

**EFFECT OF TRAINING ON IMPLEMENTATION OF KANGAROO MOTHER CARE
AMONG HEALTHCARE WORKERS IN MURANGA COUNTY HOSPITAL, KENYA**

**A study proposal submitted in partial fulfillment of the requirements for the degree of
masters of medicine in pediatrics and child health, University of Nairobi**

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DECLARATION

I declare that this proposal is my original work and does not to the best of my knowledge incorporate without acknowledgment, any material submitted for the award of a degree in any other university.

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DEDICATION

This dissertation is dedicated to my family for their support, with special thanks to my late father Abubakar Mohamed, my mother Ureinab Mohamed and my husband Abdulaziz Abdillahi for their encouragement.

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I wish to thank;

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ABBREVIATIONS

KMC: Kangaroo mother care

HCW: Health care workers

MOH: Ministry of Health

WHO: World Health Organization

UNICEF: United Nations International Children's Emergency Fund

KNH: Kenyatta National Hospital

KDHS: Kenya health demographic health survey

FGD: Focused group discussions

CME: Continuous medical evaluation

MCH: Maternal Child Health

OPERATIONAL DEFINITIONS

Preterm baby: A baby born before completed 37 weeks of gestation (WHO)

Low –birth-weight infant: Infant with birth weight lower than 2500g regardless of gestational age.

Kangaroo mother care: A continuous skin to skin contact between the newborn preterm or low birthweight infant for duration between 1hour to 24 hours a day

Health care workers: Personnel involved in care of patients may include nurses, medical doctors and clinical officers.

Quasi experimental design: Also referred to pre and post interventional method used to evaluate effectiveness of a certain intervention. This design differs from a true experimental design with no control group and no random assignment of the participants.

Kangaroo mother care training: An activity that involves teaching and developing skills of kangaroo mother care among targeted health care professionals.

Stable preterm/ low-birth-weight infant: A newborn baby whose vital functions (breathing and circulation) do not require continuous medical support and monitoring.

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ABSTRACT

Background: Care for preterm and low birth weight infants poses a great challenge to the health care providers and their care takers. In order to reach their target weight, low-birth-weight infants are often admitted for a long time increasing the incidence of hospital acquired infections. Additionally, in order to get the required warmth and special care they often share incubators with other sick infants further decreasing their chances of survival due to cross infection. Kangaroo mother care (KMC) is a low cost but effective method which has been shown to significantly reduce morbidity and mortality. The main barrier to KMC is lack of healthcare workers' skills and awareness as evidenced from several previous studies conducted, thus it is important to evaluate simple, practical and scalable approaches to training to improve knowledge and practice.

Primary objective: To assess the impact of a 1- day didactic and competency based KMC training on healthcare workers' knowledge in Murang'a County Referral Hospital.

Secondary objectives: To assess the impact of 1-day didactic and competency based KMC training on practice and to assess barriers and facilitators to KMC implementation.

Study method:

Study design: Quasi-experimental (before and after) study with a qualitative arm.

Study site and subjects and tools: Healthcare workers in Murang'a County Referral Hospital. Baseline knowledge and practice on KMC of healthcare workers was assessed 2 weeks before training. Thereafter, a one day didactic training was conducted and a repeat assessment of their knowledge and practice was analyzed after 2 weeks of training. Focused group discussions with health care workers were used to determine barriers and facilitators to KMC implementation. Data was collected using pre and post training questionnaires, observers' checklist and from focused group discussions. Qualitative data was manually transcribed and translated. Thematic content analysis was analyzed for recurring themes.

Results: Fifty seven (57) participants were recruited in the study out of which 45(79.0%) of the participants were female. Majority of the participants were nurses 37(64.9%) and 56(98.4%) of the health care workers had not undergone training. Fourteen (24.6%) of the participants were

working in the NBU department. Forty seven (82.5%) of the HCWs correctly defined what KMC was before training and 98.2% after training (p value=0.012). Twenty nine (54.7%) HCWs were able to correctly point out criteria for starting KMC before training and 44(81.5%) after training. About two thirds of the participants 35(61.4%) and 39(68.4%) of the HCWs had the correct knowledge on discharge criteria of baby and mother on KMC before training respectively and 57(100%) and 56(98.3%) after training. Approximately half of the HCWs 29 (52.7%) had correct knowledge on readmission criteria for babies on KMC before training and 57(100%) after training.

There was no change in KMC practice as observed on mother infant dyads on KMC before and after training. Majority of the participants pointed out that lack of infrastructure 25(43.9%) and training 19(33.3%) were barriers to KMC implementation in the facility, whereas LBW infants 17(30.4%) and availability of resources 14(24.5%) were facilitators to KMC success.

Conclusion: There was significant change in knowledge noted after training on feeding options for the LBW and preterm infants, admission, readmission, discharge criteria and follow up of babies on KMC. There was however no change noted on KMC practice after training.

Recommendation: Continuous medical education and sensitization on KMC should be done to the healthcare workers and priority offered to those working in maternity and newborn departments.

CHAPTER ONE: INTRODUCTION

It is estimated that every year, 15 million babies are born preterm globally accounting for 11.1% of the annual live births. Sixty percent of preterm births occur in Africa and South Asia accounting to 9.1 million preterm births annually (12.8%) (1). Kenya is ranked 48th among countries with the highest number of preterm births globally with a preterm birth rate of 12.3% (2). Of these, 8% are LBW (3).

Although advances in prenatal and neonatal care have improved the survival for preterm infants, those infants who survive have an increased risk of death and morbidity during childhood as well as delay in both growth and development compared to babies born at term (4). Children born prematurely have higher rates of learning disabilities, psychomotor problems and recurrent respiratory illnesses compared to children born at term. Their growth and developmental milestones are negatively affected and often extend to later life, resulting in educational, psychological, social and medical problems(5). Preterm birth leads to prolonged hospital stay after birth, frequent hospital admissions in the first year of life and increased risk of chronic lung disease putting the parents in social and financial crisis.

Prematurity is the largest direct cause of neonatal mortality, accounting for an estimated 29% of the 3.6 million neonatal deaths every year (6), while in Kenya it accounts for about a third(33%) of neonatal deaths (3). More than 75% of these deaths could be prevented by using low cost and effective interventions such as administering antenatal corticosteroids , essential mother and newborn care during delivery and in the postnatal period and kangaroo mother care(7).

Kangaroo mother care is a low cost ,easy and effective intervention in low birth infants which

was developed in response to overcrowding, and insufficient resources in neonatal intensive care units in 1978 by Edgar Rey Sanabria in Colombia (8). If initiated early, it can significantly decrease mortality and morbidity(9). It has been recommended by WHO as an essential part in newborn care in 2010(10) and has also been endorsed by the MOH, Kenya in 2014. The first KMC units were established in Bungoma and Nairobi counties. Currently 21 out of the 47 counties are practicing KMC in some of their facilities and 663 healthcare workers have been trained in KMC(11). Despite this the rate of KMC utilization could be increased significantly through training and it is important to evaluate simple scalable approaches for such training.

Facility-based KMC is an underutilized, affordable and effective method suited for all premature and LBW babies, particularly those in the developing world, where need is great and resources are scarce. Many LBW babies who are delivered in health facilities do not have access to incubator care which supports an argument for the use of KMC over incubator care in facilities.

According to Kenya KMC clinical implementation guideline 2016, kangaroo mother care can be continuous or intermittent. Continuous KMC takes place when the baby is in the skin to skin position for minimum of 20 hours to a close to 24 hours every day (except for very short periods when the mother has to bathe or use the toilet). Intermittent KMC refers to when the baby is put skin to skin contact for a few hours each day. When not in KMC position, the baby is kept warm in the incubator or is warmly wrapped(12).

KMC training is an important intervention to be taught among HCWs and especially in regions where preterm birth rate is high. This study will aim to assess baseline knowledge, practice gaps and barriers to effective implementation of KMC among healthcare workers in Murang'a County Referral Hospital. Murang'a County falls under Central region which is 2nd countrywide with

high preterm births(3). This study will also assess the impact of KMC training on the HCW's knowledge and practice.

