

Neonatal Nurses Knowledge, Attitude, and Practice of Kangaroo Care

Randa El-Sayed Mohammed¹, Samia Al Furaikh², Jenelle Abellar¹, Amel Abouelfetoh^{1,3}

1 College of Nursing, King Saud bin Abdulaziz University for Health Sciences,

2 King Abdulaziz Hospitals, Ministry of National Guard Health Affairs,

3 Faculty of Nursing, Cairo University

Abstract:

Background: Kangaroo care (KC) is a skin-to-skin touch between the newborn and the mother. Many researches documented that KC promotes newborn infants' physiological, psychological, and behavioral development. Therefore, its implementation is recommended for all newborns. Nurses caring for newborns should be capable of implementing such interventions. Aim: evaluate the neonatal nurses' knowledge, attitude, and practice toward KC. Method: descriptive cross-sectional correlational design used to evaluate the level of neonatal nurses working at the Neonatal Intensive Care Unit (NICU) and Labor and Delivery (LD) Unit at a tertiary hospital in the Eastern Region, KSA. Data were collected from 66 nurses using a questionnaire adapted from (El - Nagger et al., 2013). It includes three subscales one for KC Knowledge one for KC attitude and one for KC practices. Results: BSN degree was the minimum educational level of the majority of the nurses (93.9%). The majority of the nurse had good knowledge about KC (10.82 ± 1.94), and a positive attitude toward KC implementation (61.08 ± 6.45). Although nurses scored high in knowledge and attitude, they were low in practice level (11.18 ± 1.54). None of the nurses supported the practice of KC with ventilated and extremely low birth weight infants. A significant positive correlation was found between nurses' total score of knowledge and their total scores of attitudes ($P=0.001$). Conclusion: Nurses' knowledge and attitude toward KC was relatively good. Recommendations: Providing knowledge, in-service training, and mentoring nurses' performance of KC.

Keywords: Kangaroo care, Nurses' knowledge, Attitude, Practice.

Introduction

Newborns are a particularly susceptible group to a lot of complications that need high-quality medical and nursing interventions. Despite a growing body of knowledge and technological advances in neonatal care, the mortality rate of newborns is around 2.7 million newborns yearly. Worldwide, the death rate of children under five years is about 44%. Premature birth (born before 37 weeks' gestation) is considered one of the primary causes of death during the first 28 days of life, and it accounts for 50% of neonatal deaths (Liu et al. m 2015; Blencowe et al., 2013).

Kangaroo care (KC) is an evidence-based approach proven to reduce mortality rates in newborn infants weighing (<2000 g) (Chan et al.,2016). Kangaroo care is a skin-to-skin touch between the newborn and the mother. It is a method of holding the newborn by placing him/her upright in direct close contact with

his/her mother's breast. Previous research found that KC promotes the psychological and behavioral development of infants born preterm as well as full-term (Chan et al., 2016). Moreover, it improves the rate of infant physiological maturation and reduces the incidence of hospital-acquired infection (Abouelfetth et al, 2011; Mohammed et al., 2018).

Rey and Martinez were the first to introduce KC in Bogotá, Colombia in 1976 and it was used to prevent hypothermia in newborns and keep them warm when the incubators were not available and access to health services is inadequate due to poverty (Deng et al., 2018). Besides warming, there are many advantages of kangaroo, it is one of the best methods to promote bonding and breastfeeding in all newborn infants regardless of weight, gestational age, and clinical conditions of them

(Lawn et al., 2010; Conde-Anguelo & Díaz-Rossello, 2014).

There are two approaches in which the newborn is tied in close contact with the mother's breast beneath her dress. In the beginning, it was suggested that the newborn be held for 24 hours a day, the father can substitute the mother if necessary at times and it is known as a continuous approach (Nyqvist et al., 2010). Nevertheless, the intermittent approach has been implemented in many settings, which included the recurrent but not constant holding of the newborn by the mother for several hours per day and for a limited number of days. Intermittent KC is used when the newborn is unstable and the mother couldn't be in the hospital all the time and it is more conventional and possible in Neonatal Intensive Care Unit, rather than the continuous approach. Others consider it to be a natural habitat of the newborn to facilitate attachment between mother and infant, or an intervention or therapy to help stabilize and encourage growth of the infant (Nyqvist et al., 2010; Cleveland, 2011).

