic Characteristic**

**Instruction :** Please √ the response.

**1. Age** _____ *(please fill in the blank)*

**2. Gender**
01. Male ◯ 02. Female ◯

**3. Race**
01. Malay ◯ 02. Chinese ◯ 03. Indian ◯ 04. Others-_____*(please specify)*

**4. Highest Educational Level**
01. Primary ◯ 02. Secondary ◯ 03. Tertiary ◯

**5. Marital Status**
01. Married ◯ 02. Single ◯ 03. Divorced ◯ 04. Widowed 05. Engaged ◯

**6. How many years have you been qualified?** _____*(please specify)*

**7. Do you have a certificate of neonatology?**

01. Yes ◯ 02. No ◯

**8. How many years you are working in NICU ?**_____*(please specify)*

Before you completing the survey, please answer the following question, then go on to the Section B.Do you practice KC in NICU in any way? (Circle your response)

1. NO ◯
2. YES ◯

**SECTION B** : **Kangaroo Care (KC) Survey**

**Instruction**: Please answer the following questions. Use the following scale for your responses:

5 = Strongly Agree
4 = Agree
3 = Neither Agree Nor Disagree
2 = Disagree
1 = Strongly disagree

## Part I : Perception on KC

| No | Statement | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|
| 1 | All preterm babies should be allowed to participate in KC regardless of age. | | | | | |
| 2 | All preterm babies should be allowed to participate in KC regardless of weight. | | | | | |
| 3 | Babies receiving IV fluids should **NOT** be allowed to participate in KC. | | | | | |
| 4 | Babies who are intubated should **NOT** be allowed to participate in KC. | | | | | |
| 5 | Babies with umbilical catheters should **NOT** be allowed to participate in KC. | | | | | |
| 6 | Babies on ventilators should **NOT** be allowed to get KC. | | | | | |
| 7 | Babies with chest tubes should **NOT** be allowed to get KC. | | | | | |
| 8 | KC encourages the parenting role. | | | | | |
| 9 | KC enhances the attachment process between mother and baby. | | | | | |
| 10 | KC increases the quality of care on your unit. | | | | | |
| 11 | KC interrupts baby care√ giving. | | | | | |
| 12 | KC should be available only to breastfeeding mothers. | | | | | |
| 13 | KC is NOT feasible with some babies. | | | | | |
| 14 | KC keeps nurses too tied to the bedside. | | | | | |
| 15 | KC should be offered to all mothers in the NICU. | | | | | |
| 16 | KC will benefit preterm babies. | | | | | |
| 17 | KC will help mothers feel more confident in caring for their preterm baby. | | | | | |
| 18 | KC will improve the baby's outcome. | | | | | |
| 19 | KC will interfere with the completion of my tasks. | | | | | |
| 20 | Learning about KC will help me be a better nurse. | | | | | |
| 21 | Nurses look forward to introducing KC to a new mother. | | | | | |
| 22 | Our babies have adequate time for mother-baby contact without the use of KC. | | | | | |
| 23 | The increased amount of time required to prepare a baby for a KC session is out of proportion to the benefits. | | | | | |
| 24 | The teamwork required between nurses and mothers when doing KC is worth the effort. | | | | | |
| 25 | There is **NOT** enough flexibility in the NICU to allow parents extended visits (more than 1 hours) for KC. | | | | | |

**Part II : Knowledge on KC**

**Instruction:** Please answer the following questions to the best of your ability based on your own **personal knowledge** of KC, **NOT** on its practice. Circle your response that best represent to knowledge of KC. Use the following scale for your responses:

3 = True
2 = False
1 = Not sure

| No | Statement | True | False | Not sure |
|---|---|---|---|---|
| 1 | Babies appear to be satisfied in KC. | 3 | 2 | 1 |
| 2 | Babies on oxygen therapy experience a decrease in oxygen saturation. | 3 | 2 | 1 |
| 3 | Babies on phototherapy can participate in KC. | 3 | 2 | 1 |
| 4 | Babies on anotrope/vasopressor should **NOT** participate in KC. | 3 | 2 | 1 |
| 5 | Babies typically experience more bradycardia episodes during KC. | 3 | 2 | 1 |
| 6 | Babies with peripheral IVs can participate in KC. | 3 | 2 | 1 |
| 7 | KC has been shown to improve breathing patterns in preterm babies by reducing apnea. | 3 | 2 | 1 |
| 8 | KC is contraindicated in babies less than 28 weeks gestation. | 3 | 2 | 1 |
| 9 | KC is contraindicated in babies weighing less than 1000 grams. | 3 | 2 | 1 |
| 10 | KC is now considered safe as an alternative approach to care for medically stable, continuing care preterm babies. | 3 | 2 | 1 |
| 11 | Most babies experience a decrease in temperature during KC. | 3 | 2 | 1 |
| 12 | Published reports of clinical observations indicate that the rate of accidental extubation is higher with KC than with traditional methods of holding. | 3 | 2 | 1 |
| 13 | Research has indicated that babies who receive KC increase their mother's milk supply. | 3 | 2 | 1 |
| 14 | Research indicates that KC promotes quiet sleep. | 3 | 2 | 1 |
| 15 | Research shows that babies with arterial lines should **NOT** participate in KC. | 3 | 2 | 1 |
| 16 | The most physiologically stressful part of KC for the baby is the transfer to the mother's chest. | 3 | 2 | 1 |
| 17 | There is an increased risk of infection in the baby with KC. | 3 | 2 | 1 |
| 18 | Research shows that babies with Drug Withdrawal have less agitation during KMC than when **NOT** in KC. | 3 | 2 | 1 |
| 19 | Babies with some congenital heart defects have physiologic stability in KC. | 3 | 2 | 1 |
| 20 | Babies on ventilators mode do well during KC. | 3 | 2 | 1 |

**Part III : Practice on KC**

**Instruction**: Please describe how comfortable are you to initiate KC on baby with the following items? Use the following scale:

5 = Very Comfortable
4 = Somewhat Comfortable
3 = Neither Comfortable Nor Uncomfortable
2 = Somewhat Uncomfortable
1 = Very Uncomfortable

| No. | Statement | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|
| 1 | Baby with intravenous catheters. | | | | | |
| 2 | Baby during the perioperative period. | | | | | |
| 3 | Baby with endotracheal intubation. | | | | | |
| 4 | Baby with high-frequency rate or ventilator mode. | | | | | |
| 5 | Baby with nasal cannula oxygen (nasal prong). | | | | | |
| 6 | Baby with Nasal Continuous Positive Airway Pressure (NCPAP). | | | | | |
| 7 | Baby with percutaneous central lines. | | | | | |
| 8 | Baby with phototherapy treatment. | | | | | |
| 9 | Baby with Umbilical Arterial Catheters (UAC). | | | | | |
| 10 | Baby with Umbilical Venous Catheters (UVC). | | | | | |
| 11 | Baby with anotrope/vasopressors. | | | | | |

**Appendix I: Structured kangaroo care educational program (KC-EP) for nurses.**

| UNIVERSITY OF MALAYA | **Course contents of kangaroo care education programme (KC-EP) for Nurses** |
|---|---|
| Educational Program Session: | All nurses in neonatal intensive care unit (NICU), University Malaya Medical Centre (UMMC). |
| Course:<br>Course Tittle:<br><br>Medium of Instruction: | Neonatal Health Nursing<br>Physiology of kangaroo care (KC) and benefits for infant – mother dyads.<br>English and Bahasa Malaysia |
| Teaching materials/ Equipment | Laptop, LCD, white board, marker pen, lecture notes, showing video, pamphlets, booklet, incubator,thermometer, dummy, baby sling/tube, diapers, infant cap, mother's outfit (open infront),all related forms/diary applicable to the topic presentation and red & blue ball point. |
| Learning | Lecture (show and tell),<br>Practical (skill) & Discussion |
| Student Learning Time | Face to face (interpersonal communication): 8 hours<br>Guide learning(theory): 4 hours<br>Assessment(practical) : 4 hours |
| Soft Skills | Communication skills<br>Problem solving skills<br>Teamwork skills<br>Information Management<br>Professional Ethic and Moral |
| Presenter<br>e-mail address | Sharmiza Bt Samsudin<br>sharmizaamri72@gmail.com @ sharmiza@oum.edu.my |
| **Theory Session**:<br>Day :<br>Time :<br>**Practical session:**<br>Day :<br>Time :<br>Venue : | <br>Friday & Sunday<br>2.00pm – 6.00pm<br><br>Monday,Tuesday,Wednesday, Thursday and Saturday and including public holiday<br>08.00am – 5.00pm<br>Conference Room, Neonatal Intensive Care Unit, University Malaya Medical Centre, Klang Valley |

## Appendix J : Contents of structured kangaroo care educational program (KC-EP) for nurses.

| UNIVERSITY OF MALAYA | **Course contents of kangaroo care education programme (KC-EP) for nurses.** |
|---|---|
| Educational Program Session (Participant) | All nurses in neonatal intensive care unit (NICU), University Malaya Medical Centre.(UMMC) |
| Course:<br>Course Tittle:<br><br>Medium of instruction | Kangaroo care education programme (KC-EP) for nurses<br>Physiology of kangaroo Care and benefits for infant – mother dyads.<br>English and Bahasa Malaysia |
| Teaching materials/aids Equipment | Laptop, LCD, hand out, white board, marker pen, lecture notes, showing video, pamphlets, booklet, incubator,thermometer,infant dummy, baby sling/tube, diapers, infant cap, mother's outfit (open infront),all related forms/diary applicable to the topic presentation and red & blue ball point. |
| Mode of teaching Learning stratexperimental groupies | Lecture-demonstration<br>Lecture (show and tell),Practical (skill) & Question and Answer |
| Student Learning Time | Face to face (interpersonal communication): 8 hours<br>Guide learning(theory): 4 hours<br>Assessment(practical) : 4 hours |
| Presenter<br>e-mail address | Sharmiza Bt Samsudin<br>sharmizaamri72@gmail.com @ sharmiza@oum.edu.my |
| **Theory Session**:<br>Day/Time:<br>Venue:<br><br>**Practical session:**<br>Day/Time: | Every Friday and Sunday (August –September 2018)<br>2.00 pm – 6.00pm<br>Conference Room, Neonatal Intensive Care Unit, University Malaya Medical Centre, Klang Valley<br>Every Monday,Tuesday,Wednesday, Thursday, Saturday and including public holiday (August – September 2018)<br>08.00am – 5.00pm |
| Pre-requite knowledge | **Anatomy and Fundamental of Nursing**<br>- Intergumentary system<br>- Reproductive system<br>- Digestive system<br>- Cardiovascular system<br>- Cardiopulmonary system<br>- Central nervous system<br>- Neonatal and pediatric nursing<br>- Nurses have knowledge on giving care and treatment to the preterm babies (feeding) |
| General objective : | At the end of the program the nurse will be able to have in depth understanding of physiology and benefits of Kangaroo Care in detail and demonstrate the technique as well. |
| Specific objectives : | At the end of the program the nurses will be able to :<br>1) define the term and dose of kangaroo care (KC).<br>2) explain the physiology and method of KC.<br>3) state the benefits of KC to infant-mother dyads.<br>4) state the indication and contraindication for KC (eligibility criteria).<br>5) state the guidelines and protocols before, during and after the KC method.<br>6) recognize sign and symptoms of deterioration among premature infant before,during and after the method.<br>7) state the preparation before, during and after the KC method.<br>8) list the equipment for KC method ;<br>8.1 for infant<br>8.2 for mother<br>9) educate and guided on chart/record the infant progress record /diary<br>10) demonstrate and return-demonstrate the kangaro care method. |
| Important Date | Pre-test & Post-test (7th day after pretest and KC-EP for nurses) |