1.1 Kangaroo mother care consists of key four elements (10)(12):

1.1.1 Kangaroo position

Babies on KMC should be dressed in socks, nappy and a cap and placed between the mothers' breasts with skin to skin contact. The babies' head should be turned to one side in a slightly extended position, hips in a frog like position and arms flexed. Finally the babies should be secured onto mothers' chest with a clean soft cloth.

It has been proven from several studies from low income countries that babies placed in the KMC position are able to achieve early initiation of breastfeeding and hence faster weight gain(13). Mwendwa *et al* conducted a randomized control study among preterm neonates in KNH and demonstrated that babies on KMC were discharged earlier as compared to those on conventional care. The duration of hospital stay among the study groups was 16.3 days in the KMC group and 18.1 days in the control group. KMC group infants achieved higher growth rates as shown by higher mean weight gain of 22.5g/kg/day in comparison to the control group which achieved mean weight of 16.7g/kg/day (P value < 0.001) (14). This position has also been proven to be beneficial in thermal control, metabolism for the newborn LBW babies and to provide psychological stability of the mothers caring for the low birth weight infant(15)(16).



Image 1. 1: kangaroo position (researchgate.net)

1.1.2 Kangaroo nutrition

The babies on KMC should be exclusively breastfed on demand for 6 months and frequently, every 2-3 hours. Those unable to suckle or weigh less than 1500g should be fed with alternative methods like via cup and nasogastric tube.

1.1.3 Kangaroo discharge

The babies should be discharged when the mother is willing, confident to continue KMC care, able to breastfeed or express milk and finally has support from the family. Similarly the baby should have consistently gained 15g/kg/day for 3 consecutive days, has regained birth weight and weighs at least 2000g, able to breastfeed /feed via cup and finally the overall condition of baby is stable. Mothers on KMC should still be followed up at least weekly for 4 weeks to promote adherence and practice of KMC. As evidenced from a longitudinal study conducted by Samuel Blayet *et al* conducted a longitudinal study among 202 mothers and their inpatient LBW infants from November 2009 to May 2010 in 2 hospitals in Kumasi concluded that at recruitment 11.4% mothers knew about KMC, at discharge 95.5% and 93.1% were willing to continue with KMC at home and practice at night. It was also noted that over the four weeks more mothers

were increasingly practicing KMC at night($P=0.005$), outside their homes($P < 0.001$) and received spousal help($p=0.007$)(17).

1.1.4 Kangaroo support

Mothers on KMC should be offered support from health staff, family members and most importantly the male partners should be involved right from preconception to actually participate in KMC. A longitudinal study by Er Mei Chen et al among 83 first time fathers conducted at a regional teaching hospital in Taiwan demonstrated that participants in the experimental group who received skin to skin contact with the fathers had a higher mean Father- Child Attachment Scale as compared to those in the control group (18).

CHAPTER TWO: LITERATURE REVIEW

2.1 KMC training

Effective clinical training should be planned and facilitated according to the principles of adult learning. They should actively be involved in the learning and be able to relate it to their work. This kind of training should apply behavior modeling, competency-based and humanistic training techniques.

Training healthcare workers involved in newborn care is an integral aspect in KMC implementation yet many studies have shown that a large proportion of healthcare workers are undertrained. A study conducted by Nasheetah *et al* in Eastern Sub-district of Cape Town among neonatal nurses on knowledge and attitude of KMC, concluded that 60% of the nurses had not received KMC training(19).

Both local and contextual pathways of training have been suggested by Bergh *et al*. It was noted that participants recognized that implementation depended on context with the development of locally relevant education models with incorporation of universal aspects of KMC. Similarly, training was required to be flexible and individualized, and that the choice of educational and implementation modalities should match the technology and resources available in a particular setting(20).

Bergh *et al* also demonstrated in a randomized controlled trial (RCT) on offsite versus on site facilitation methods on KMC implementation and concluded that no significant difference was found between the two methods($p=0.633$) (21).

One-day training has been found to be sufficient in improving health workers knowledge on KMC. Parikh *et al* conducted a study to assess improvement in knowledge on KMC amongst 95

health care workers caring for newborn babies following 1 day based skills training. He noted significant change in knowledge in all aspects of KMC (P value<0.001)(22).

Harmesh Singh et al also demonstrated from a cross sectional study immediate cognitive impact of KMC workshop on Sixty three final professional medical students at a Neonatal unit of a teaching hospital in India following 1 hour lecture and demonstration(23).

2.2 Knowledge on KMC

Knowledge on KMC among health care workers is paramount to its effective implementation. Most health care workers lack basic knowledge on the benefits, technique, discharge and follow up criteria of KMC.

As evidenced from a cross sectional descriptive study conducted on 67 nurses selected from the four main hospitals in the Tamale Metropolis, Ghana which determined that only 23.9% of nurses were able to define what KMC means. Similarly only 46.3%, 29.9% and 50.7% of nurses were able to identify exclusive breastfeeding, early discharge and family support as part of KMC components respectively(24).

In another study conducted by Parikh et al involving 95 participants among them were 65 pediatric and obstetric nurses, 30 pediatricians and obstetricians demonstrated that only minority of them had adequate knowledge on KMC components and significant improvement was noted following 1 day training with 72% now being aware of the KMC components (p<0.001) (22).

Harmesh Singh *et al* conducted a cross sectional study among 63 final professional medical students in neonatal unit of a teaching hospital. A pretest questionnaire was issued to them and 54% of the participants scored zero. Following 1 hour workshop on KMC, immediate cognitive impact on knowledge was demonstrated with 46% participants scoring 100% (22).

In Uganda, Namazzi *et al* conducted training on KMC in one district hospital and 19 lower-level facilities among healthcare workers as part of health strengthening system strategy. Seventy percent of eligible health workers were trained. Health workers' skills and competency improved after mentoring and supervision. The mean post-training knowledge score was 68% compared to 32% in the pre-training test, and increased to 80% one year after implementation. KMC unit was introduced during the implementation phase. Of 547 preterm babies admitted to the newly introduced kangaroo mother care (KMC) unit, 85% were discharged alive to continue KMC at home and in hospital neonatal mortality rate declined from 17% in first quarter to 9% in the last quarter (25).

In Kenya a study was conducted by Bogonko *et al* among 88 healthcare workers including nurses, clinical officers and medical officers. Following 2 days of training, there was improvement in level of knowledge on breastfeeding during KMC from 55% to 79% (p value=0.000) and also knowledge of early discharge of babies on KMC improved from 43% to 63% (p value=0.003)(26).

2.3 KMC practice.

Despite healthcare workers having knowledge on KMC, its practice is still low as evidenced from cross sectional study by Deng *et al* conducted among 830 neonatal nurses. The study was conducted on an online platform where the participants filled the questionnaires and concluded that only 48.2% reported practicing KMC in their units (27).

Similarly a national survey conducted by Engler AJ *et al* on practice, knowledge, barriers and perception of KMC in 1,133 hospitals in the United States among nurses concluded that 82% of the respondents reported practicing KMC (28).

Adzitey *et al* also demonstrated from cross sectional study among neonatal nurses from 4 referral hospitals in Ghana that only 37.3% of nurses are highly enthused when assisting mothers in practicing KMC and 50.7% insist on mothers to practice KMC if they do not respond to persuasion(24).

In Ethiopia a national cross-sectional survey of all public hospitals, health centers and private facilities was conducted to assess KMC quality. Of the 768 LBW babies included in this analysis, only 356 (46.4%) received KMC. A total of 102 (13.3%) were put in incubators, and 368 (47.9%) LBW babies received neither service(29).

In Kenya a study conducted by Muriianki *et al* in Kenyatta National Referral Hospital in newborn unit indicated that KMC practice was at 59%. Only intermittent KMC was practiced; the mean duration of skin to skin contact (SSC) was 2.3 (± 0.91) hours a day (30).