In light of KC's benefit, it worse full implementation in the NICU as a required routine infant care and nurses to advocate for its full implementation. To do so, nurses need to have adequate knowledge, and a positive attitude toward KC implementation as well as follow well-established KC guidelines. Therefore, the aim of the current study is to evaluate the knowledge, attitude, and practice of nurses working with newborn infants toward kangaroo care.

Method

Research design: Cross-sectional correlational descriptive explorative design was used to evaluate knowledge, attitude, and practice related to kangaroo care among nurses.

Setting: The study was conducted in the Neonatal Intensive Care at a tertiary-level hospital in the Eastern Region of Saudi Arabia.

Subject: Convenient sample was used and all nurses working in the NICU and Labor and Delivery unit (66 nurses) were invited to

participate in the study after granting required approval from the IRB committee.

Data were collected from January 2018 to April 2018. The questionnaire was distributed to all nurses with the consent form. None of the nurses declined to participate in this study. Afterward, they accomplished a self-administered questionnaire that included questions related to general knowledge, benefits, attitude, and practices associated with KC

Tools of data collection: The researcher used the standardized tools adapted from (El-Nagger et al., 2013). It consists of four parts:

Part one: Sociodemographic characteristics of the nurses were collected using a structured questionnaire including nurses' age, level of education, years of experience in the specialized area, and if they had attended any previous program related to kangaroo care.

Part two: The KC Knowledge subscale included 14 items with a yes or no response, a score of 1 given to a yes response, and a score of 0 given to a no response to each item. A total score of 70% and above is considered a good level of knowledge, and a score below 60% is considered an unsatisfactory level of knowledge. The knowledge question adopted from (El-Nagar et al., 2013)

Part three: To measure attitude related to KC, questions used a validated tool (El-Nagar et al., 2013), The KC attitude subscale included 16 items with 5 point Likert scale rating the responses from 1 strongly disagree to 5 strongly agree. Some items were negatively stated and it was reversed for scoring.

Part four: The KC practice subscale included 7 items observational checklist adapted from (El-Nagar et al., 2013) with a score of 0 to 2 with 0 for not attempted items and 1 for attempted but incompletely performed and 2 for completely and correctly performed items.

Statistical analysis of the data

The completed questionnaire was completed and data were fed to the computer and analyzed using IBM SPSS software package version 20.0. (Armonk, NY: IBM Corp) Qualitative data were described using numbers and percentages Quantitative data were described using range (minimum and maximum), mean, and standard deviation. The significance of the obtained results was judged at the 5% level.

The used tests were

1 - Student t-test

For normally distributed quantitative variables, to compare between two studied groups

2 - F-test (ANOVA)

For normally distributed quantitative variables, to compare between more than two groups

3 - Pearson coefficient

To correlate between two normally distributed quantitative variables

Ethical approval

The proposal was approved by the Ethics Committee of National Guard Health Affairs

King Abdullah International Medical Research Center.

Results

Socio-Demographic Characteristics of the Nurses

All nurses working in the Labor and delivery and in the NICU were approached (N=66). All nurses responded and participated in the study, giving a 100% response rate. Table 1 illustrates the percent distribution of nurses according to their socio-demographic data. The majority of the nurses (93.9%) had a BSN degree and 62.1% of them had attended educational programs related to Kangaroo care.

Nurses KC Knowledge:

Table 2 shows the percent distribution of nurses according to their knowledge about kangaroo care for each item in the KC knowledge subscale. The majority of the nurses (97%) indicated that Kangaroo care promotes bonding, and it has a positive effect on the physical well-being of the infant. However, some did not know that KC can be implemented for infants weighing less than 1000gms, or intubated infants (34.8%, 28.8%) respectively. Very few nurses indicated that KC was an added burden to the staff (4.5%).