## Appendix K : Schedule of structured kangaroo care educational program (KC-EP) for nurses.

## Venue: NICU, Conference Room, University Malaya Medical Centre

| Date/ Time | Pretest / Theory session | Date/ Time | Posttest / Practical Session (Morning session) | Date /Time | Posttest / Practical Session (Afternoon session) | Posttest after 7th day |
|---|---|---|---|---|---|---|
| **02.00 pm - 02.30 pm** | Registration for kangaroo care educational program (KC-EP)<br>- Pretest (QI) | **08.00 am - 08.30 am** | Registration for post-test after attended KC-EP for nurses | **02.00 pm - 02.30 pm** | Registration for post-test after attended KC-EP for nurses | - Post intervention Posttest (QI)<br>- Demonstrate (Checklist)<br>- Gift certificates to nurses who have pass and proficient in posttest knowledge and skills on KC. |
| **02.30 pm - 04.00 pm** | Introduction of KC:<br>- Define KC<br>- KC physiology<br>- KC benefits<br>- KC indication & contraindication<br>- KC guidelines and protocols | **08.30 am - 10.00 am** | KC hand-on workshop:<br>- KC Ice-breaking<br>- Demonstration<br>- Question and Answer(QA) | **02.30 pm - 04.00 pm** | KC hand-on workshop:<br>- KC Ice-breaking<br>- Demonstration<br>- Question and Answer(QA) | |
| **04.00 pm - 04.30 pm** | **Tea Break** | **10.00 am - 10.30 am** | **Tea Break** | **04.00 pm - 04.30 pm** | **Tea Break** | |
| **04.30 pm - 06.00 pm** | KC procedure<br>- preparation infant- mother<br>- equipment before, during and after the KC procedure (standing and sitting transfer)<br>-recognize sign and symptoms of deterioration during and after KC procedure<br>-charting the infant progress record<br>- Question and Answer(Q&A) | **10.30 am - 12.00 noon** | Return demonstration of KC procedure:<br>- Standing and sitting transfer<br>- Question and Answer (Q&A) | **04.30 pm - 05.00 pm** | Return demonstration of KC procedure:<br>- Standing and sitting transfer<br>- Question and Answer(Q&A) | |

**Appendix L: Courses contents structured kangaroo care educational program (KC-EP) for mothers.**

| UNIVERSITY OF MALAYA | **Course contents of Kangaroo Care Education Programme (KC-EP) for mother.** |
|---|---|
| Educational Program Session (Participant) | All mothers in intervention group at neonatal intensive care unit (NICU) University Malaya Medical Centre (UMMC) |
| Course:<br>Course Tittle:<br><br>Medium of instruction<br>Presenter : | Kangaroo Care Educationa Programme (KC-EP)<br>Kangaroo Care Benefits for Premature Infant- Mother dyads and quality of care.<br>Bahasa Malaysia and English<br>Sharmiza Bt Samsudin |
| Teaching materials/ Equipment | Laptop, LCD, white board, marker pen, lecture notes, showing video, pamphlets, booklet, infant dummy, baby sling, diapers, infant cap, all related forms applicable to the topic presentation and red & blue ball point. |
| Mode of teaching<br><br>Learning | Lecture-demonstration<br><br>Lecture (show and tell),practical (skill) & Question and Answer |
| Student learning time | Face to face (interpersonal communication): 1 hours<br>Guide learning(theory):30 hours<br>Assessment (practical) :30 hours |
| Presenter<br>e-mail address | Sharmiza Bt Samsudin<br>sharmizaamri72@gmail.com @ sharmiza@oum.edu.my |
| Theory & practical session:<br>Day :<br>Time :<br>Venue : | Every Friday, Saturday and Sunday<br>10.00 am – 11.00 am. 12.00noon – 1.00pm or 3.00pm – 4.00pm & 5.00pm – 6.00pm<br>Conference Room, Neonatal Intensive Care Unit, University Malaya Medical Centre, Klang Valley |
| General objective | At the end of the presentation the mothers will be able to have in depth understanding of kangaroo care in detail and demonstrate the procedure as well. |
| Specific objectives : | At the end of the presentation the mothers will be able to:<br>1) define term of kangaroo care (KC).<br>2) state the benefits of KC to infant-mother (breast feeding)<br>3) recognize sign and symptoms of deterioration among premature infant before, during and after the procedure<br>4) state the preparation before, during and after the KC procedure.<br>5) list the equipment for KC procedure;<br>5.1 infant<br>5.2 mother<br>6) demonstrate and return-demonstrate & charting the infant progress record by the nurses to mothers |
| Important dates (Primary and Secondary outcomes) | Pretest & posttest after 1st month and 3rd months of KC-EP for mothers. |

**Appendix M (a) : Schedule of structured kangaroo care educational program (KC-EP) for mother's.**

| Date / Time | **Kangaroo Care Educational Program (KC-EP) for mother**<br><br>Venue : NICU, Conference Room, University Malaya Medical Centre<br>Participant : All mothers in experimental group and nurses available in NICU |
|---|---|
| **9.45 am - 10.00 am** | **Registration structured educational program (KC-EP) for mothers'**<br>- Pretest (experimental mother's group & nurses) |
| **10.00 am - 10.20 am** | **Introduction of kangaroo care (KC)**<br>1. What is kangaroo care?<br>1.1 Kangaroo care definition.<br>2. Who can perform kangaroo care?<br>2.1 indication and contraindication of kangaroo care.<br>3. When can mothers perform kangaroo care?<br>3.1 before, during and after kangaroo care procedure (instruments and observation needs).<br>3.2 indicate any abnormalities.<br>4. How do mothers perform kangaroo care?<br>4.1 showing videos on kangaroo care procedure.<br>4.2 show and tell how to perform and document in kangaroo care (KCRP booklet)<br>4.3 informative pamphlet.<br>4.4 equipment for kangaroo care procedure (infant & mother).<br>4.5 preparation before, during and after the kangaroo care procedure.<br>4.6 demonstrate the standing and sitting kangaroo care procedures.<br>4.7 charting the infant progress record by mother assisted by nurses<br>*** Question and Answer** |
| **10.20 am - 11.00 am** | **KC procedure preparation and Hand-on station**<br>5. Why should mothers perform Kangaroo Care?<br>5.1 Benefits for babies;<br>5.2 Benefits for mothers;<br>6. How do mother recognize sign and symptoms of deterioration before, during and after KC procedure?<br>7. Health education on breastfeeding status (handwashing)<br>8. Demonstrate and return demonstration of KC technique<br><br>*** Question and Answer** |
| **11.00am** | **Tea break** |

**Appendix M(b) : Schedule of KC-EP (cont'd)**

| Date / Time | **Mother Structured Kangaroo Care Educational Program (KC-EP)**<br><br>Venue : NICU, Conference Room, University Malaya Medical Centre<br>Participant: All mothers in intervention group and nurses available in NICU |
|---|---|
| **11.45 am - 12.00 am** | **Registration structured kangaroo care educational program (mothers)**<br>- Pretest and intervention mother's group & nurses |
| **12.00 am - 12.20 noon** | **Introduction of KC**<br>1. What is Kangaroo Care (KC)?<br>1.1 definition of term KC<br>2. Who can perform Kangaroo care?<br>2.1 indication and contraindication of KC<br>3. When can mothers perform Kangaroo care?<br>3.1 pre, during and post KC technique (instruments and observation needs)<br>3.2 indicate any abnormalities<br>4. . How do mothers perform Kangaroo care?<br>4.1 showing a videos on KC technique/procedure<br>4.2 show and tell how to perform and document it in KC diary provided for mothers (KCRP booklet)<br>4.3 informative pamphlet<br>4.4 equipment for KC procedure e. g infant & mother<br>4.5 preparation before, during and after the KC technique<br>4.6 demonstrate the standing and sitting procedure<br>4.7 charting the infant progress record/by mother assisted by nurses<br>*** Question and Answer** |
| **12.20 noon - 01.00 pm** | **KC procedure preparation and Hand-on station**<br>5. Why should mothers perform Kangaroo Care?<br>5.1 Benefits for babies;<br>5.2 Benefits for mothers;<br>6. How do mother recognize sign and symptoms of deterioration before, during and after KC procedure ?<br>7. Health education on breastfeeding /feeding status.<br>8. Demonstrate and return demonstration of KC technique<br><br>*** Question and Answer** |
| **01.00pm** | **Tea break** |

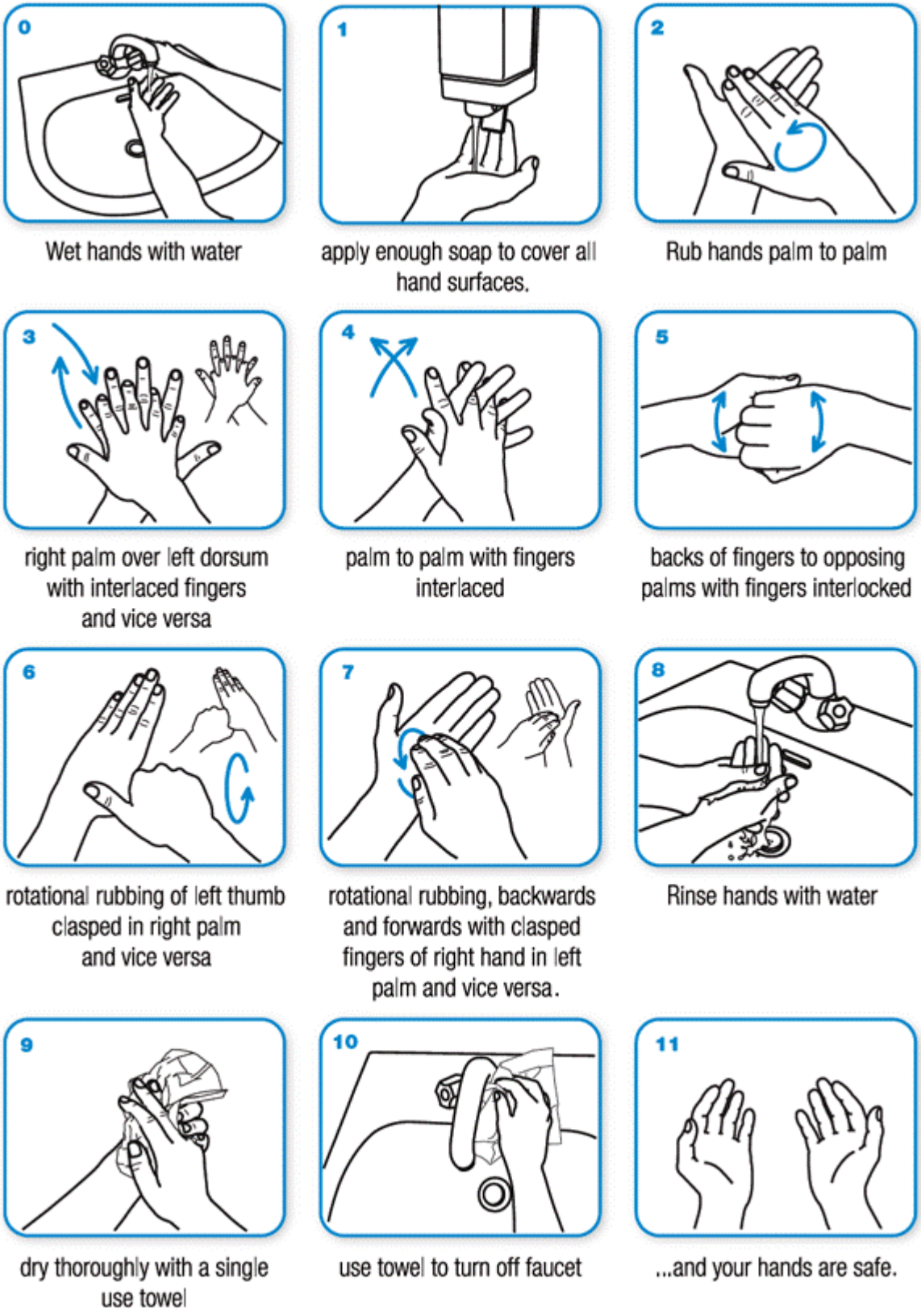
**Appendix M(c): Schedule of KC-EP (cont'd)**