Similarly, another study conducted by Bogonko *et al* among 88 healthcare workers in Northern district hospitals of Eldoret, Kenya demonstrated that 80% of HCWs assisted mother to practice KMC before training and 92% of HCWs were noted to practice KMC after training(26).

In all studies conducted to assess level of KMC practice the researchers proposed the need for more training and interactive workshops to improve its implementation.

2.4 Barriers and facilitators to KMC practice

KMC implementation faces many changes both at the facility and community level. As evidenced from the systematic reviews by Grace J Chan *et al* from 1st Jan 1960 to 19th August 2015, the main barriers to KMC implementation were lack of social support from partners, community and health care workers. Similarly high workload of healthcare workers hindered provision of KMC education to the mothers(31).

It was also noted from the multi country analysis on KMC implementation bottlenecks that limited information is available on human resources required to provide KMC services at different levels of health facilities and to promote skin-to-skin care in the community. Therefore it was recommended that KMC and other competency based maternal and newborn care should be incorporated into pre-service education and not relying on high cost, time-consuming, in-service training model (32).

Seidmana et al conducted a systematic review on barriers and enablers of KMC practice. Lack of a conducive environment, negative attitudes of staff, lack of help with KMC practice and low awareness of KMC were among the top ranked barriers to KMC practice and implementation. Whereas, mother-infant attachment and support from family, friends, and other mentors were termed as enablers to practice KMC(33).

In Kenya a cross sectional study conducted by Murila F et al among 155 healthcare workers on barriers and motivator to KMC using a structured questionnaire issued to the health care workers before workshop organized by the MOH , UNICEF AND WHO demonstrated that, the main barriers to KMC practice were inadequate skills (59%) and reluctant healthcare workers (11%) respectively(34).

In another study conducted by Muriangi et al in KNH determined that facilitators to KMC practice were positive perception and peer support where as healthcare facility factors, social support for mothers, limited time provided for KMC and medical concerns of both the mother and the baby were perceived to be barriers to KMC practice (30).

2.5 Conceptual framework

The figure below represents the conceptual framework for the study on effect of training on implementation of kangaroo mother care in Murang'a County Referral Hospital. It addresses how an intervention (training health care workers on KMC) can improve the knowledge and finally its practice.

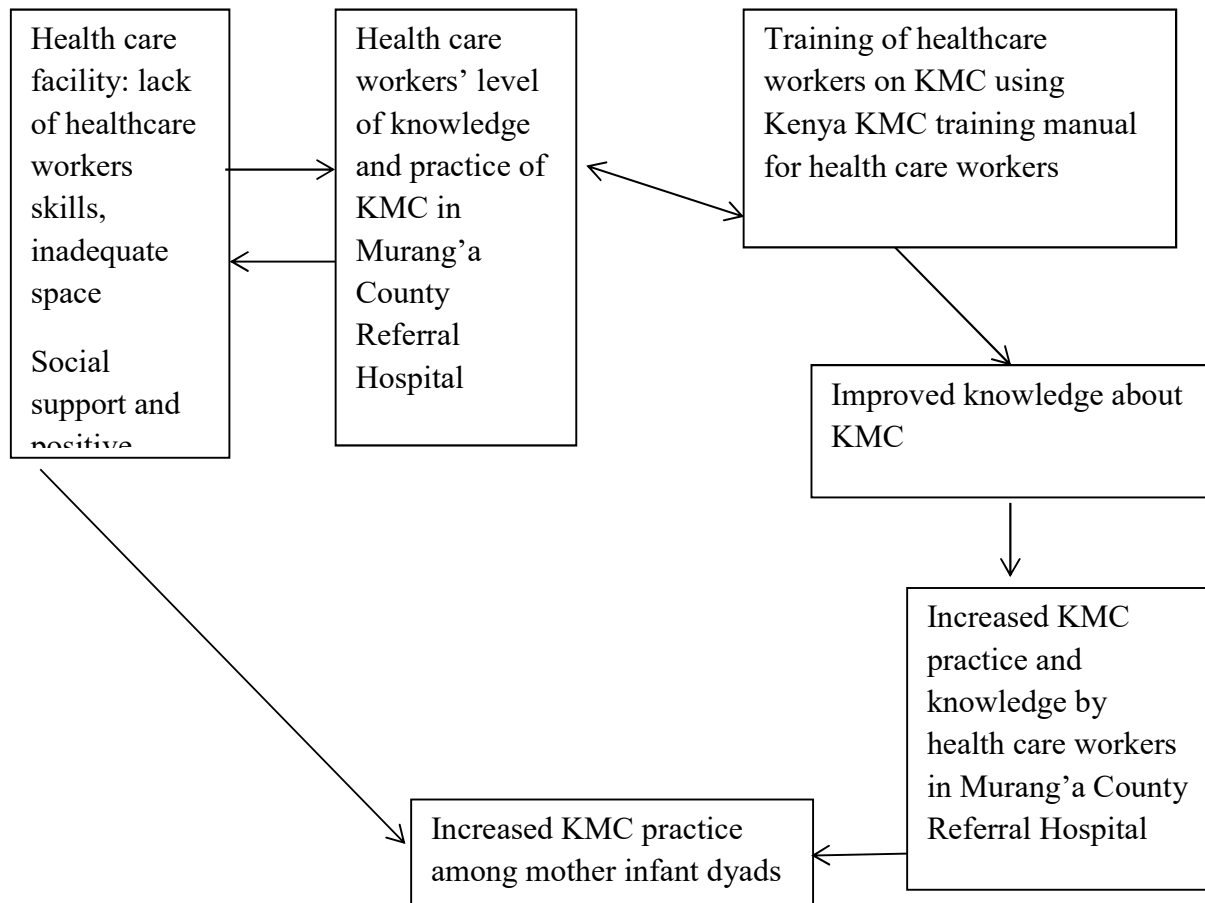


Figure 2. 1:Conceptual framework by T.A.M. (not published)

2.6 Justification and utility

Kangaroo mother care has consistently been shown to be safe and effective low-cost intervention in the care of premature low-birth weight infants(9)(13).

National KMC uptake is still low about 55% despite several measures put in place by the Ministry of Health Kenya in setting up of KMC units countrywide, therefore more sensitization and training is required(35). Similarly, Muriangi et al also found an uptake of 59% of KMC and 57.8% of the HCWs had no KMC training at KNH.

Several previous authors have proposed for need for HCWs' training to aid in its implementation rate(30)(34) .This study will aim to assess the improvement in implementation of the guidelines after training the HCWs and will inform the design of programs for implementing and promoting practice of KMC in Kenya.

The level of KMC knowledge and practice among health care workers in the county hospitals in Central region part of Kenya is unknown. In addition it is also not clear what effect of KMC training will have on their knowledge and practice.

This study will be conducted to assess baseline knowledge and practice of KMC among health care workers and effect of training of KMC in Murang'a County Referral Hospital. The study will help in the identification of knowledge and practice gaps and inform decision of intervention programs to help in the implementation of KMC.

2.7 Research question

What is the effect of training on implementation of kangaroo mother care among healthcare workers in Murang'a County Referral Hospital?

2.8 Research objectives

2.8.1 Primary objective

1. To assess impact of a 1-day didactic and competency based KMC training on knowledge among HCWs in Murang'a county hospital.

2.8.2 Secondary objectives

- 1) To assess impact of 1-day didactic and competency based KMC training on practice among HCWs in Murang'a county hospital.
- 2) To assess barriers and facilitators to implementation of KMC among HCWs in Murang'a county hospital.

CHAPTER THREE: STUDY METHODOLOGY

3.1 Study design

This study utilized a quasi-experimental design with a qualitative aspect. Kirkwood method was used to compare knowledge and practice among healthcare workers before and after training. Focused group discussions were conducted to ascertain barriers and facilitators to KMC implementation.