Nurses KC Attitude:

Table 3 displays that the majority of the nurses hold a positive attitude toward the practice of KC and it's beneficial for most newborn infants and to the mothers. However, about one-quarter of the nurses finds KC increase their workload and compromises the work of other babies. Regarding mothers' acceptance of KC, 22.7% of the nurses reported that mothers would not easily come to KC with their babies in NICU. Most of the nurses have a positive attitude toward the benefits of KC to the baby. They reported that KC decrease crying and improve sleep (97%). About 36 % of the nurses do not see the benefits of KC in improving an infant's temperature as it will not decrease the use of warming gadgets as well KC about 18% see KC can cause apnea and/or hypothermia.

Nurse KC Practice:

Table (4) shows the percent distribution of nurses' practice toward kangaroo care. The majority of the nurses (90.9%) helped the mothers to practice kangaroo care with full-term stable infants, and 75.8% helped the mothers in the practice of KC with their preterm infants with birthweight of 1000g and above. However, nurses were unwilling to practice KC with preterm infants weighing less than 1000g. Moreover, all nurses did not support the mother to practice KC with ventilated infants.

Figure (1) illustrates that the mean percent score of nurses' knowledge concerning kangaroos was 77.27 ± 13.89 while the mean

percent score of nurses' attitudes concerning kangaroos care was 70.43 ± 10.08 . on the other hand, percent score of nurses' practice concerning kangaroo was 63.20 ± 19.26 .

Table (5) illustrates the correlation between nurses' total mean score of KC

knowledge, attitude and practice. A significant positive correlation was found between nurses' attitude toward KC and their level of knowledge ($r = 0.548^*$, $p < 0.001^*$). On other hand, no significant correlation between nurses' knowledge and practice concerning kangaroo care where ($r = 0.235$ and $p = 0.057$).

Table1. Percent Distribution of Studied Nurses according to Socio- Demographic characteristics (No = 66)

Demographic characteristics	Min. – Max.	Mean \pm SD.
Age (years)	25.0 – 65.0	37.11 \pm 8.79
Level of Education	No.	%
BSN	62	93.9%
Masters	2	3.0%
Midwifery	1	1.5%
Diploma in Nursing	1	1.5%
Years of experience as pediatric nurse (No = 66)	No.	%
≤ 5 years	13	19.7%
5 – 10 years	23	34.8%
10 – 15 years	10	15.2%
15 – 20 years	11	16.7%
Years	2	3.0%
25 – 30 years	2	3.0%
Other	5	7.6%
Attended KC program	No.	%
Yes	41	62.1%
No	25	37.9 %

Table 2. Percent Distribution of Nurses according to their knowledge about kangaroo care (N=66)

Knowledge Items	Yes		No	
	No.	%	No.	%
1. KC promote bonding	64	97.0	2	3.0
2. KC have positive effect on physical well-being of infant	64	97.0	2	3.0
3. KC enhances Parent's confidence	64	97.0	2	3.0
4. KC results in more effective breastfeeding	65	98.5	1	1.5
5. Potential benefits of kangaroo care have been overstated	39	59.1	27	40.9
6. Kangaroo care should not be practiced with intubated infant	19	28.8	47	71.2
7. Kangaroo care should only be practiced for infant weighing 1000g or more	23	34.8	43	65.2
8. Kangaroo care should begin within a few hours of Birth	61	92.4	5	7.6
9. All parents should be encouraged to practice kangaroo care	65	98.5	1	1.5
10 All parents should be given relevant information on kangaroo care	65	98.5	1	1.5
11 Nurses should remain with parent support and assistance during kangaroo care	63	95.5	3	4.5
12 Nurses should facilitate kangaroo care when NICU is quiet	54	81.8	12	18.2
13 Facilitating kangaroo care is professionally satisfying	65	98.5	1	1.5
14 Facilitating kangaroo care is an added burden to NICU nurses	3	4.5	63	95.5

Table (3): Percent Distribution of Nurses' Attitude towards Kangaroo Care (n = 66)