| Date / Time | **Mother Structured Educational Program in Kangaroo Care (KC-EP)**<br><br>Venue: NICU, Conference Room, University Malaya Medical Centre<br>Participant: All mothers in the experimental group and nurses available in NICU |
|---|---|
| **2.45 pm - 03.00 pm** | **Registration structured KC Educational Program for mothers'or KC-EP**<br>- Pretest and intervention mother's group & nurses |
| **03.00 pm - 03.30 am** | **Introduction of KC**<br>1. What is Kangaroo Care(KC)?<br>1.1 definition of term KC<br>2. Who can perform Kangaroo care?<br>2.1 indication and contraindication of KC<br>3. When can mothers perform Kangaroo care?<br>3.1 pre, during and post KC technique (instruments and observation needs)<br>3.2 indicate any abnormalities<br>4. . How do mothers perform Kangaroo care?<br>4.1 showing a videos on KC technique/procedure<br>4.2 show and tell how to perform and document it in KC diary provided for mothers (KCRP booklet)<br>4.3 informative pamphlet<br>4.4 equipment for KC procedure e. g infant & mother<br>4.5 preparation before, during and after the KC technique<br>4.6 demonstrate the standing and sitting procedure<br>4.7 charting the infant progress record/by mother assisted by nurses<br>*** Question and Answer** |
| **03.30 pm - 04.00 pm** | **KC procedure preparation and Hand-on station**<br>5. Why should mothers perform Kangaroo Care?<br>5.1 Benefits for babies;<br>5.2 Benefits for mothers;<br>6. How do mother recognize sign and symptoms of deterioration before, during and after KC procedure?<br>7. Health education on breastfeeding/feeding status<br>8. Demonstrate and return demonstration of KC technique<br><br>*** Question and Answer** |
| **04.00 pm** | **Tea Break** |

**Appendix M(d) : Schedule of KC-EP D (cont'd)**

| Date / Time | **Kangaroo Care Education Programme (KC-EP)**<br><br>Venue : NICU, Conference Room, University Malaya Medical Centre<br>Participant : All mothers in experimental group and nurses available in NICU |
|---|---|
| **4.45 pm - 05.00 pm** | **Registration Kangaroo Care Education Programme (KC-EP) for mothers.**<br>- Pre-test and experimental mother's group & nurses |
| **05.00 pm - 05.20 pm** | **Introduction of KC**<br>1. What is Kangaroo Care (KC)?<br>1.1 definition of term KC<br>2. Who can perform Kangaroo care?<br>2.1 indication and contraindication of KC<br>3. When can mothers perform Kangaroo care?<br>3.1 pre, during and post KC technique (instruments and observation needs)<br>3.2 indicate any abnormalities<br>4. . How do mothers perform Kangaroo care?<br>4.1 shows a video on KC technique/procedure<br>4.2 show and tell how to perform and document it in KC diary provided for mothers (KCRP booklet)<br>4.3 informative pamphlet<br>4.4 equipment for KC procedure e. g infant & mother<br>4.5 preparation before, during and after the KC technique<br>4.6 demonstrate the standing and sitting procedure<br>4.7 charting the infant progress record/by mother assisted by nurses<br>*** Question and Answer** |
| **05.20 pm - 06.00 pm** | **KC procedure preparation and Hand-on station**<br>5. Why should mothers perform Kangaroo Care?<br>5.1 Benefits for babies;<br>5.2 Benefits for mothers;<br>6. How do mother recognize sign and symptoms of deterioration before, during and after KC procedure?<br>7. Health education on breastfeeding and handwashing<br>8. Demonstrate and return demonstration of KC technique<br><br>*** Question and Answer** |
| **04.00pm** | **Tea break** |

## Appendix N: Handwashing steps



**Appendix O(a) : Flipchart for mothers' on Kangaroo Care (English version)**

UNIVERSITI MALAYA
KUALA LUMPUR
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UNIVERSITY OF MALAYA


# Kangaroo Care

By :
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Phd Candidate,

Certified Kangaroo Caregiver,(CKC)USA,Consultant,.
Department of Nursing Science,
Faculty of Medicine,
University Malaya.

## Outline objectives

1. **WHAT** is Kangaroo Care?
2. **HOW** do I perform Kangaroo Care?
3. **WHY** should I perform Kangaroo Care?
   - 3.1 For babies;
   - 3.2 For mothers;
4. **WHO** can perform Kangaroo Care?
5. **WHEN** can I perform Kangaroo Care?

## Kangaroo

## **WHAT** is kangaroo care?

- It's a **special way** and **method of caring for a premature** baby in which the baby is position an **upright** skin-to-skin and **chest-to-chest** contact with a mother for at **least 1 hour per day**. Moms initiate it in the Neonatal Intensive Care Unit (NICU) and **continue at home** until the first **3 months old**.

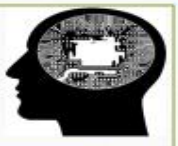
Ludingtone-Hoe,et al.,(1990,2013,2018)

## **WHEN** can I perform Kangaroo Care?

- Any time can work at **90 to 120** minutes **post feeding**. Plan a convenient period with your nurse and set aside at least **1 hour or 60 minutes per day** and continuously **7 hours in a week** to sit with your baby.

For more information, please feel free to ask a member of NICU team.

## Special Care Nursery
## University Malaya Medical Centre
## Kangaroo Care Workshop



## Kangaroo Care Workshop

**Doctors & nurses are trained in caring the mother and baby for kangaroo care**

## Evidenced by Kangaroo Care practice

- Evidence shows that **visitation**, **holding**, **talking**, and **skin to skin contact** are associated with better outcomes for infants and parents during hospitalization and beyond.

  Feeley.N., Genest.C., Niela-Vilén.H.,Charbonneau.L., & Axelin.A.(2016)

- Kangaroo care **improves cerebral blood flow (CBF)**, thus it might influence the structure and **promote development** of the **premature infant's brain**.

  Korraa. A.El Nagger. A. Mohamed. R., & Helmy.N. (2014)

## Cont.

- Kangaroo care can be used to **promote emotional bonding** and **support between mothers and their babies**, and to **stabilize the physiological functions** of premature babies and may be one of **the most effective nursing interventions** in the neonatal intensive care unit **for the care of preterm infants and their mothers.**

Cho E,et al.,(2016)

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## The Use Of Kangaroo Care Is Spreading Around The World

- It started in **Bogota**, Colombia approximately **30 years ago**
- **KC in Africa** - Benin, Burkina Faso, Ethiopia, Mali and Malawi (WHO,2014)
- **KC in Asia** - India, Indonesia and the Philippines (Recent study,1990,2012)
- **KC in Europe** - Belgium, Denmark, France, Italy, the Netherlands, Spain, Sweden and the UK.(Spanish study report, 2013)

**Since 2011, "Kangaroo Care Awareness Day" has been observed worldwide on May15**


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## Kangaroo Care world wide

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Shared Kangaroo Care

## HOW do I perform Kangaroo Care?

- You will dress your baby only a **diaper** and **head cap**. Your baby should be placed an **upright** position between your breasts. Have their **tummy** against your **chest**. Head turned to one side, arm and legs in **flexed position**. Support your baby's head, back an buttocks. (Ludington-Hoe,et al.,(1990,2013,2018) & Nayist,(2010)

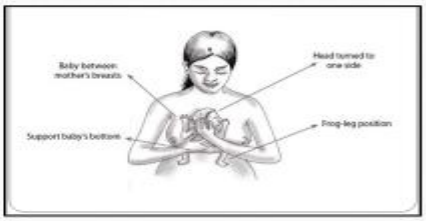
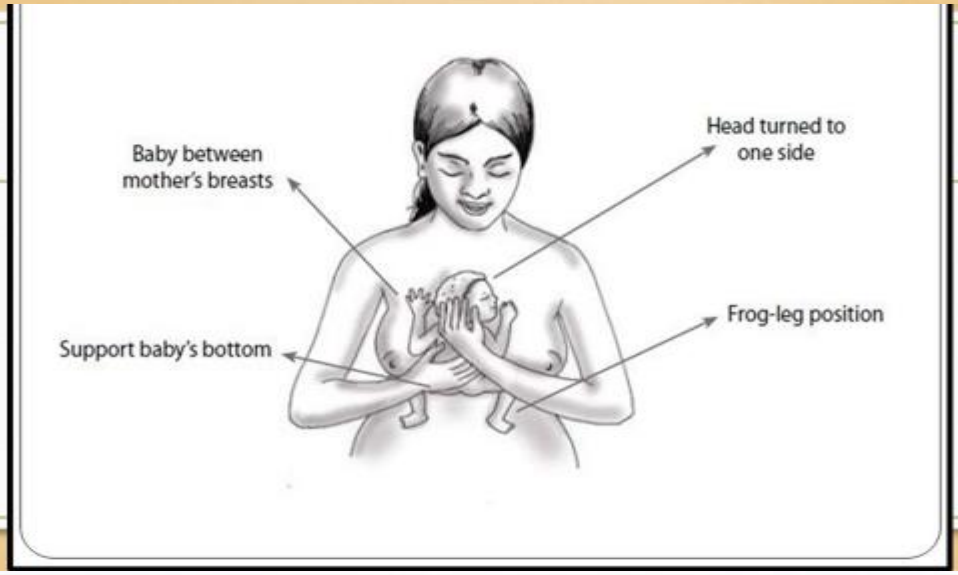



**Figure 1: Positioning of Kangaroo Care**

17

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## WHY should I perform Kangaroo Care?

- There are lots of benefits for babies and mother :-

**For babies;**

- Improve babies' sleep which can **promote weight gain** and **brain development.**
- Regulates babies' **temperature, heart rate** and **breathing.**
- Supports **successful breast feeding** sessions and reduces infection.
- **Shortens** length of hospital stay.