3.2 Study site

This study was conducted in newborn, maternity, pediatric units and MCH clinic in Murang'a County Referral Hospital. The hospital offers maternity and newborn care services. The hospital also serves as a referral center to sub county hospitals, health centers and dispensaries from Northern and Southern region of Murang'a County. The hospital has approximately 80 healthcare workers working in newborn, maternity, pediatric units and MCH clinic .The newborn unit has a 30 bed capacity with only 5 incubators. It also houses a 3 bed capacity separate room for continuous KMC. Majority of the mothers practice intermittent KMC. The newborn unit is run by 1 general pediatrician, 2 medical officers, 2 medical officer interns, 4 clinical officer interns and 8 nurses.

3.3 Study population.

3.3.1 Inclusion criteria:

- Health care providers (nurses, clinical officers and medical officers) working both in out-patient and in-patient sections , who give consent to participate in the study during the pre-test, training and post-test and are involved in newborn care in Murang'a County Referral Hospital.

- Stable mother –infant dyads practicing KMC.

3.3.2 Exclusion criteria

- Healthcare workers (nurses, clinical officers and medical officers) on leave or absent during the training.

3.4 Study period

The study was conducted over a period of 3 months from July, 2020 to September,2020.

3.5 Sample size determination

Using a formula for pre and post comparison studies by Kirkwood and Sterne medical statistics, power of 80% and 0.05 level of significance will be used to calculate sample size.

$$n = \frac{\{u \sqrt{[\pi_1(1 - \pi_1) + \pi_0(1 - \pi_0)]} + v\sqrt{[2\bar{\pi}(1 - \bar{\pi})]}\}^2}{(\pi_0 - \pi_1)^2}$$

Figure 3. 1: Sample size estimation formula

U = 0.84 with power 80%

V = 1.96 (95% C.I)

$$\pi = (\pi_0 + \pi_1)/2$$

π_0 = Percentage of HCWs with knowledge on KMC before training (43%) (Bogonko *et al*).

π_1 = Percentage of HCWs with knowledge on KMC after training (63%) (Bogonko *et al*).

n = 58 HCW for each phase (before and after training)]

However, 80 healthcare workers were sampled in total. 15 healthcare workers did not respond to the pre training questionnaire and 8 did not give consent to participate in the study. Therefore, 57 healthcare workers were included in the final analysis.

3.6 Sampling method

3.6.1 Quantitative sampling

3.6.1.1 Health Care Workers sampling

All healthcare workers working in newborn, pediatrics, maternity wards and MCH clinic were sampled and recruited into the study. The matron in charge and medical superintendent of the hospital were approached for contacts of nurses and clinicians working in the newborn, pediatric, maternity wards and Maternal and Child Health clinic. Those sampled were approached for consent via text messages with a link. The healthcare workers who gave consent were inquired on their availability for the training.

3.6.1.2 Mother- infant dyads

The mother infant dyads practicing KMC who were stable and gave consent were included in the study.

3.6.2 Qualitative sampling method

We conducted 2 focused group discussions each with 6 healthcare workers. Each group included 3 nurses and 3 medical officers. Purposive sampling of health care workers was done taking into account on their availability. Those selected were then categorized according to their working year experience. Those selected gave consent to participate in the FGD.

3.7 Study tools

- a. Observers' checklist adopted from Kenya KMC clinical guidelines and KMC save the children guidelines.
- b. Questionnaire adopted and modified from Kenya KMC clinical implementation guidelines and Kangaroo mother care progress monitoring tool.
- c. FGD topic guide

3.8 Study procedure

The research assistant was trained by the principal investigator on quantitative data collection method. The list and contacts of the eligible health workers were obtained from the Nursing officer in charge of the facility.

The principal investigator with the research assistant then visited the newborn unit and KMC practice was observed for a period of 2 weeks using observation tool adopted from Kenya KMC clinical implementation guide which included observation of correct KMC position, HCWs' support in demonstrating KMC, breastfeeding and newborn care practice by mothers.

All the HCWs were contacted on phone for consent to participate in the study and a link with consent form was sent via a text message. The healthcare workers who gave consent were issued with the online based pre training questionnaire.

After assessing their knowledge from the self-administered questionnaire, training via online platform was conducted as scheduled. The training was conducted via zoom platform and a reminder via text message was sent prior to the planned date to remind them. The healthcare workers were provided with financial support to enable them access to the online training. The content of the training sessions was adopted from WHO essential newborn care training course

2010 module 5 session 14 format on KMC(10) and Ministry of Health Kenya KMC training manual for healthcare workers 2018. Video links were shared together with the link to the training to be watched prior to the scheduled training. The video links were on appropriate KMC position and feeding during KMC.

2 weeks after training all those who participated in the online training were called and then issued with similar post training questionnaire. The questionnaires were administered online via web based platform. With the help of the research assistant observation of KMC practice was also conducted using the similar observers' checklist over a period of 2 weeks after the 1-day training. The period of 2 weeks before and after the training was selected to allow for a wider range of experiences with different mothers and healthcare workers.