Attitude Items	Strongly Agree		Agree		Uncertain		Disagree		Strongly disagree		
	No.	%	No.	%	No.	%	No.	%	No.	%	
Benefits for Nurses											
1	KC increase nurses work load	0	0	6	9.1	9	13.6	38	57.6	13	19.7
2	It is worth putting efforts in advocating KC	19	28.8	43	65.2	3	4.5	1	1.5	0	0.0
3	KC compromise care to other sick babies	0	0	4	6.1	13	19.7	41	62.1	8	12.1
Benefits for Mothers											
4	Mothers feel happy doing KC	32	48.5	29	43.9	3	4.5	1	1.5	1	1.5
5	Mothers accept KC easily	9	13.6	40	60.6	15	22.7	1	1.5	1	1.5
6	KC increases lactation in mother	29	43.9	35	53.0	1	1.5	1	1.5	0	0.0
7	Mothers more confident to handle their LBWI after KC	21	31.8	36	54.5	6	9.1	2	3.0	1	1.5
8	To advise mothers to continue KC at home	33	50.0	32	48.5	0	0.0	1	1.5	0	0.0
9	Mothers do KC at home without supervision	24	36.4	31	47.0	9	13.6	2	3.0	0	0.0
10	Useful to educate family about KC	23	34.8	37	56.1	5	7.6	1	1.5	0	0.0
Benefits for the baby											
11	KC decrease cry and increase sleep of infant	24	36.4	40	60.6	1	1.5	1	1.5	0	0.0
12	KC is a useful method of care for LBWI	23	34.8	35	53.0	4	6.1	4	6.1	0	0.0
13	To recommend KC use in community and hospitals	30	45.5	32	48.5	3	4.5	1	1.5	0	0.0
14	KC is effective in care of baby's temperature and other vital signs	30	45.5	33	50.0	2	3.0	1	1.5	0	0.0
15	KC can cause apnea and or Hypothermia	2	3.0	2	3.0	8	12.1	34	51.5	20	30.3
16	KC decreases the use of warming gadgets	12	18.2	30	45.5	18	27.3	6	9.1	0	0.0

Table (4): Percent Distribution of Nurses' Practice toward Kangaroo Care (N = 66)

Practices	Yes		No	
	No.	%	No.	%
Encouraged mothers to use KC	59	89.4	7	10.6
Helped mothers to practice KC with healthy full term infants	60	90.9	6	9.1
Helped the mothers to practice of KC with preterm infants (weighing \geq 1000g)	50	75.8	16	24.2
Helped the mothers to practice KC with preterm infants (weighing \leq 000g)	0	0.0	66	100.0
Supported the mothers to practice KC with preterm ventilated infants	0	0.0	66	100.0
Provided information about KC to parents/grandparents	60	90.9	6	8.1
Practiced KC as per hospital policy	59	89.4	7	10.6

Figure 1 Percent distribution of the nurses mean of total scores of knowledge, attitudes, and practices.

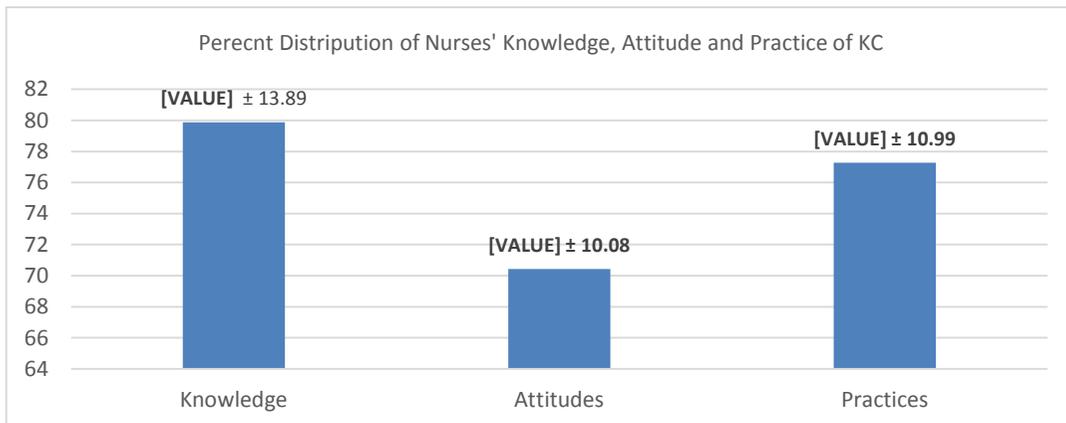


Table 5: Correlation between nurses ‘total mean score of KC knowledge, KC Attitude and KC practice.