## **WHY** should I perform Kangaroo Care?

**For mothers;**

- **Increases confidence** in **ability to care** for babies.
- **Enhanced bonding**, **feeling of closeness** with babies.
- **Improve** mothers' **milk production.**
- **Creates** more **nurturing interactions.**

20

## Benefits of breastfeeding

## Top 10 benefits of breastfeeding


**Colostrum**

| Property | Importance |
|---|---|
| ▪ Antibody-rich | ▪ protects against infection and allergy |
| ▪ Many white cells | ▪ protects against infection |
| ▪ Purgative | ▪ clears meconium; helps prevent jaundice |
| ▪ Growth factors | ▪ helps intestine mature; prevents allergy, intolerance |
| ▪ Vitamin-A rich | ▪ reduces severity of some infection (such as measles and diarrhoea); prevents vitamin A-related eye diseases |

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# Kangaroo Care Diary


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# Kangaroo Care Diary

Nursing & mother daily **documentation**

| Gestational Age Week 32/40 | Kangaroo Care | | | | Body Weight (kg) | Feeding | |
|---|---|---|---|---|---|---|---|
| | Pre Temp | Post Temp | Time Start | Time End | | Types of feeding (√ ) | |
| Thursday 26/7/2018 | 36.8◦C | 37.2◦C | 8.00am | 9.00am | 1.790 kg | Express Breast Milk | √ |
| | | | | | | Breast Feeding | √ |
| | | | | | | Formula Milk | |
| Friday 27/7/2018 | 37.0◦C | 37.3◦C | 2.00pm | 3.00pm | 1.800 kg | Express Breast Milk | √ |
| | | | | | | Breast Feeding | √ |
| | | | | | | Formula Milk | |

24


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THANKS
FOR
CONCERN
OVER ME
THANK YOU
26

**Appendix O(b) : Flipchart for mothers' (Malay version)**



## APAKAH Kangaroo Care?

- Kangaroo Care adalah cara atau **kaedah yang khusus** untuk penjagaan bayi pramatang. Ia dilakukan dengan merapatkan **sentuhan kulit di bahagian dada ibu dan bayi** seperti kangaroo membawa bayinya di hadapan kantung. Di mana bayi bersentuhan dari kulit-ke-kulit dan **dada bayi ke dada** ibu secara menegak, sekurang-kurangnya **1 jam sehari**. Para ibu boleh memulakannya di Unit Rawatan Rapi Neonatal (NICU) dan diteruskan di rumah sehingga bayi berusia **3 bulan pertama**.

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## SIAPAKAH boleh melakukan Kangaroo Care?

- Semua **ibu** boleh melakukan kaedah Kangaroo Care. Namun begitu, setiap kaedah perubatan di NICU adalah berbeza.Anda boleh **bertanya kepada jururawat** sekiranya bayi anda mampu menjadi **calon** yang baik.Para ibu tidak perlu merasa risau sekiranya tidak selesa ketika melakukan kaedah Kangaroo Care.Rujuk jururawat bertugas kerana mereka mempunyai pelbagai cara membantu penjagaan bayi.

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## BILAKAH saya boleh melakukan Kangaroo Care?

- Kangaroo Care boleh dilakukan pada **bila-bila masa** diantara **90 - 120 minit** selepas menyusu. Ibu perlu berbincang dengan jururawat yang bertugas untuk berada bersama bayi sekurang-kurangnya **1 jam atau 60 minit** untuk sesuatu sesi Kangaroo Care, manakala **7 jam dalam masa 1 minggu**. Kaedah ini perlu **diteruskan** sehingga bayi anda berusia **3 bulan** pertama.

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## Special Care Nursery
## University Malaya Medical Centre
## Kangaroo Care Workshop

## Kangaroo Care Workshop

**Doktor dan jururawat terlatih dalam menjaga ibu dan bayi dalam amalan Kangaroo Care**

## Fakta dan bukti amalan Kangaroo Care

- Bukti menunjukkan bahawa lawatan, memegang, bercakap, dan **sentuhan kulit ke kulit** dikaitkan dengan hasil yang lebih baik untuk bayi dan ibu bapa semasa dimasukkan ke hospital dan seterusnya.

Feeley.N., Genest.C., Niela-Vilin.H.,Charbonneau.L., & Axelin.A.(2016)

- Kangaroo care meningkatkan aliran darah serebrum (CBF), oleh itu ia mungkin mempengaruhi struktur dan mempromosikan **perkembangan otak bayi pramatang**.

Korraa, A.El Nagger, A. Mohamed, R., & Helmy.N. (2014)

10

## Sambungan

- Kangaroo care boleh digunakan untuk menggalakkan ikatan emosi dan sokongan antara ibu dan bayi, bagi menstabilkan fungsi fisiologi bayi pramatang dan mungkin merupakan salah **satu intervensi kejururawatan yang paling berkesan** dalam Unit Perawatan Rapi Neonatal (NICU)untuk penjagaan bayi pramatang dan ibu mereka.

Cho E,et al.,(2016)

11

## Amalan Kangaroo Care di seluruh dunia.

- Ia bermula di **Bogota**, Colombia kira - kira **30 tahun** yang lalu.
- **KC di Afrika** - Benin,Burkina Faso, Ethiopia, Mali dan Malawi (WHO, 2014).
- **KC di Asia** - India,Indonesia dan Filipina. (Kajian terkini, 1990.2012)
- **KC di Eropah** - Belgium,Denmark, Perancis, Itali, Belanda, Sepanyol, Sweden dan Inggeris. (Kajian Sepanyol laporan, 2013)

**Sejak 15 Mei 2011, "Hari Kesedaran Kangaroo Care" telah diperhatikan di seluruh dunia.**


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## Kangaroo Care di seluruh dunia.

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## Shared Kangaroo Care

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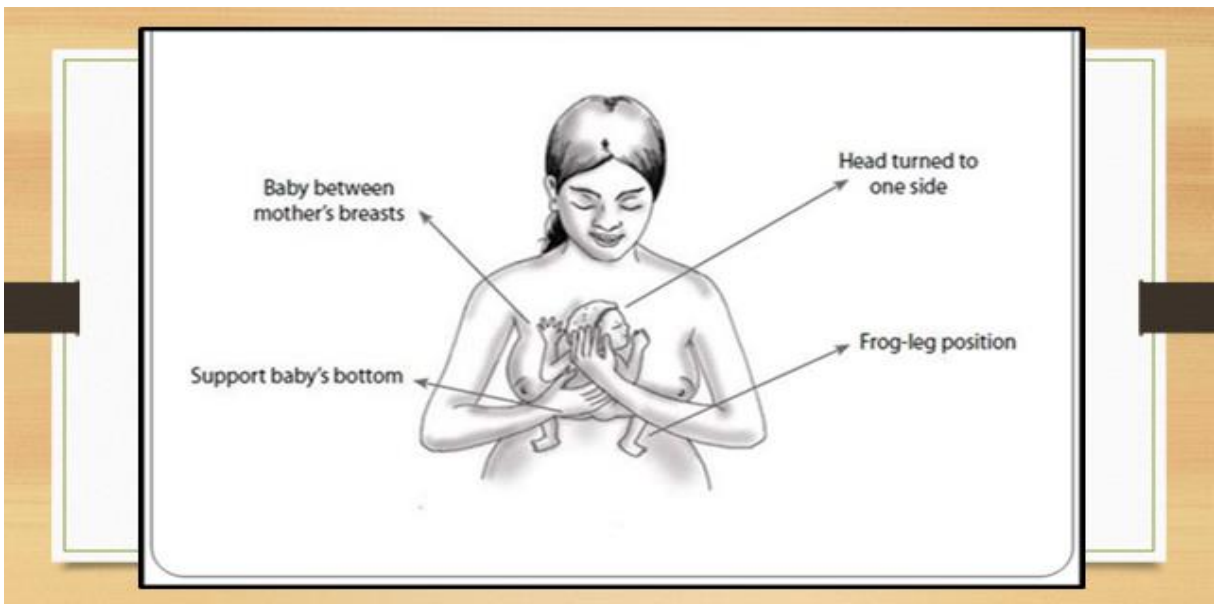
BAGAIMANAKAH cara
Kangaroo Care dilakukan?
Kangaroo Care dilakukan dengan bayi dipakaikan lampin pakai buang dan topi sahaja.
Bayi dirapatkan kebahagian dada ibu dalam keadaan menegak berada diantara payudara ibu.
Perut bayi bersentuhan dengan dada ibu. Kepala bayi dihalakan ke satu arah, kaki dan tangan berada dalam posisi membengkok seperti katak.
Ibu dikehendaki menyokong bahagian kepala,belakang dan punggung bayi.
Gambarajah 1 : Posisi Kangaroo Care


Baby between mother's breasts
Head turned to one side
Support baby's bottom
Frog-leg position

## KENAPAKAH saya perlu melakukan Kangaroo Care ?

❖ **Terdapat banyak manafaat untuk ibu dan bayi.**

**Untuk bayi;**

- **Menyerupai persekitaran** rahim yang menenangkan.
- **Mengawal suhu badan**, kadar denyutan jantung dan pernafasan bayi supaya berada dalam kaeadaan **stabil.**
- Bayi **kurang menangis**.
- Meningkatkan tempoh **tidur yang lebih lama** (yang boleh menggalakkan pertumbuhan dan perkembangan keseluruhan).
- Meningkatkan pertambahan **berat badan.**
- Menyokong sesi penyusuan **susu ibu** sepenuhnya.
- Pelepasan **awal** dari hospital.

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## KENAPAKAH saya perlu melakukan Kangaroo Care?

**Untuk ibu;**

- **Meningkatkan** penghasilan dan **pengeluaran susu ibu.**
- Mengeratkan **kasih sayang** antara ibu dan bayi.
- **Membina keyakinan** ibu menjaga bayi pramatang.
- **Mengurangkan tekanan** dan rasa dihargai.

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## Kelebihan

## Susu Ibu

## KEBAIKKAN KEPADA BAYI

1. **ZAT PEMAKANAN**
   Mengandungi zat pemakanan yang betul, yang diperlukan oleh bayi semasa dalam pembesarannya.
2. **ANTIBODI**
   susu ibu mempunyai antibody semulajadi untuk bayi yang boleh melindungi bayi dari jangkitan.
3. **MENCEGAH JANGKITAN**
   Bayi yang menyusu dengan ibunya jarang mendapat jangkitan seperti cirit-birit, jangkitan saluran pernafasan dan juga radang peru-paru.
4. **MENCEGAH BAYI DARI ALAHAN**
   susu ibu boleh melindungi bayi dan mendapat alahan.
5. **KURANG PENCEMARAN**
   Susu ibu diberi terus melalui puntil susu dan terus kedalam mulut bayi.Cara ini tidak mendedahkan air susu itu dicemari oleh udara.
6. **SUHU**
   Suhu susu ibu amat sesuai untuk bayi .Dengan ini,ibu-ibu tidak perlu khuatir tentang tahap Kepanasan atau sejuk suhu ibu.
7. **JIMAT MASA**
   Penyusuan susu ibu tidak perlu masa untuk Menyediakannya. Ianya boleh diberikan pada bila-bila masa.
8. **MUDAH DIHADAM**
   Susu ibu amat sesuai untuk bayi kerana ia mudah dihadamkan

## KEBAIKKAN KEPADA IBU

1. **MUDAH**
   Susu ibu senang diberi. Ianya boleh dilakukan dimana-mana pada bila-bila masa.
2. **EKONOMI / JIMAT**
   Susu ibu adalah percuma. Ianya tidak memerlukan wang untuk mendapatkannya.
3. **MENJARAKKAN KEHAMILAN**
   Pemberian susu ibu juga boleh melambatkan kedatangan haid ibu. Dengan ini kehamilan boleh dijarakkan.
4. **KASIH SAYANG**
   semasa bayi disusui oleh ibunya, bayi tersebut merasa disayangi dan selamat dan ibu akan merasa lebih sayang kepada bayinya.
5. **ELAK BARAH BUAH DADA / OVARI**
   Pemberian susu ibu boleh mengurangkan risiko buah dada dan ovari.
6. **PENGECUTN RAHIM**
   Apabila bayi menyusu, rahim lebih cepat mengecut. Dengan ini perdarahan selepas bersalin dapat dielakkan.
7. **MELANGSINGKAN BADAN**
   Ibu-ibu yang menyusui bayi mereka dengan bantuan senaman dan makanan seimbang boleh membantu mengurangkan pengumpulan lemak di tempat-tempat tertentu seperti perut dan pinggul.