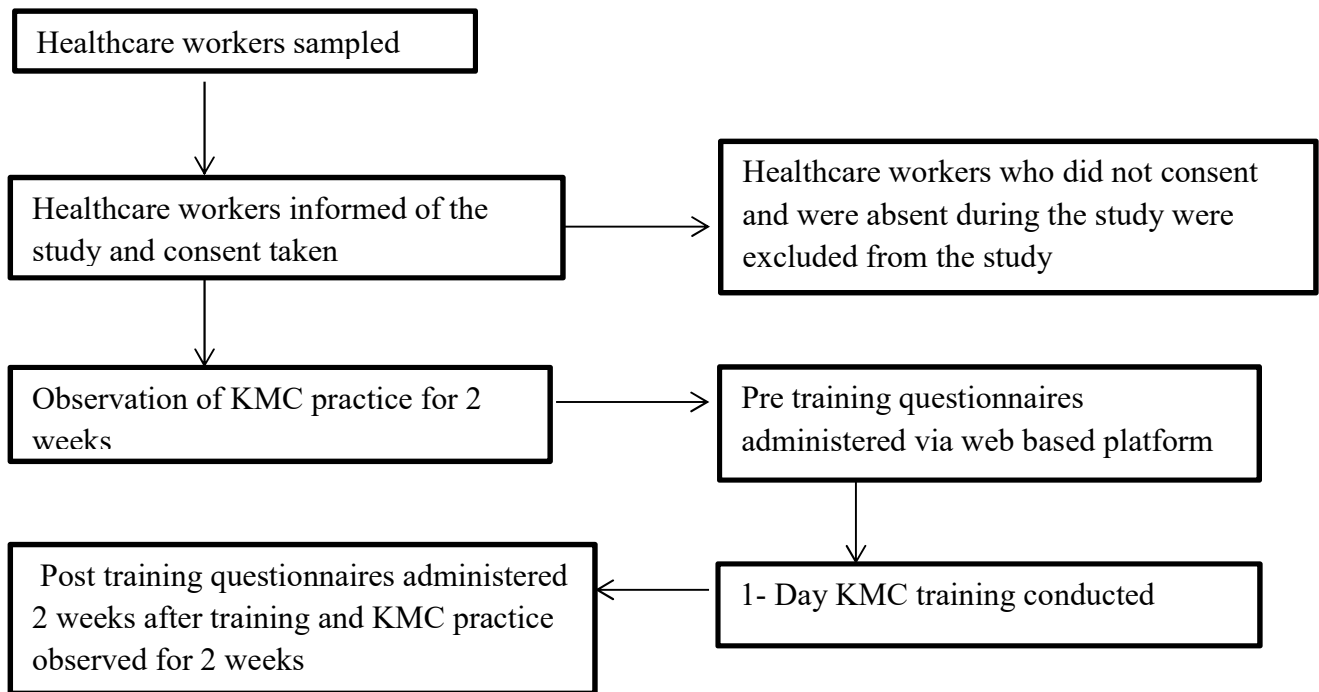


Figure 3. 2: Showing study procedure

Table 3. 1: KMC training schedule

<p>Training was conducted in 3 sessions and in form of power point presentation. The details obtained to prepare power point presentation were derived from Kenya KMC clinical guidelines 2018 and WHO essential newborn care course training manual 2010 (see appendices). Prior to start of the training, the participants were educated on basic ground rules for using zoom platform.</p>
<p>Session one</p> <p>It included power point presentation with the following objectives captured:</p> <ol style="list-style-type: none">1. Introduction to kangaroo mother care for low birth weight babies2. The practice of kangaroo mother care and skin to skin care3. Feeding and newborn care during kangaroo mother care4. Kangaroo mother care discharge and follow-up5. Counselling on kangaroo mother care
<p>Session two:</p> <p>All the participants (57 HCWs) were assigned and allocated to a zoom break-out room. There were 4 break-out rooms with approximately 15 participants in each room.</p> <p>During this session, each group was allocated with two trainers to discuss the case scenarios and simulations. The case scenarios and simulations were derived from Kenya KMC training manual for healthcare workers.</p>
<p>Session three.</p> <p>All the participants returned to the plenary room to view a video from Global Media Project on kangaroo mother care position and how to keep small baby warm.</p> <p>The session was then concluded with questions from the participants and summary of the training given.</p>

3.9 Data collection procedure

3.9.1: The questionnaire

The self-administered questionnaire adopted and modified from the Kenya KMC clinical implementation guidelines and KMC progress monitoring tool was used(36). The questionnaires were prepared in English and focused on demographics and their knowledge on KMC. The questionnaire consisted of 10 open and close ended questions. For each correctly answered question the participant earned 1 point. Questions not correctly answered or left blank earned zero point. The total points earned were then calculated as percentages. Being a quasi-experimental study with a qualitative arm, a question on barriers and facilitators to KMC implementation was included in the questionnaire to integrate the two arms of the study.

3.9.2 Focused group discussions

Those identified to participate in the FGD were given a detailed explanation of the study and were invited via a text message to take part in process. The participants received a phone call prior to the scheduled meeting to confirm attendance. Prior to commencing the FGD, HCWs were required to fill their demographic data in a brief questionnaire which was sent via a link. The FGD was conducted in English in person or via zoom platform. The questions were obtained from FGD topic guide that contained 5 open ended questions.

The FGD was conducted in four stages:

Stage 1 Scene setting and ground rules: the research team welcomed participants as they logged in for the FGD. Once the group was complete, the principle investigator formally started the FGD by introducing herself and stated the research topic and the purpose of the study. The principle investigator then explained to the participants that they were all invited to give their own point of view during the discussion as there was no right or wrong answers. Participants

were also asked to respect each other's' opinions and to allow one individual to speak at a time. The PI informed the participants that the discussion will be audio or tape recorded and that records will be kept confidential and will be utilized only for study purposes. The participants who agreed to the rules signed a consent form and participated in the FGD. The participants were called prior to FGD for consent and then a link with a consent form was sent via text message. The research assistant then started voice recording.

Stage 2: The opening topic: the PI engaged the participants by introducing the topic. She inquired about the participants' views and opinions on KMC.

Stage 3: Discussion: the participants will be involved in in-depth discussion of the study topic using FGD topic guide containing open ended questions. Formulation of further questions and comments were done based on the participants' responses as the PI probed deeper until data saturation was achieved.

Stage 4: Ending the discussion: the PI concluded the discussion by thanking the group for their participation.

3.10 Quality assurance procedures

All the information gathered from the questionnaires was saved and was accessible to the principal investigator and the research assistant. The questionnaires were also checked regularly after data collection to ensure no initials are written on them to ensure anonymity and confidentiality. The audio recording and transcripts obtained from FGD were also kept away to ensure confidentiality. During FGD participants were allocated identifiers in form of number to ensure anonymity so that no name was captured from the audio recorder. The principal

investigator and the research assistant moderated the FGD to ensure all the objectives were addressed and assisted when challenges arose.

3.11 Ethical consideration

Ethical approval was obtained from the ethic and regulatory commission of Kenyatta National Hospital and University of Nairobi. The approval obtained was then used to ask for permission from county director of health Murang'a County. The introductory letter obtained from the county was issued to the medical superintendent and matron in charge of the Murang'a County Referral Hospital before beginning of the study.

Mother -infant dyads on observation were ensured that they are stable enough to practice KMC to prevent any harm on both the mother and the infant. If the principal investigators with the research assistant found incorrect KMC practice during observation of the mother-infant dyads they ensured that it was rectified.

3.12 Data management and analysis

3.12.1 Quantitative data

Data obtained was coded and analyzed using stata version 11. The characteristics of the study participants were analyzed as frequency expressed in percentages. The proportion of healthcare workers with correct knowledge on various aspects of KMC was expressed in percentages. Knowledge of HCWs was measured by percentages and the score was measured in points. In order to get the overall knowledge of HCWs median and interquartile ranges were used.

For change in knowledge of HCWs in pre and post training Mcenamar test was used where as for change in points scored by HCWs during pre and post training paired t test was used. Odd ratios with their confidence intervals were also used to characterize the level of significance. Paired t

test was used to analyze practice using the points scored using the checklist during pre and post training.

3.12.2 Qualitative data

Data was obtained from focused group discussions. Data was analyzed manually and transcribed verbatim. It was then coded into categories of factors affecting KMC practice. The themes were analyzed and classified into barriers and facilitators to KMC practice. Similar codes obtained were established to produce concept.

3.13 Dissemination of study findings

The study findings were disseminated to:

1. Ministry of health child and adolescent health department
2. County director of health Murang'a county
3. Medical superintendent Murang'a County Referral Hospital

3.14 Study limitations

- I. Mobilization of health care workers was challenging and was difficult to assess them in one sitting since some were engaged in their work duties
- II. Evaluation of kangaroo mother care practice among healthcare workers 2 weeks after training may not have revealed its actual effect thus a longer duration of time was required. Also some of the HCW trained in KMC were absent during the 2 weeks of reevaluation.
- III. There was an element of bias during observation of KMC practice among mother infant dyads , in that the healthcare workers tried to demonstrate best practice in front of the principal investigator.

CHAPTER FOUR: STUDY RESULTS

4.1: Descriptive analysis of sample characteristics

A total of 80 healthcare workers were approached to take part in the study. Of these, 23 healthcare workers were excluded: 8 healthcare workers did not give consent to participate in the study and 15 did not respond to the pre training questionnaire. A total of 57 HCWs were included in the study and underwent training.

Table 4. 1 shows the characteristics of study population (n=57)

Characteristics	Frequency (%) Median (IQR)
Gender	
Female	45(79.0)
Male	12(21.0)
Age in years	
20-29	24(42.1)
30-39	15(26.3)
40-49	9(15.8)
>50	9(15.8)
Cadre	
Clinical officer interns	13(22.8)
Medical officer interns	6(10.5)
Medical officer	1(1.8)
Nurses	37(64.9)
Department	
Antenatal ward	8(14.0)
Labour ward	12(21.1)
Medical ward	2(3.5)
New Born Unit	14(24.6)
Gynecological ward	4(7.0)
Pediatric ward	13(22.8)
Post-natal ward	2 (3.5)
MCH clinic	2(3.5)
Working experience in years	
Intern	13(25.5)
0-5 years	13(25.5)
5-10 years	11(21.6)
>10 years	14(27.5)
Recent training	
Yes	1(1.8)
No	56(98.4)

Forty five participants (79.0 %) were female and majorities were aged between 20-29 years. Thirty seven (64.9%) HCWs were nurses, while those working in NBU and Labour ward were 14(24.5%) and 12(21.0%) respectively. Majority of the participants 56(98.4%) had not undergone training at the time of the study. Fourteen (27.5%) HCWs had a working experience of more than 10 years.

4.2: Descriptive characteristics and analysis of kangaroo mother care knowledge among healthcare workers

Fifty seven (57) healthcare workers who responded to online based pre training questionnaire underwent training. Their knowledge on various aspects of kangaroo mother care was determined before and after training which was also conducted on an online platform.