Measure		KC knowledge	KC Attitude	KC Practices	M ± SD
1.KC Knowledge	r		0.548**	0.235	79.87 ± 13.89
	P		<0.001*	0.057	
2.KC Attitude	r	0.548**		0.477*	70.43 ± 10.08
	P	<0.001*		<0.001*	
3.KC Practices	r	0.235	0.477*		77.27 ± 10.99
	P	0.057	<0.001*		

r: Pearson coefficient

*: Statistically significant at $p \leq 0.05$

Discussion

Kangaroo care or skin-to-skin contact is one of the harmless and relatively inexpensive interventions for full-term and preterm infants. It is also one of the developmental nursing interventions that are proven to improve both infant and maternal outcomes. For nurses to implement KC in the practice setting, it is essential to have the needed knowledge and a positive attitude to practice it (George, 2013).

The current study aims to evaluate KC knowledge, attitude, and practice for nurses caring for a newborn infant in the study setting. The majority of the nurses (93.9%) had a BS certificate and had more than 5 years of experience working with newborns (table 1). It also was recommended by Mirlashari, (2016) that a bachelor's degree should be the minimum practice entry level of nurses working with

newborn infants as well to have at least five years of experience working with infants and children.

Li (2022), Stuard (2015) and Jefferies (2012) reported that kangaroo care stimulates breastfeeding, improves maternal-infant bonding, and infant brain development, and can be used as an approach to involve a parent in caring for sick neonates and assist in humanizing the NICU experience. It is remarkable from the findings of the current study that the majority of nurses (97%) have good knowledge about kangaroo care and its benefits to promote bonding, improve infants' physical well-being, enhance effective breastfeeding and they are aware of their role to encourage all parent to practice after giving them the relevant information (table2).

Although all nurses are aware of the benefits of KC, more than a quarter of them (28.8%) respond incorrectly and mentioned that Kangaroo care should not be practiced with mechanically ventilated neonates (table 2). This might be due to the nurses' consideration of safety issues especially for very low birthweight neonates and being scared of the accidental dislodgment of ventilator tubes and intravenous line displacement. It was recommended that KC can be practiced with mechanically stable ventilated infants if the nurses follow the guidelines of transferring the infant (**Rocha G et al., 2018**). The following conditions can lead KC to be delayed: heart rate below 85 beats per minute, necessitating stimulation to recover to the normal range; four episodes of 85–100 beats per minute per hour; frequent apnea; low oxygen saturation (SaO₂ 85%); unstable blood pressure; or use of vasoactive medications (**Li, Y. et al., 2022**).

For KC implementation with ventilated infants, it was recommended that nurses need to practice up to three times the step-by-step procedures for different types of transfer (sitting and standing) before conducting KC independently for mechanically ventilated infants (Ludington et al., 2008). Therefore, it is important to have an up to date KC implementation guidelines for such fragile newborns in the study setting. Another concern was that 34.8% of the nurses in the current study did not know that KC can be practiced for infants weighing 1000g or less (table 2). **WHO (2015)** recommendation of applying kangaroo care for clinically stable low birth weight neonates (< 2000 g) to decrease the mortality rate of neonates. Additionally, many researchers reported that KC improves the health outcomes of LBW infants (**Conde-Agudelo & Díaz-Rossello, 2016; hi Luong et al., 2016; Ludington et al., 2008**).

The current study showed a positive attitude of nurses toward kangaroo care (table 3). Only nurses had a concern regarding the increased workload when KC is fully implemented. This concern was similarly found by **El-Nagar et al., (2013)** who reported that a shortage in nursing staff is one of the barriers that made them disagree to implement kangaroo care because it increased the workload of the

nurses. Therefore, the recognition of Kangaroo care by healthcare facility leadership plays an important role to encourage applying of kangaroo within the facility (**Cunningham et al., 2022; Chan G et al., 2018; El-Nagger et al., 2013**).