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## Buku Harian Kangaroo Care


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## Buku Harian Kangaroo Care

**Dokumentasi Jururawat & Ibu**

| Umur Gestasi Minggu | Kangaroo Care | | | | Berat Badan (kg) | Penyusuan | |
|---|---|---|---|---|---|---|---|
| 32/40 | Pre Temp | Post Temp | Masa Mula | Masa Tamat | | Jenis Penyusuan (√ ) | |
| Khamis 26/7/2018 | 36.8○C | 37.2○C | 8.00am | 9.00am | 1.790 kg | Perahan Susu Badan | √ |
| | | | | | | Susu Badan | √ |
| | | | | | | Susu Formula | |
| Jumaat 2/7/2018 | 37.0○C | 37.3○C | 2.00pm | 3.00pm | 1.800 kg | Perahan Susu Badan | √ |
| | | | | | | Susu Badan | √ |
| | | | | | | Susu Formula | |

24


Ibu….. Ayah…
Tolonglah pertahanKan
susu ibu untuK saya….
Saya taKnaK saKit


Disokong oleh :
Jabatan Neonatologi,Pusat Perubatan Universiti Malaya
& Jabatan Sains Kejururawatan, Fakulti Perubatan Universiti Malaya
Disediakan oleh : Sharmiza Samsudin
Ahli yang terlibat :
• Prof. Azanna Ahmad Kamar
• Prof. Choo Yao Mun
• Prof. Dr. Katijah Lim Abdullah @ Lim Geok Kim
• Dr. Ping Lei Chui
• Matron Fatimah Sharif
• Matron Azfawahiza Hashim
• Sister Mastura Mohd Musa

**Appendix P : Slide Presentation KC-EP (Theory session)**

USIKC
Promoting Skin-to-Skin Care
United States Institute of Kangaroo Care

# KANGAROO CARE

1

Presented by :
**Sharmiza Samsudin**
Phd Candidate,
Certified Kangaroo Caregiver, USA(CKC) & Consultant
Department of Nursing Science
Faculty of Medicine, UM

## OBJECTIVES

1. Define premature infant and late preterm infant.
2. Explain the origins of Kangaroo Care (KC)
3. Define Kangaroo Care(KC).
4. Explain the different between Kangaroo Care(KC) and skin to skin contact.
5. State the different between Kangaroo Care(KC) and Kangaroo Mother Care(KMC)
6. State the indication and contraindication of Kangaroo Care(KC)
7. Explain the positioning safe for Kangaroo Care(KC).

2

## OBJECTIVES (CONT.)

8. State the benefit of Kangaroo Care(KC)
   - 8.1 For Infant
   - 8.2 For Mother
   - 8.3 For family
   - 8.4 For Institution
   - 8.5 For Nation
9. Explain how to document and follow- up policy for Kangaroo Care.

3

## Defining The Preterm Infant & Late Preterm Infant

- Preterm, preemies or premature infant refers to a baby born before 37 weeks of pregnancy have been completed.
- **Late Preterm Infant (LPI)** refers to **34** weeks/0 days to **36** weeks/6 days gestational age.

(WHO,2018)

4

## Classification Preterm By Weight

**Table 1: Shows the classification of gestational age and weight**

| Classification of preterm | Gestational age |
|---|---|
| Overall preterm | < 37 weeks gestation |
| Moderately preterm | Between 32 to 36+6(days) weeks gestation. |
| Very preterm | < 32 weeks gestation. |

| Classification of preterm infant | Weight |
|---|---|
| Low Birth Weight (LBW) | < 2500gram |
| Very Low Birth Weight (VLBW) | < 1500gram |
| Extreme Low Birth Weight (ELBW) | < 1000grams |

5

Bogota Nursery

Non- sterile IV bags; rinsed and reused

Shared Incubator; unreliable electricity source

Shared phototherapy

Infant in heating pad for warmth… NICU is 50°

Transitional Nursery… waiting for mom to KC

Mortality rate 70% infection

# The Origins Of Kangaroo Mother Care

- Kangaroo Mother Care was originated by **Dr.Edgar Ray and Dr.Hector Martinez** 1983 in Bogota, Colombia to reduce preemie mortality and morbidity..

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# The Use Of Kangaroo Care Is Spreading Around The World

- It started in Bogota, Colombia approximately 30 years ago
- **Kmc in Africa** - Benin, Burkina Faso, Ethiopia, Mali and Malawi (WHO,2014)
- **Kmc in Asia** - India, Indonesia and the Philippines (Recent study,1990,2012)
- **KMC in Europe** - Belgium, Denmark, France, Italy, the Netherlands, Spain, Sweden and the UK (Spanish study report, 2013)

- Since 2011, **"Kangaroo Care Awareness Day"** has been observed worldwide on **May15.**


10

# Definition of Kangaroo Care

- It's a **special way** or method of **caring** for a **premature infant** in which the infant is position, skin-to-skin and **chest-to-chest (ventral surface)** contact from **umbilicus to sternum** of the infant is **upright** against the **mother's ventral surface**.
- Foster health, **weight gain**, promoting effective thermal control, **breastfeeding**, infection prevention and **bonding**.

Ludingtone-Hoe,et al.,(1990,2013,2018)

11

## Cont.

- **1 hour/60 minutes/day** to complete **one full cycle of sleep** and benefits of KC.
- < 30 minutes a day of KC no physiologic benefits.
- KC initiate in NICU & continue at home
- Continuously from **40 to 52 weeks post conception** (3 months old)

(Ludingtone-Hoe et.al., 2006,2010)

- Uninterrupted **60 minutes** at **first 12 w** continue **first 3 months** of life.

The Academy of Pediatrics US,(2013)

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## Different Between Kangaroo Care(KC) & Skin To Skin Contact

❖ Kangaroo Care ....

- 1st KC is "**CHEST TO CHEST**" and skin to skin contact.
- 2nd KC is **not** "any" skin to skin contact.
- 3rd Skin to skin can be : cheek - to - cheek, head - to – breast and arm - in - hand **BUT** these position **Do Not Do** what the KC position **does !!**
- **2016**,June Chan et al.(2016) says SSC is most common part of KMC

13

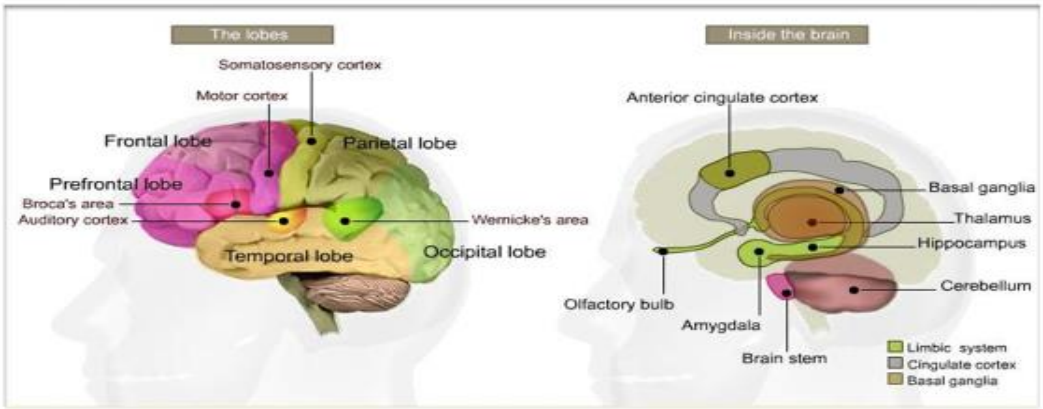


**Figure 1 : Structure of the lobes and inside the brain**

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# Different- Kangaroo Care from Skin To Skin Contact

- **Skin-to-skin contact** stimulates the brain through **A- AFFERENT NERVE.**
- Stimulation through **somatosensory cortex-source** of all common touch, pressure in the brain. (Left Amygdala)

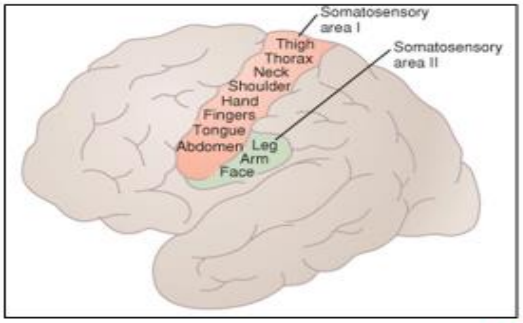


Figure 2: Somatosensory cortex area

15

# Cont.

- **Kangaroo Care** stimulate the brain through an entirely separate set of nerves that are only responsive to **PLEASING TOUCH** and non-phasic stimulation of the chest, across the shoulders, stimulates the **C-AFFERENT** nerve. (Right Amygdala)
- Stimulation is through the **INSULAR CORTEX** of the LIMBIC brain.

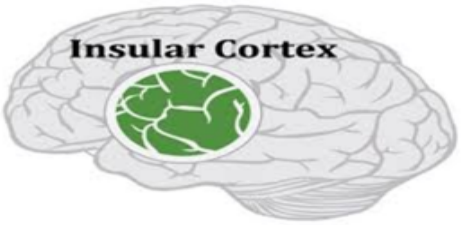


**Figure 3 : Insular cortex**

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# C- Afferents

- Message from **C-Afferents** goes directly to the **insular cortex**
  - limbic brain
  - seat of emotions and emotional memory

(Clausson HW et al.,2008. Unmylinated tactile afferents have opposite effects on insular and somatosensory cortical processing)

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## Neuropeptide Oxytocin Goes To Amygdala

- **Right Amygdala** is a center of **calm,**
- **contentedness, happiness, relaxation,compassion,empthy,**
- **sympathy** and ability to recognize a "safe",loving face.
- When infant **in KC**, nerve pathways to the right amygdala are set early and not undone later.

18

## Cont.

- **BUT**, when infant is **separated** from the mother, neuronal networks to **left amygdala** are established and **set within first three days** of life.(affect child's whole life)
- **Lest Amygdala** is seat of **hatred,violence,agression,fear, terror** and **inability** to determine if face is **safe or unsafe face**.