The descriptive data on kangaroo mother care knowledge was later compared to show significant of the training. McNemar test of significance was used to compare the pre and post data.

Forty seven (82.5%) HCWs were able to correctly define what KMC entails before training and 56(98.2%) after training. Only 24(42.1%) and 51(89.5%) of the HCWs correctly defined intermittent and continuous KMC respectively before training and 45(79.0%) and 55(96.5%) of the HCWs after training respectively. Twenty nine (54.7%) HCWs were able to correctly point out criteria for starting KMC before training and 44(81.5%) after training. Forty HCWs (70.2%) had the correct knowledge on the minimum time a KMC session should last and 48(84.2%) after training.

All 57 (100%) healthcare workers had correct knowledge on the frequency of feeding of the preterm and low birth weight babies on KMC before training. Approximately half of the participants 31(54.4%), 38(66.7%) and 21(49.1%) of the healthcare workers had the correct

decision to feed babies on KMC via nasogastric, breastfeeding and cup respectively before training and 55(96.5%), 56(98.3%) and 52(91.2%) after training.

Forty six (80.7%) HCWs were able to correctly point out the frequency of weight monitoring before training and 81.7% after training. Similarly 17.5% of the healthcare workers correctly stated the ideal weight to be gained by the LBW babies on KMC and 43(75.4%) after training.

About two third 35(61.4%), 39(68.4%) HCWs had the correct knowledge on KMC discharge criteria of baby and mother before training and 100%, 98.3% of the HCWs after training respectively. Only 11 (19.3%) HCWs had the correct knowledge on frequency of follow up for babies discharged on KMC and 35(61.4%) after training. Thirty nine (68.4%) HCWs knew that babies discharged on KMC can be readmitted into KMC and 98.3% after training. Twenty nine (52.7%) participants had correct knowledge on readmission criteria for babies on KMC and 100% after training.

Table 4. 2: KMC Knowledge among health workers

Characteristics	Pre training n=57(%)IQR median	Post training n=57(%)IQR median	P value	Odds ratio(CI)
Correct knowledge of KMC				
Yes	47(82.5)	56(98.2)	0.012	0.84(0.74-0.95)
No	10(17.5)	1(1.8)		
Correct knowledge of intermittent KMC				
Yes	24(42.1)	45(79.0)	0.0002	0.53(0.38-0.74)
No	28(45.9)	12(21.0)		
Correct knowledge of continuous KMC				
Yes	51(89.5)	55(96.5)	0.01573	0.93(0.84-1.03)
No	6(10.5)	2(3.5)		
Correct criteria for starting KMC				
Yes	29(54.7)	44(81.5)	0.006	0.68(0.52-0.90)
No	28(45.3)	10(18.5)		
Correct minimum time KMC session should take				
Yes	40(70.2)	48(84.2)	0	18(2.68-120.92)
No	17(19.8)	7(15.8)		
Correct benefits of KMC to infants				
Yes	53(93.0)	57(100)	0.0455	0.93(0.87-1.00)
No	4(7.0)			
Correct benefits of KMC to mother				
Yes	46(80.7)	57(100)	0.009	0.81(0.71-0.92)
No	11(19.3)			
Correct decision to feed via NGT				
Yes	31(54.4)	55(96.5)	0	0.56(0.44-0.72)
No	26(45.6)	2(3.5)		
Correct decision to feed via breastfeeding				
Yes	38(66.7)	56(98.3)	0.0001	19(2.54-141.93)
No	19(33.3)	1(1.7)		
Correct decision to feed via cup				
Yes	28(49.1)	52(91.2)	0	0.54(0.40-0.72)
No	29(50.9)	5(8.8)		

Table 4. 3: KMC Knowledge among health workers (Continuation)

Characteristics	Pre training n=57(%)IQR median	Post training n=57(%)IQR median	P value	Odds ratio(CI)
How often should babies be weighed				
Daily	46(80.7)	46(81.7)	1	1(0.82-1.22)
Don't know	3(5.3)			
Alternate days	8(14.0)	11(19.3)		
Ideal weight gain per kg/day				
10 grams	39(68.4)	14(24.6)	0	0.42(0.28-0.63)
15 grams	10(17.5)	43(75.4)		
Don't know	8(14.1)			
Correct criteria to discharge baby on KMC				
Yes	35(61.4)	57(100)	0	0.61(0.50-0.75)
No	22(38.6)			
Correct criteria to discharge mother on KMC				
Yes	39(68.4)	56(98.3)	0.0001	0.70(0.58-0.84)
No	18(31.6)	1(1.7)		
Frequency of follow up after discharge				
Weekly	11(19.3)	35(61.4)	0	0.31(0.18-0.54)
2 weekly	39(68.4)	22(38.6)		
Don't know	7(12.3)			
Until what weight are they followed up				
2500g	37(64.9)	52(91.2)	0.0006	5(1.79-13.97)
3000g	16(28.1)	2(5.3)		
Don't know	4(7.0)	3(3.5)		
Can babies be readmitted to KMC				
Yes	39(68.4)	54(94.7)	0.0006	0.72(0.60-0.87)
No	18(31.6)	3(5.3)		
Correct criteria for readmission to KMC				
Yes	29(52.7)	57(100)	0	7.33(2.56-20.90)
Don't know	8(14.6)			
No	18(32.7)			