Nurses in the current study reported their agreement that mothers accept to perform kangaroo care easily while around one quarter (22.7%) of nurses were uncertain about this statement and quite a number 3% disagreed about the mother accepting to perform kangaroo care easily (table 3). It could be justified by some nurses who found it difficult to inform the mother about the benefit of kangaroo care due to the language barrier because the majority of the nurses didn't speak the same language as the mother. In addition, kangaroo care time length is another possible obstacle for parents. **Cunningham et al., (2022) & Chan et al., (2016)** added that the timing needed to provide kangaroo by parents was a barrier due to responsibilities at home and work. Also, the medical condition of the mother such as fatigue after the delivery may be another barrier to providing kangaroo care (**Chan et al., 2016; El-Nagger et al., 2013**).

The current study showed that nurses agree that kangaroo care increases lactation, decreases crying, and increases sleeping of the infant. The mother was confident to handle their low birth weight infant and effective in the care of the infant's temperature and other vital signs (table 3). In the same context, **Mohammed et al., (2018), & Band era et al., (2014)** who studying the effect of kangaroo care on the physiological parameters of less than 2000 g neonates, found that neonates received kangaroo care displayed progress in vital parameters where physiological abnormalities such as hypothermia, tachycardia, and low oxygen saturation were often corrected during the kangaroo mother care sessions. In addition, **Whitney, (2015)** found a statically significant difference in the nurse's attitude after implementation of kangaroo care guidelines. The nurses reported that kangaroo care is a convenient method to decrease the crying and increase the sleeping hours of the infants and the mothers were able to handle their babies in a confident manner (**Whitney, 2016**).

The result of the current study reflected that the majority of nurses encouraged the mother to practice KC and provided them with the needed information to apply kangaroo care (table 4). However, none of the nurses helped the mothers in the practice of kangaroo care for preterm infants who are weighing $\leq 1000\text{g}$ and none of them supported the mothers in the practice of kangaroo care for preterm ventilated infants (table 4). It could be justified by the nurses being scared from dislodge of ventilated tubes and they needed training regarding how to support the ventilator tube and the infants on the mother's chest. The finding of the present study is supported by another study done in 2010 where the nurses were unsure how to apply kangaroo care for intubated infants (**Mohammed et al., 2018**). On the contrary, **El-Ngar, (2013)** mentioned that all nurses enhanced and helped the parents to implement kangaroo care with pre-term neonates, regardless of the weight of the neonate at birth and whether the neonate was intubated or not after the training program about the application of kangaroo care. In addition, **WHO 2015** recommended the implementation of kangaroo care for low birth infants weighing less than 2000g. Along the same line, kangaroo care in **NICU JHCH, (2018)** guideline included the characteristics of infants suitable for kangaroo care and how to apply for stable ventilated infants (**Flynn & Leahy-Warren, 2010; WHO, 2015**).

The current study revealed that a significant positive correlation was found between nurses' total score of knowledge and their total scores of attitude (table 5). The finding is consistent with **Shah et al., (2017)** who found that knowledge and attitudes of nurses and doctors were better than their practice of KC. However, there was a significant correlation between the total score of knowledge about kangaroo care and the total score of practices concerning kangaroo care (table 5). It could be justified by the neonatal nurses recognizing the advantages of kangaroo care but need to implement kangaroo care guidelines to adequately practice it. These findings were supported by **Yao Zhang et al. (2018)** who found that the majority of NICU nurses in China knew the advantages of KC, but they had many barriers to practicing it and

emphasized the importance of education of both staff and parents about KC, as well as providing policies and supplies to support parents practice of KC.

Conclusion

Based on the previous results, the present study concluded that nurses are knowledgeable about KC and had a positive attitude toward its implementation with most newborn infants. The majority of nurses encouraged the mother to practice KC and provided them with the needed information to apply kangaroo care. However, none of the nurses helped the mothers in the practice of kangaroo care for preterm infants who are weighing $\leq 1000\text{g}$ and none of them supported the mothers in the practice of kangaroo care for preterm ventilated infants.