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## Different Between Kangaroo Care(KC) & Kangaroo Mother Care (KMC)

❖ **Kangaroo Care ....**

- Skin-to-skin placement of the infant's chest against the chest of another human being – usually upright and chest-to-chest **(1-1.5 hours per day, at least 5 hours per week)**

❖ **Kangaroo Mother Care...**

- KC given by the mother, **continuously (24 hours/day x 7 days/week)** with unlimited access to the breast.

Dr.Gene Anderson's (1991) Classified Glossary Of Terms & Breitbach (2001) Published In NANDA Nursing Diagnoses KC.

20

## Indication infants for Kangaroo Care

❖ **Indication** : GA >**28** week or **30** week(corrected ages)

- Wt **>1,000 –1,500** grams
- BW **1,300 –1,800** grams after **7 days old** weight **1,500** or less
- Wt **> than 1,500** grams with the combination :

- Stable clinically :
  - **HR**: 120 – 160 /min
  - **RR**: 35 – 50 /min
  - **SAo2** : 90 - 95%
  - **Pink** color (good perfusion)


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## Indication infants for Kangaroo Care(Cont.)

- Incubator / open air crib - can maintain (36.8 – 37.4 ○C)
- Stable in low rate ventilator
- Dosages of medications have stabilized
- No O2 supplement or with low O2
- Consistently taking milk well.

- Gain weight (15 – 20 grams/day for 3 - 5 days/ 10 – 15 gram/day)
- Infant with phototherapy – Mother presses the fiber - optic blankets against the infant's back while doing KC.

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## Contraindication For Kangaroo Care

❖**Infants…..**


1. Wt <1000 g & < 28 week GA
2. Under radiant warmer – still quite sick
3. Umbilical artery catheter (UAC & UVC) - blocked
4. Chest tubes – dislodged during KC.
5. TPN – percutaneous line place in the arm- dislodged.
6. Scalp vein Ivs, IVH grade 3 & 4 (bleeding into the brain) – too sick to participate in KC
7. Nil by mouth – may try to go to the breast during KC

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# Is Your Infant Eligible For Kangaroo Care (Cont.)

- **The Apgar scale can be used to judge if the infant ready for KC;**
- **APGAR score 9 – 10**
  - very healthy & start immediately
- **APGAR score 7 – 8**
  - healthy & probably to start KC within the next 2 days, if not within the first 2 hours of birth.
- **APGAR score 5 – 6**
  - may need to wait 3 to 5 days before beginning KC
- **APGAR 0 – 4**
  - won't be able to start KC for 7 days or more.

APGAR SCORING

| INDICATOR | 0 | 1 | 2 |
|---|---|---|---|
| HR | Absent | <100 | >100 |
| RR | Absent | Slow, irregular weak cry | Good vigorous cry |
| MUSCLE TONE | Flaccid, limp | Some flexion of extremities | Good flexion, active motion |
| REFLEX IRRITABILITY | NR | Weak cry and grimace | Vigorous cry, cough, sneeze |
| SKIN COLOR | Blue | Acrocyanosis | Pink |

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# Positioning For Safe Kangaroo Care

1. Place on abdomen, allow to crawl to **breast** or...
2. Place infant an **U**pright **between** the breasts (prepare for breastfeeding)
3. Head should be **midline** turned to side and neck straight (to keep airway open)
4. Arm and legs in **FLEXED POSITION**
   (flexion contribution to advanced motor development in KC)

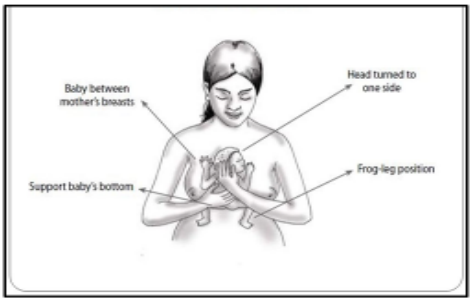
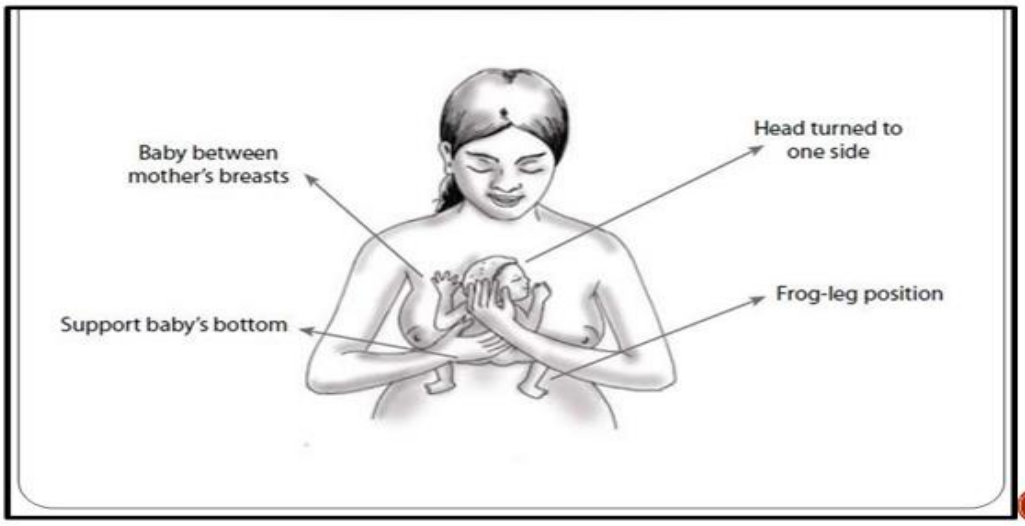



**Figure 4 : Positioning of Kangaroo Mother Care**

25

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# KC Position Neuro-psychology

- In KC, the **C-Afferent nerves** (**chest nerves are activated at birth**, from **umbilicus** to **sternum** & **across infant's back** in newborn period and have greatest **DENSITY** here in newborn period) are stimulated.
- (Morrison L et al.,2011,Reduced C-Afferents fibers density affect perceived pleasantness and empathy for touch Brain,134,1116-1126)

27

# Cont.

- **C-Afferent nerves** are exquisitely **sensitive to chest-to-chest**, **non** phasic **skin stimulation.**
- (UVNAS-Moberg.,Arn,Magnusson,D.(2005) The physiobiology of emotion: the role of the oxytocinergic system, IJOBM 12(2),59-65)
- encode it as **Pleasant Touch**
- (Morrison,I.et al., 2011)Reduced C-Afferents fibre density effects perceived pleasantness and empathy for touch brain.

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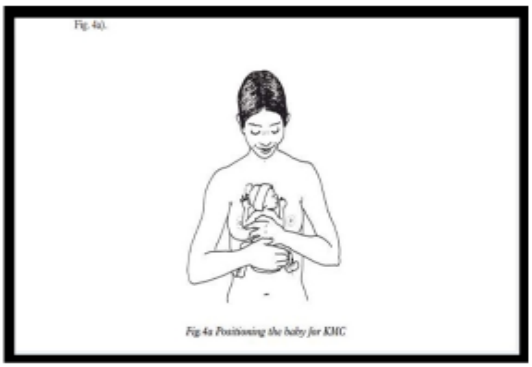
# Positions The Baby For KC




29

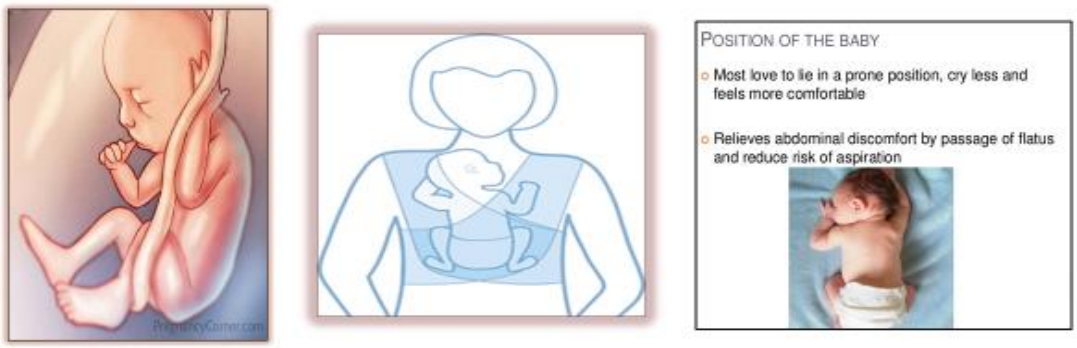



**Figure 5 : Shows the arms and legs in flexed and prone position.**

30

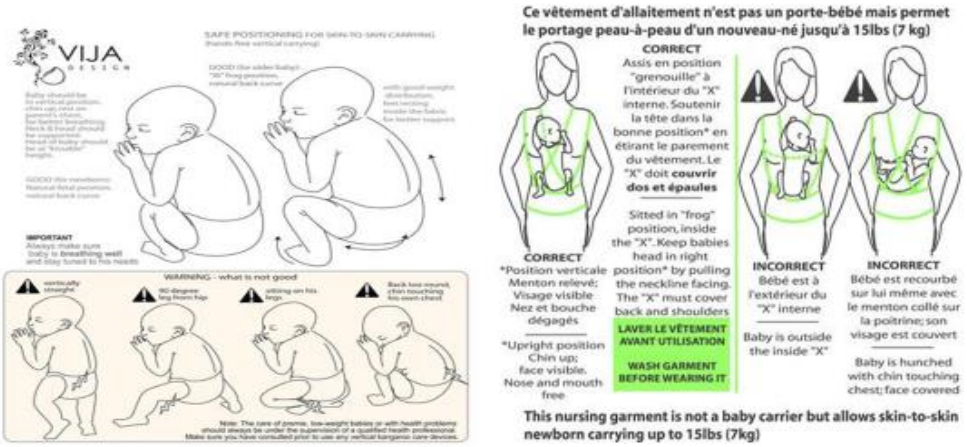



**Figure 6 : Show the safe and warning for KC positioning**

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**Table 2 : Types Of Sleep**

| Active sleep | Eye closed,irregular respiratory patterns,body movements present. |
|---|---|
| Quiet sleep | Eyes closed, regular respiratory pattern, no body movements. |
| Indiscriminant sleep | Chaotic; neither active nor quiet sleep. |
| **An infant's sleep cycle** | A **60 minute cycle** that includes:<br>• **5 to 10 minutes of active sleep**, accompanied by frequent arousals to awake and crying states.<br>• A long period of deep, **quiet sleep**, hopefully **40 to 50 minutes**, with very few minor arousals(fluttering eyes, only lip movements or slight flutter of a finger),so minor the infant returns to deep quite sleep.<br>• A return to **active sleep for 2 to 5 minutes**. |

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# CONT.