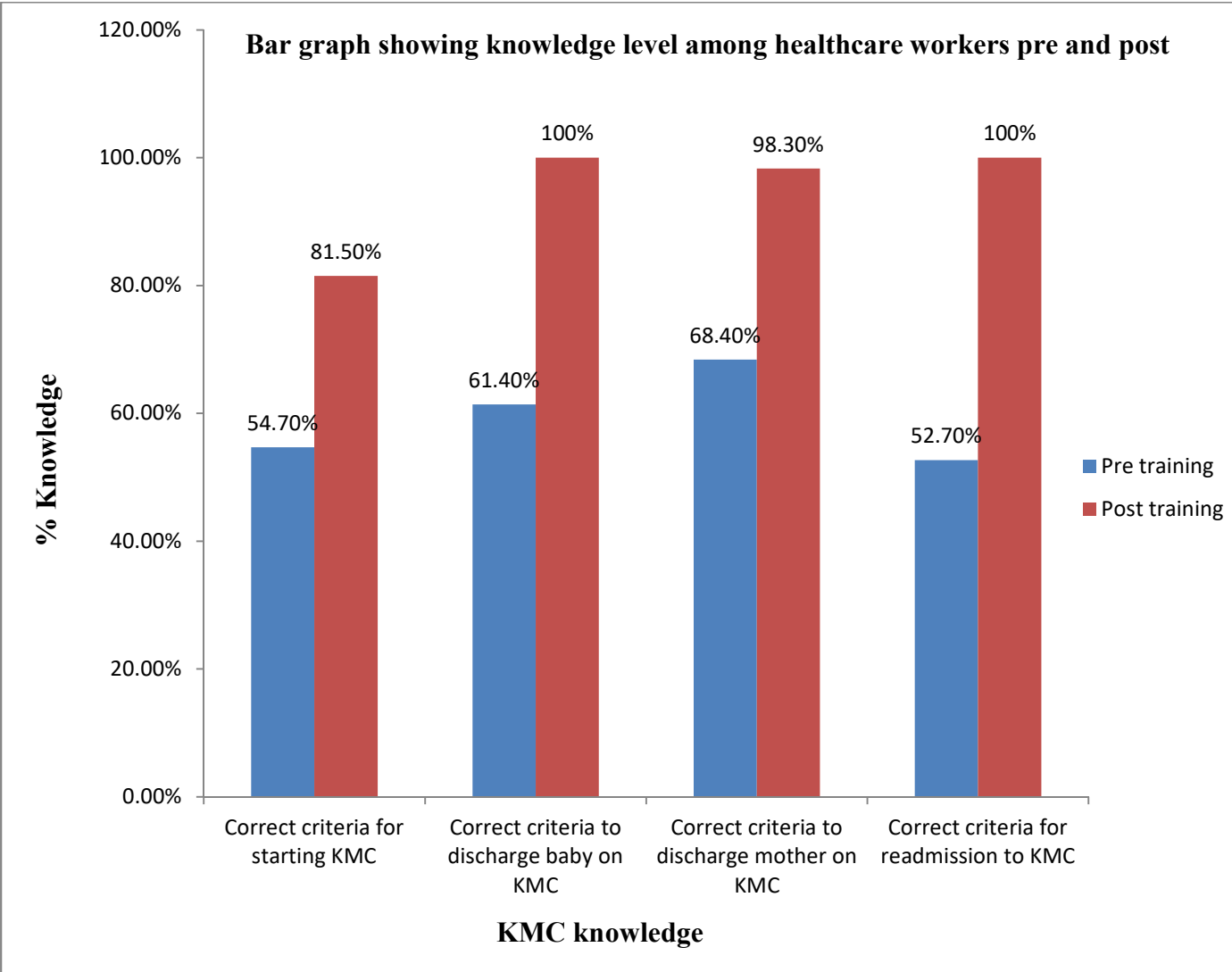


Figure 4. 1: KMC knowledge among healthcare workers before and after training

4.3: Additional results

4.3.1: Overall KMC knowledge score

The participants scored 60.3% overall on various components of KMC before training and 92.4% after training. The overall KMC knowledge score among nurses was 52.6% before training and 87.2% after training. The medical officer scored 76.9% before training and 100%

after training. The clinical officer and medical officer interns scored 66.8% and 46.2% respectively before training. After training their scores were 94.0% and 92.3% respectively.

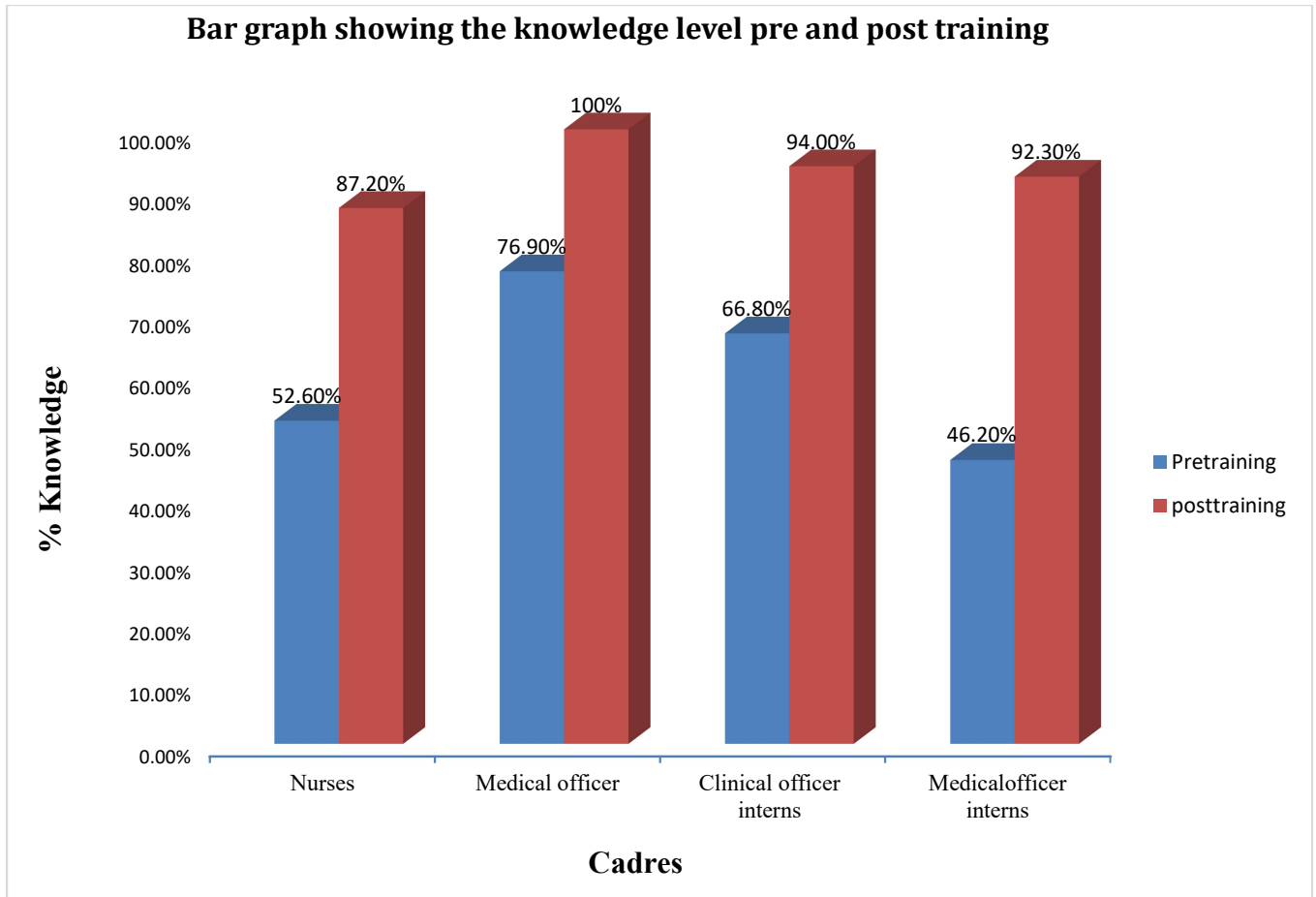


Figure 4. 2: Overall KMC knowledge score according to cadre

4.4: Kangaroo mother care practice among mother-infant dyads

Fifteen (15) mother-infant dyads were observed before and after training and a checklist completed. The average time of observation was 30 minutes per participant. The observer documented that all aspects were done correctly both before and after the training.

4.5: Barriers to kangaroo mother care implementation

Majority of the healthcare workers pointed out that lack of infrastructure and training were barriers to KMC implementation in the facility,

Table 4. 4: List of barriers to kangaroo mother care implementation (n=57)

Barriers to KMC implementation	Frequency (%)
Lack of infrastructure	25(43.9)
Lack of training	19(33.3)
Uncooperative mothers	10(17.5)
Unstable mothers	4(7.0)
Don't know	2(3.5)

4.6: Facilitators to kangaroo mother care implementation

Majority of the health care workers pointed out that low birth weight infants and availability of resources and infrastructure were facilitators to KMC implementation at the facility.

Table 4. 5: List of facilitators to KMC implementation (n=57)

Facilitators to KMC implementation	Frequency (%)
Low birth weight infants	17(30.4)
Availability of resources and infrastructure	14(24.5)
Health workers knowledge	13(22.8)
Cooperative mothers	10(17.5)
Don't know	2(3.5)

4.7: Qualitative data

We conducted 2 FGDs with HCWs providing services within the newborn unit at Murang'a County Referral hospital. We interviewed 11 healthcare workers (HCWs), who included nurses and doctors. We explored experiences supporting Kangaroo mother care (KMC) services to preterm and low birth weight babies with a focus on barriers and facilitators.

4.7.1: Facilitators to implementation of KMC

The facilitator to KMC that were discussed by the HCWs included Parental-level factor and Provider-level factors.

4.7.1.1: Mother to mother support approaches are useful to KMC implementation

Both groups of HCWs reported that mothers had influence over one another and it was easy for them to motivate each other for successful uptake and implementation of KMC. They also noted that there will be increased acceptability of this practice if mothers hear it from fellow mothers. In addition, they observed that mothers who had successfully gone through KMC and been successfully discharged from hospital after their babies gained weight could motivate the mothers who are being educated and counseled in preparation for KMC.