Recommendation:

Based on the previous results, the following recommendations are suggested:

KC Practice guidelines need to be refined and followed by nurses working with newborn infants.

Providing knowledge, in-service training, and mentoring nurses' performance of KC.

Appropriate pre-service training for newly hired nurse for nurses about the implementation of KC.

Facilitation of the presence of the mother around her infant in NICU would increase maternal willingness to do KC as well providing full information of the benefits of KC and how to safely practice it with the infant.

References

- Abouelfetoh, A. M., & Ludington-Hoe, S. M. (2012).** Preterm twins cardio-respiratory, thermal and maternal breast temperature responses to shared kangaroo care. *International Journal of Nursing and Midwifery*, 4(6), 76-83.
- Bera, A., Ghosh, J., Singh, A. K., Hazra, A., Som, T., & Munian, D. (2014).** Effect of kangaroo mother care on vital physiological

- parameters of the low birth weight newborn. *Indian journal of community medicine: official publication of Indian Association of Preventive & Social Medicine*, 39(4), 245.
- Chan, G. J., Labar, A. S., Wall, S., & Atun, R. (2016).** Kangaroo mother care: a systematic review of barriers and enablers. *Bulletin of the World Health Organization*, 94(2), 130.
- Chan, G. J., Valsangkar, B., Kajeepeta, S., Boundy, E. O., & Wall, S. (2016).** What is kangaroo mother care? Systematic review of the literature. *Journal of global health*, 6(1).
- Chan, G., Bergelson, I., Smith, E. R., Skotnes, T., & Wall, S. (2017).** Barriers and enablers of kangaroo mother care implementation from a health systems perspective: a systematic
- Chi Luong, K., Long Nguyen, T., Huynh Thi, D. H., Carrara, H. P., & Bergman, N. J. (2016).** Newly born low birthweight infants stabilise better in skin- to- skin contact than when separated from their mothers: a randomised controlled trial. *Acta Paediatrica*, 105(4), 381-390.
- Cunningham, C., Patton, D., Moore, Z., O'Connor, T., Bux, D., & Nugent, L. (2022).** Neonatal kangaroo care-What we know and how we can improve its practice: An evidence review. *Journal of Neonatal Nursing*, 28(6), 383-387.
- Conde- Agudelo, A., Belizán, J. M., & Diaz-Rossello, J. (2012).** Cochrane Review: Kangaroo mother care to reduce morbidity and mortality in low birthweight infants. *Evidence- Based Child Health: A Cochrane Review Journal*, 7(2), 760-876.
- Deng, Q., Zhang, Y., Li, Q., Wang, H., & Xu, X. (2018).** Factors that have an impact on knowledge, attitude and practice related to kangaroo care: National survey study among neonatal nurses. *Journal of Clinical Nursing*, 27(21-22), 4100-4111.
- El-Nagger, N. M., El-Azim, H. A., & Hassan, S. M. Z. (2013).** Effect of kangaroo mother care on premature infants' physiological, behavioral and psychosocial outcomes in Ain Shams Maternity and Gynecological Hospital, Cairo, Egypt. *Life Sci J*, 10(1), 703-716.
- Flynn, A., & Leahy-Warren, P. (2010).** Neonatal nurses' knowledge and beliefs regarding kangaroo
- George OB. (2013).** Effect of 'kangaroo mother care' training on knowledge, attitude and practice of health care providers in selected district hospitals in north rift region, Kenya. March 2013. <http://hdl.handle.net/123456789/20> (last accessed on 5/12/2013)
- Grayson, C. E. (2018).** "Kangaroo Mother Care to Reduce Morbidity and Mortality in Low Birthweight Infants" (2016), by Agustin Conde-Agudelo and José Díaz-Rossello. *Embryo Project Encyclopedia*.
- Harms, H. K., Zimmer, K. P., Kurnik, K., Bertele-Harms, R. M., Weidinger, S., & Reiter, K. (2002).** Oral mannose therapy persistently corrects the severe clinical symptoms and biochemical abnormalities of phosphomannose isomerase deficiency. *Acta paediatrica*, 91(10), 1065-1072.
- Howson, C. P., Kinney, M. V., McDougall, L., Lawn, J. E., & Born Too Soon Preterm Birth Action Group. (2013).** Born too soon: preterm birth matters. *Reproductive health*, 10, 1-9.
- Howson, C. P., Kinney, M. V., McDougall, L., Lawn, J. E., & Born Too Soon Preterm Birth Action Group. (2013).** Born too soon: preterm birth matters. *Reproductive health*, 10, 1-9.
- Jefferies, A. L., Canadian Paediatric Society, & Fetus and Newborn Committee. (2012).** Kangaroo care for the preterm infant and family. *Paediatrics & child health*, 17(3), 141-143.
- Kangaroo Care in NICU JHCH. Local guideline 2018** available at http://www.hnekidshealth.nsw.gov.au/site/content.cfm?page_id=605017¤t_category_code=8338
- Li, Y., Hu, Y., Chen, Q., Li, X., Tang, J., Xu, T., ... & Evidence- Based Medicine Group, Neonatologist Society, Chinese Medical Doctor Association. (2022).** Clinical practice guideline for kangaroo mother care in preterm and low birth weight infants. *Journal of Evidence- Based Medicine*, 15(4), 408-424.
- Liu, L., Oza, S., Hogan, D., Perin, J., Rudan, I., Lawn, J. E., ... & Black, R. E. (2015).**