- Oxygen is regularly used in preterm infants because of their immature lungs and oxygen is important for metabolism and physiological functions
- This study has shown an improvement in peripheral oxygen saturation (SapO2) after 30 min of KMC. Researchers have explained the improvement in oxygenation by the fact that the upright position of KMC increases the efficiency of the diaphragm and pulmonary function
- On other hand, other researchers have concluded no significant changes in oxygen saturation and consumption during KMC
- Bauer K, Uhrig C, Sperling P, Pasel K, Wieland C, Versomold H (1997)

33

# CONT.

- Improvement in CBF has been probably mediated by stabilized cardio respiratory parameters during sleep.
- Another explanation; is that human hairy skin has slow conducting unmyelinated (C) afferents that respond to touch and skin to skin contact during KMC.
- Activation of these fibers stimulates the insular cortex (limbic system) to produce mediators (endorphins, neuropeptide and calcitonin gene-related peptide), which in turn enhance postsynaptic Nitric Oxide Synthase.
- Nitric oxide induces smooth muscle relaxation and plays a pivotal role in regulating blood flow in the microvasculature.
- Parmar VR, Kumar A, Kaur R, Parmar SD, Kaur R, Basu S, Jain S, Narula S (2010)

34

# The Benefits of Kangaroo Care


- **Infant;**

1. A **stable heart rate**
2. Less **hypoglycemia,** rare **hypothermia** (Boundy et al., 2016)
2. More **regular breathing**
3. Improved dispersion of oxygen throughout the body.
4. Prevention of **cold stress**.(When preemie becomes too cold, he burns up much needed oxygen and calories to stay warm)
5. Longer periods of **sleep** (during which the brain matures)
6. Improves **weight gain** (reduction of purposeless activity which simply burns calories at the expense of the infant's growth and health)

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## The Benefits For Kangaroo Care (Cont.)

8. **Decreased crying** – better cerebral blood flow, higher SaO2
9. Longer periods of alertness – more stable physiology
10. Opportunities to **breastfeed** and enjoy the healthful benefits of breast milk (**prevents hypoglycemia**).
11. Increases initiation-duration-exclusivity – **supports and successful breastfeeding** session – swifter transition to nipple and breastfeeding
12. Possibly less severe Neonatal Abstinence Syndrome (Ludingtone-Hoe et al.,2015)
13. Earlier **bonding**
14. Fewer infections, **shorter lengths of stay.**


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## The Benefits For Kangaroo Care (Cont.)

- **For Mothers;**


1. Decreases maternal **stress**
2. Minimize maternal **depression** – prevents depression
3. Hastens recovery from birth, **decreases lochia** enhances placental expulsion
4. Lowers maternal BP, help prevention & recovery from postpartum hemorrhage
5. Enhances **maternal sensitivity** and responsiveness **in ability to care** for their babies.
6. Enhances maternal **attachment/ bonding**, feeling of closeness with babies.

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## Cont.

7. Increases **confidence and competence** in providing infant care.
8. Creates more nurturing interactions.
9. **Increases milk production** and lengthens breastfeeding
10. **Improves interactions** with child for years


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## The Benefits of Kangaroo Care (Cont.)

- **Family :**
  1. Economical
  2. Better follow-up
  3. Promotes bonding among the family members.
- **Hospital/institution :**
  1. Saves materials like incubators,O2 cylinders
  2. Saves in man power in term of nursing staff
- **Nation:**
  1. Reduces mortality & infant mortality
  2. Healthy and intelligence children, adds to the nation's health and wealth.

Support from day one

Means better care, for each other and our patients

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- **PHOTOS ON KC PROCEDURE**
  - VENDOR Wrap
  - Sitting Transfer
  - Standing Transfer

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## Vendor Wrap

## Standing Transfer


## Sitting Transfer


Document And Follow-up Policy For Kangaroo Care.

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## Documentation

- **The diary for the infant progress on**
- KC frequency – I hour per day and 4-5 hours per week in the first 3 months old
- KC attainment of breast feeding nearly exclusive
- Weight gain monitored in every 1 month and 3 months old of corrected ages.

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## Kangaroo Feeding Policy

- **Kangaroo Care Feeding**
- Kangaroo position is ideal for breast feeding
- Exclusive breast feeding is the policy
- Feeding is done once in **90 -120 minutes** before KC
- If the baby can suckle, it is promoted
- If baby cannot suckle, express breast milk to be fed.
- If the baby is unable to swallow, EBM is fed by nasogastric tube.

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## Early Discharge

- Criteria for discharge
- Weight gain at least 1.8kg
- Baby should feed well on breast milk
- Temperature should be maintain
- No evidence of illness

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## Follow - Up

- After discharge, KC is continued at home until the **first 3 months** old
- Follow up is done weekly to ensured the baby feeding well and gaining about 15 – 20g weight daily
- Afterwards once a month till the baby reaches 52 weeks of post conceptional age.

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## So, what's not to like?

Why isn't KC used routinely, consistently and continuously every time mother is there?

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**Showing video on standing transfer**

**Showing video on sitting transfer**

**Appendix Q(a) : Practical session (Kangaroo care through sitting transfer)**

# The Sitting Transfer Kangaroo Care Procedure

BY

SHARMIZA SAMSUDIN

## LEARNING OUTCOMES

- Define sitting transfer kangaroo care technique.
- State the purpose of sitting transfer of kangaroo care technique.
- Explain the indication and contraindication of sitting transfer kangaroo care technique.

## Cont.

- Explain the principles of assessment of sitting transfer kangaroo care
- Prepare the infant and mother for sitting transfer kangaroo care
- Demonstrate the sitting transfer correctly and skillfully.

## Definition

**Sitting Transfer Kangaroo Care** :

- The mother is already sitting in a chair or recliner when the infant is given to her for KC.
- Place the infant prone on mother chest from the incubator pass to the mother sitting on the chair.

## Purpose of sitting transfer for Kangaroo Care technique

1. To ensure the proper and safe positioning of infant on mother bear chest.
2. To prevent infant from slipping down from the mother chest.
3. To ensure mother support infant's back and buttocks during Kangaroo Care technique.

## Indication of sitting transfer Kangaroo Care technique

1. Infant > 28 week of gestational age and > 1500 g
2. Infant clinically stable and eligible for KC
3. Mother post delivery (SVD) or Caesarean)
4. Mother with back pain.
5. Mother with first baby.

## Contraindication of sitting transfer Kangaroo Care technique

1. Infant < 28 week of gestational age and < 1500 g
2. Post caesarean mother.

## Principles assessment of sitting transfer Kangaroo Care

**For the infant :**

1. Review clinical condition for past 24 hours to assure infant is clinically stable for KC.
2. Place infant in supine position with receiving blanket folded in fourths under the infant's head and torso/back.
3. Dress infant in diaper and head cap only (booties optional)
4. Check patency of IV,PICC Line and ETT if present to prevent dislodgement during KC

## Cont.

5. Suction ETT if indicated

6. Check for moisture in ventilator and N CPAP tubing; drain if necessary.

6. Check that all lines are free and will reach to KC chair easily without tension.

7. Check for secure placement of all leads and pulse oximeter probe with strong signal.

## Cont.

**For mother :**

1. Mother have receive information about the benefits of KC for their infant; Question have been ask(consent)

2. Mother understands the correct KC position for infant;(head midline, well flexed, nares/mouth visible)

3. Mother express desire to hold infant in KC

## Cont.

4.Mother is comfortable and able to sit for minimum 60 minutes.

5. Mother should remove bra and wear blouse or robe that opens in front.

6.Have mother use the restroom prior to KC session to eliminate need to disrupt KC session.

## Cont.

4.Mother is comfortable and able to sit for minimum 60 minutes.

5. Mother should remove bra and wear blouse or robe that opens in front.

6.Have mother use the restroom prior to KC session to eliminate need to disrupt KC session.

## MINUTES BREAK


## Incubator & Screen

## Infant thermometer

## Woolen head cap & woolen booties

## Diaper & Receiving baby napkin

## Baby blanket

## Recliner chair & Foot rest

## Blouse open in front/Robe

## Small mirror

## Kangaroo Care Diary


## Composite skills

1. Check the infant's temperature 15-30 minutes pre,during and post sitting KC.
2. Close ends of receiving napkin around infant to contain arms, legs,IV lines and lead wires.
3. Pick up and support the infant with the left hand and palm up facing between the head and back and the right hand and palm up facing under infant's torso.

# Cont.

4. Position infant at vertical surface, chest-to-chest in midline position between both sides of breast, head turned to one side line, mouth and nose uncover and flexed arms and legs.

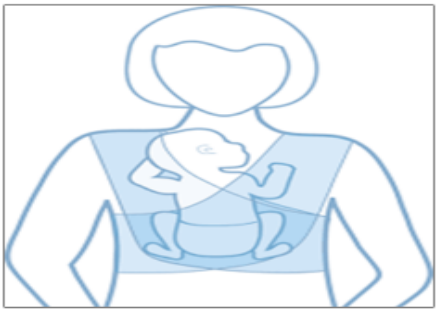
5.Mother to fold her arms across the infant's back and buttocks

1. Check the infant's temperature 15-30 minutes pre and post sitting KC.

2. Close ends of receiving napkin around infant to contain arms, legs, IV lines and lead wires.

3.Pick up and support the infant with the left hand and palm up facing between the head and back and the right hand and palm up facing under infant's torso.

4.Position infant at vertical surface, chest-to-chest in midline position between both sides of breast, head turned to one side line, mouth and nose uncover and flexed arms and legs



5. Mother to fold her arms across the infant's back and buttocks.

# Documentation

**Nursing & mother record**

| Gestational Week 32/40 | Kangaroo Care | | | | Body weight(kg) | Feeding | |
|---|---|---|---|---|---|---|---|
| | Pre Temp | Post Temp | Time Start | Time End | | Type of milk (√ ) | |
| Thursday 26/ 7 /2018 | 36.8oC | 37.2oC | 8.00am | 9.00am | 1.790 kg | Express Breast Milk | √ |
| | | | | | | Breast Feeding | √ |
| | | | | | | Formula Milk | |
| Friday 27/ 7 /2018 | 37.0oC | 37.3oC | 2.00am | 3.00am | 1.800 kg | Express Breast Milk | √ |
| | | | | | | Breast Feeding | √ |
| | | | | | | Formula Milk | |

# Implementation

1. Greet mother, introduce yourself and explain the purpose of the procedure.

R: Mother understands the correct KC position for infant;(head midline, well flexed, nares/mouth visible)

2. Prepare the mother and baby equipment & screen mother and baby for privacy

R: Mother is comfortable and able to sit for minimum 60 minutes.
Mother should remove bra and wear blouse or robe that opens in front or tube.
Mother eliminate need to disrupt KC session.(BO,PU)

3. Position the KC Chair at the side of the incubator door.

R: To prevent unnecessary tension on the lines during transfer.

# Implementation

4. Assist mother to sit in chair next to incubator with her blouse/shirt open or robe.

R : Ready to receive the infant for KC and ensure the entire body over the naked chest and abdomen is covered.

5. Check the infant's vital signs such as temperature, respiration and heart rate, 15 – 30 minute pre and post KC.

R : To monitor baseline temperature, respiration and heart rate.

6. Place infant in supine position with receiving napkin/blanket under infant's head and torso/back.

R : To prevent heat loss.

# Implementation

7. Take off the infant clothes and dress infant in diaper and head cap only.

R : To check of BO and PU and prepare for KC

8. Close the ends of receiving blanket around infant to contain arms, legs,IV lines and lead wires.

R : To prevent heat loss and dislodge of the entire lines.

9. Pick up the infant with hand under head and buttocks close to your chest.

R : To support and infant stability the infant during transfer.

10. Place the infant prone on mother's chest, pulling the ends of blanket out.

R : To assure proper skin to skin contact.

# Implementation

11. Assure proper, safe positioning of infant; head midline, neck straight, nares and mouth visible, arms and legs flexed.

R : To get the benefits of KC effect.

12. Instruct mother to fold her arm across infant's back and buttocks.

R : To prevent slipping down from her chest.

13.Place an additional folded fourths blanket or wrap across the infant's back.

R : To keep baby warmth.

14. Advice mother to be in KC position not less than 1 hour. Accumulative and continue KC for 7 hours in a week and until the infant 3 month old.

R: To complete the cycle sleep.

# Implementation

15. Help mother to initiate breastfeeding after the baby show readiness signs of the following:

by moving tongue and mouth, licking the mother's skin during KC procedure.

R : To encourage exclusive breastfeeding.

16. Record the date, time, temperature, duration of KC start until end of the session, weight gain and type of feeding intake daily in the diary provided.

R : To monitor the frequency of KC, weight gain and breast feeding rate.

17. Tidy up the mother and equipment.

R : For comfortable and cleanliness.

## Demonstration sitting transfer



## Return Demonstration

Group 1 - Pn Sharmiza & Dr Chui
Group 2 - Pn Sharmiza
Group 3 - Pn Sharmiza
Group 4 - Pn Sharmiza
Group 5 - Pn Sharmiza
Group 6 - Pn Sharmiza
Group 7 - Pn Sharmiza
Group 8 - Pn Sharmiza

**Appendix Q(b) : Practical session (Kangaroo care through standing transfer)**

# The Standing Transfer Kangaroo Care Procedure

BY

SHARMIZA SAMSUDIN

## LEARNING OUTCOMES

- Define standing transfer kangaroo care technique.
- State the purpose of standing transfer of kangaroo care technique.
- Explain the indication and contraindication of standing transfer kangaroo care technique.

## Cont.

- Explain the principles of assessment of standing transfer Kangaroo Care.
- Prepare the infant and mother for standing transfer Kangaroo Care
- Demonstrate the standing transfer correctly and skillfully.

## Definition

**Standing Transfer Kangaroo Care** :

- The mother stands beside the infant's incubator or bed to receive the infant or place the infant into KC.

## Purpose of standing transfer for Kangaroo Care technique

1. To ensure the proper transfer and safe positioning of infant on mother bear chest.
2. To prevent infant from slipping down from the mother chest during transportation from the incubator to the chair.
3. To ensure mother support infant's back and buttocks during Kangaroo Care technique.

## Indication of standing transfer Kangaroo Care

1. Infant > 28 week of gestational age and > 1000 g
2. Infant clinically stable and eligible for KC
3. Mother confidence and ready for KC her infant.

## Contraindication of standing transfer Kangaroo Care technique

1. Infant < 28 week of gestational age and < 1000 g
2. Post caesarean mother.

## Principles assessment of sitting transfer Kangaroo Care

**For the infant :**

1. Review clinical condition for past 24 hours to assure infant is clinically stable for KC.
2. Place infant in supine position with receiving blanket folded in fourths under the infant's head and torso/back.
3. Dress infant in diaper and head cap only (booties optional)
4. Check patency of IV,CPAP,PICC Line and ETT if present to prevent dislodgement during KC

## Cont.

5. Suction ETT if indicated

6. Check for moisture in Nasal CPAP and ventilator tubing; drain if necessary. CPAP

6. Check that all lines are free and will reach to KC chair easily without tension.

7. Check for secure placement of all leads and pulse oximeter probe with strong signal.

## Cont.

**For mother :**

1. Mother have receive information about the benefits of KC for their infant; Question have been ask(consent)

2. Mother understands the correct KC position for infant;(head midline, well flexed, nares/mouth visible)

3. Mother express desire to hold infant in KC

## Cont.

4.Mother is comfortable and able to sit for minimum 60 minutes.

5. Mother should remove bra and wear blouse or robe that opens in front.

6.Have mother use the restroom prior to KC session to eliminate need to disrupt KC session.

## MINUTES BREAK


## Incubator & Screen

## Infant thermometer

## Woolen head cap & woolen booties

## Diaper & Receiving baby napkin

## Baby blanket

## Recliner chair & Foot rest

## Blouse open in front/Robe

## Small mirror

## Kangaroo Care Diary


## Composite skills

1. Check the infant's temperature 15-30 minutes pre,during and post standing KC.
2. Close ends of receiving napkin around infant to contain arms, legs, IV lines and lead wires.
3. Pick up and support the infant with the left hand and palm up facing between the head and back and the right hand and palm up facing under infant's torso.

## Cont.

4. Position infant at vertical surface, chest-to-chest in midline position between both sides of breast, head turned to one side line, mouth and nose uncover and flexed arms and legs.
5. Mother to fold her arms across the infant's back and buttocks.

1. Check the infant's temperature 15-30 minutes pre and post standing KC.

2. Close ends of receiving napkin around infant to contain arms, legs, IV lines and lead wires.

3.Pick up and support the infant with the left hand and palm up facing between the head and back and the right hand and palm up facing under infant's torso.

4.Position infant at vertical surface, chest-to-chest in midline position between both sides of breast, head turned to one side line, mouth and nose uncover and flexed arms and legs.

5. Mother to fold her arms across the infant's back and buttocks.

# Documentation

**Nursing & mother record**

| Gestational Week 32/40 | Kangaroo Care | | | | Body weight(kg) | Feeding | |
|---|---|---|---|---|---|---|---|
| | Pre Temp | Post Temp | Time Start | Time End | | Type of milk (√ ) | |
| Thursday 26/ 7 /2018 | 36.8oC | 37.2oC | 8.00am | 9.00am | 1.790 kg | Express Breast Milk | √ |
| | | | | | | Breast Feeding | √ |
| | | | | | | Formula Milk | |
| Friday 27/ 7 /2018 | 37.0oC | 37.3oC | 2.00am | 3.00am | 1.800 kg | Express Breast Milk | √ |
| | | | | | | Breast Feeding | √ |
| | | | | | | Formula Milk | |

## Implementation

1. Greet mother, introduce yourself and explain the purpose of the procedure.

R: Mother understands the correct KC position for infant;(head midline, well flexed, areas/mouth visible)

2. Prepare the mother and baby equipment & screen mother and baby for privacy

R: Mother is comfortable and able to sit for minimum 60 minutes.
Mother should remove bra and wear blouse or robe that opens in front or tube.
Mother eliminate need to disrupt KC session.(BO,PU)

3. Position the KC Chair at the side of the incubator door.

R: To prevent unnecessary tension on the lines during transfer.

## Implementation

4. Open incubator door or raise the overhead component of incubator.

5. Have mother stand next to opened door wearing just open the blouse or robe. Screen the area .

R : Ready to pick up the infant and privacy.

6. Check the infant's vital signs such as temperature, respiration and heart rate, 15 – 30 minute pre and post KC.

R : To monitor baseline temperature, respiration and heart rate.

7. Place infant in supine position with receiving napkin/blanket under infant's head and torso/back.

R : To prevent heat loss

## Implementation

8. Take off the infant clothes and dress infant in diaper and head cap only.

R : To check of BO and PU and prepare for KC

9. Close the ends of receiving blanket around infant to contain arms, legs,IV lines and lead wires.

R : To prevent heat loss and dislodge of the entire lines.

10. Pick up the infant with hand under head and buttocks close to your chest.

R : To support and infant stability the infant during transfer.

11. Have mother lift baby, with blanket and place the infant on her chest while standing.

# Implementation

11. Place the infant prone on mother's chest.

R : To prevent from slipping down during transfer.

12. Instruct mother to fold her arms cross the infant's back and head and to hold the infant in place as she moves backward toward the chair/recliner.

R : To stabilize and support the infant.

13. When the mother feels the chair/recliner against her calf, then she is permitted to sit down.

R : To assure in the position.

14. Once seated, put the chair into the reclining position (about 30 – 45 degrees if available)

R : To ensure mother comfortable.

# Implementation

15. Adjust infant as necessary to assure adequate positioning; (Head midline, well flexed, nares visible.

R : To get the benefits of KC.

16. Assure proper, safe positioning of infant; head midline, neck straight, nares and mouth visible, arms and legs flexed.

R : To get the benefits of KC effect.

17. Instruct mother to fold her arm across infant's back and buttocks.

R : To prevent slipping down from her chest.

# Implementation

18.Place an additional folded fourths blanket or wrap across the infant's back.

R : To keep baby warmth.

19. Advice mother to be in KC position not less than 1 hour. Accumulative and continue KC for 7 hours in a week and until the infant 3 month old.

R: To complete the cycle sleep.

# Implementation

18.Place an additional folded fourths blanket or wrap across the infant's back.

R : To keep baby warmth.

19. Advice mother to be in KC position not less than 1 hour. Accumulative and continue KC for 7 hours in a week and until the infant 3 month old.

R: To complete the cycle sleep.

# Demonstration standing transfer


# Return Demonstration

Group 1 - Pn Sharmiza & Dr Chui
Group 2 - Pn Sharmiza
Group 3 - Pn Sharmiza
Group 4 - Pn Sharmiza
Group 5 - Pn Sharmiza
Group 6 - Pn Sharmiza
Group 7 - Pn Sharmiza
Group 8 - Pn Sharmiza

**Appendix R: Ten Steps to Successful Kangaroo Care**

**TEN STEPS TO SUCCESSFUL KANGAROO CARE**

Just as the Ten Steps to Successful Breastfeeding have been helpful in promoting breastfeeding around the world, the Ten Steps to Successful Kangaroo Care can guide efforts to promote non-separation of mother and preterm/full-term infant through skin-to-skin contact. The Ten Steps to Successful Kangaroo Care have been developed using the format of the Ten Steps to Successful Breastfeeding and are as follows:

Every facility providing services and care for newborns and infants up to 3 months' age should:

1. Have written KC policies (for very sick and very-low-birth-weight neonates, for relatively stable preterm neonates [such as the one provided within this review], for healthy term infants within 2 hours of birth, and for healthy term infants until discharge) that are routinely communicated to all healthcare staff.

2. Train all healthcare staff in skills necessary to implement the policy pertaining to their area of care.

3. Inform all pregnant women about the benefits and management of KC.

4. Help mothers of healthy term infants initiate KC within a few minutes of birth. Help mothers of cesarean infants and premature or sick infants initiate KC as soon as possible (able to tolerate transfer and skin contact without physiologic or behavioral compromise), and monitor infant to ensure tolerance without physiologic and behavioral compromise.

5. Show mothers how to position the infant for both safe transfer and safe KC (head sustained in midline, not flexed or hyperextended, and infant secured so that infant cannot fall down or

out of KC position).

6. Practice 24/7 KC, allowing mothers and infants to remain in skin-to-skin contact 24 hours a day, 7 days a week until discharge.

7. Give newborns and infants at least 1 hour of KC per session, if not continuous 24/7 KC.

8. Encourage KC for all warming and comforting needs of infants.

9. Give adequate thermal insulation (head cap, warm blankets, insulating cover as needed) to the infant throughout KC.

10. Foster the establishment of KC support for mothers through posters, patient scrapbooks, patient record of KC, and support groups that may assist even after discharge.

(Ludington-Hoe, Morgan, Abouelfettoh, 2008)