- Global, regional, and national causes of child mortality in 2000–13, with projections to inform post-2015 priorities: an updated systematic analysis. *The Lancet*, 385(9966), 430-440.
- Ludington-Hoe, S. M., Morgan, K., & Abouelfetoh, A. (2008).** A clinical guideline for implementation of kangaroo care with premature infants of 30 or more weeks' postmenstrual age. *Advances in Neonatal Care*, 8(3), S3-S23.
- Mirlashari, J., Qommi, R., Nariman, S., Bahrani, N., & Begjani, J. (2016).** Clinical competence and its related factors of nurses in neonatal intensive care units. *Journal of caring sciences*, 5(4), 317.
- Mohammed, R. E., Khamis, G. M., & Sabry, Y. Y. (2018).** Effect of preterm neonates' developmental supportive care program on nurses' performance. *IOSR Journal of Nursing and Health Science*, 7(4), 33-45.
- Nyqvist, K. H., an Expert Group of the International Network on Kangaroo Mother Care, Anderson, G. C., Bergman, N., Cattaneo, A., Charpak, N., ... & Widström, A. M. (2010).** State of the art and recommendations Kangaroo mother care: application in a high- tech environment. *Acta paediatrica*, 99(6), 812-819.
- Riordan, J., & Wambach, K. (Eds.). (2010).** *Breastfeeding and human lactation*. Jones & Bartlett Learning.
- Rocha, G., Soares, P., Gonçalves, A., Silva, A. I., Almeida, D., Figueiredo, S., ... & Guimarães, H. (2018).** Respiratory care for the ventilated neonate. *Canadian respiratory journal*, 2018.
- Sarg, T. (2016).** The Effects of Kangaroo Care on the Neurodevelopment of Preterm Infants in the Neonatal Intensive Care Unit (NICU).
- Shah, R. K., Sainju, N. K., & Joshi, S. K. (2018).** Knowledge, Attitude and Practice towards Kangaroo Mother Care. *Hospital*, 15(14.4), 0-098.
- Sloan, N. L., Ahmed, S., Anderson, G. C., & Moore, E. (2011).** Comment on: 'Kangaroo mother care' to prevent neonatal deaths due to pre-term birth complications. *International journal of epidemiology*, 40(2), 521-525.
- Stuard, W. (2016).** The effects of kangaroo care on a newborn development and vital physiology. *Clinics in Mother and Child Health*, 13(1), 1-4.
- World Health Organization. (2015).** WHO recommendations on interventions to improve preterm birth outcomes.
- Zhang, Y., Deng, Q., Zhu, B., Li, Q., Wang, F., Wang, H., ... & Johnston, L. (2018).** Neonatal intensive care nurses' knowledge and beliefs regarding kangaroo care in China: a national survey. *BMJ open*, 8(8), e021740.