“I also noticed something else, that a mother who has been through KMC and has been discharged from the hospital; if that mother is able to talk to the mothers in the KMC room, that gives more hope to them because she will be able to associate with them at their level and they will be able to ask her anything that they are afraid to ask the health worker.” FGD 2, Participant 2 – Medical officer

Following experiences supporting mother to provide KMC to their infants, HCWs felt that mothers may gain interest to practice KMC when they see other successfully provide it to their babies.

“The fact that they see it is working, it makes other mothers excited and willing to try” FGD 1,
Participant 5 - Nurse

In some instances, HCWs work with mothers who are already practicing KMC to educate the others on the practice.

“Once there are patients (mothers) in the KMC room, I find it easier to explain to the others disseminate the importance of kangaroo care to them and the others find that those in the KMC room, their babies are gaining weight, it encourages them to even do intermittent KMC.” FGD 2,
Participant 3 - Nurse

4.7.1.2: HCWs who have knowledge on KMC are a great resource

The HCWs participants felt that once staffs have adequate information to counsel and educate the mothers about KMC, they are able to support the mothers to provide KMC to their preterm and low birth weight infants.

““I concur that the social support from the other mothers usually empowers our women ... the new mothers, and also the role that we the staff in NBU play like explaining to the mothers to understand why we are practicing such and the benefits to the baby.” FGD 2, Participant 6 – Medical Officer

In addition, they noted that staff at the facility had received training on newborn care guidelines within which KMC is included.

“KMC as a concept is part of the newborn care guidelines and staff have been trained and can comfortably support the process” FGD 1, Participant 1 - Pediatrician

4.7.2: Barriers to implementation of KMC

Hospital level factors such as infrastructure and parental factors such as lack of cooperation from the mother.

4.7.2.1: Lack of adequate space to accommodate mothers needing to provide KMC to their infants

The hospital had a very small capacity and sometimes when there was an influx of clients needing KMC, it was not easy as they either have to wait for their turn or seek alternatives.

“Currently we have three beds which are propped up; our room is small so it cannot accommodate any more beds. So, within the three beds we can only have three mothers at a given time.” FGD 2, Participant 2 – Medical officer

4.7.2.2: Lack of cooperation from mothers

Some mothers may not cooperate despite receiving information and counseling on KMC yet implementation of the practice mainly relies on them.

“The willingness of the mother; some mothers are not willing to practice KMC, you teach them how to do it and if you go back after 2 minutes, the mother is not with the kid.” FGD 2,

Participant 5 – Nurse

Some mothers may lose motivation to practice KMC if they do not experience the anticipated weight gain. They may end up questioning the practice or even give up.

“Having explained the benefits of KMC to the mothers as weight gain in the babies, you may find that not all babies gain weight the same. So, you will find that today they have gained maybe 50 grams and another day they have lost the 50 that they gained. So the mothers start questioning, is kangaroo really something for weight gain.” FGD 1, Participant 3 - Nurse

CHAPTER FIVE: DISCUSSION

In our study about 80% participants were able to define what KMC is, in comparison to a study conducted in Ghana where 20% defined correctly. This could be attributed to the fact that our participants included medical officers and clinical officers whereas in their study only nurses were enrolled(37).

On the other hand, nearly 80% of participants defined KMC correctly before training and 98% after training in our study. These values were higher in comparison to a study conducted in North Rift region, Kenya where 76% of the participants were able to define what KMC is, on a pre-training questionnaire and 70% after training(26). This could be due to the fact that the study was conducted before KMC was established in the country. Similarly the post training questionnaires in their study were issued 3 months after training in comparison to 2 weeks in our study.

There were significant gaps in knowledge on criteria for initiating kangaroo mother care and the minimum time a KMC session should take. Approximately half of the participants (54%) and (70%) of the participants were able to correctly define criteria for starting KMC and minimum duration of KMC respectively on a pre training questionnaire and significant improvement in knowledge of the participants observed on the post training questionnaire. Majority of the healthcare workers responded to those questions with regards to their current practice in the unit. Most hospitals practice intermittent kangaroo mother in the country due to inadequate space and therefore mothers spend less than 60 minutes for KMC before or after feeding their babies. In addition facilities often interpreted guidelines as malleable and changed them according to their specific situation instead of using the set MOH guidelines(38).

Similarly, there were knowledge gaps identified on the ideal weight a preterm or a low birth weight infant should gain. Only a quarter (24%) of the participants was able to identify the required weight to be gained per kilograms per day before the training with 75% of the healthcare workers after training being able to define correctly. This was a significant improvement noted. This could be attributed due to the fact, healthcare workers only documented the weight gained per day generally but do not go further to qualify if the weight gain was adequate or not.

The healthcare workers also had inadequate knowledge on the correct criteria to be used to discharge both the baby and the mother on KMC. Approximately two third of the participants were able to correctly define criteria for discharge for the baby and the mother on a pre training questionnaire. Almost all of the healthcare workers (98%) scored correctly after the training. There was a significant change in knowledge and this could have been attributed to the fact that the healthcare workers discharged mothers and babies on KMC based on weight and clinical stability alone and not taking into consideration of the other parameters like (family social support, willingness to continue with KMC and feeding options).

This was similarly seen in a study conducted in Ghana where only 29% of the participants had knowledge of early discharge of babies on KMC. The score was lower in comparison to our study. This could be attributed to the fact that, they included nurses only whereas in our study medical officers and clinical officers also participated.

In addition, in a study conducted in North Rift Region, Kenya 49% of the participants had a good knowledge on KMC discharge criteria before training and 70% after training.(26). This study

similar to ours brought out the knowledge gap before training and the significant improvement of knowledge after training.

Majority of the participants (68%) also were not aware of the frequency of follow up and approximately a third (30%) of the HCWs did not know that babies on KMC could be readmitted. There was a deficit in knowledge on the maximum weight babies on KMC should gain during follow up and the readmission criteria of babies on kangaroo mother care with only 60% and 50% of the healthcare workers correctly defining them respectively on a pre training questionnaire. There was however, a significant change in knowledge after training as nearly 90% of the participants correctly pointed out the maximum weight babies on follow up on KMC should gain and all 57 (100%) participants were able to state correctly the readmission criteria for babies on KMC. This significant change in knowledge could have been attributed to the fact that healthcare workers adopt their own criteria of follow up instead of the set guidelines by the MOH due to shortage of healthcare workers staffs and financial constraints faced by the mothers if they were to come for weekly follow up visits(39). Majority of the participants stated that they readmitted babies on KMC based on weight loss but could not identify other danger signs.

There was however no change in knowledge among the participants on the aspect of frequency of feeding among low birth weight and preterm infants on kangaroo mother care. All the participants correctly stated that the babies are to be fed 2-3 hourly.

The overall KMC knowledge score among the participants was 60% before training and 92% after training similar to the 2 studies conducted in India(23) which showed a change in overall KMC knowledge score after training. Similar to our study, the training was conducted for 1 day and included different cadres in the analysis.

The overall knowledge score was high among the medical officers (70%) and approximately 50% among the nurses. This disagrees with the study conducted in North Rift Region, Kenya where the nurses scored the highest(26).

There was no change in practice observed on 15 mother-infant dyads on KMC before and after training on the aspects of kangaroo mother care position, newborn care and support from healthcare workers during KMC. In contrast to the study conducted in North Rift District Region, Kenya where a change in practice was noted after training(26). This however, could be attributed to the fact that the practice was assessed subjectively on questionnaire in their study, whereas in our study a checklist was used to objectively determine KMC practice before and after the training.

Most of the participants pointed out that the most common barriers to KMC implementation in the facility were: inadequate infrastructure for mothers to practice KMC, lack of training among healthcare workers, inadequate staff working in the newborn unit and lack of knowledge of KMC among the mothers practicing KMC. This was similar to the systematic reviews conducted by Seidmana *et al* and Chan *et al* (33)(40).

Similarly a study conducted in Kenya by Murila *et al* on barriers to KMC implementation, pointed out that 59% of the healthcare workers had inadequate skills on KMC which was higher in comparison to our study where 33% of the participants pointed out that inadequate training and skills was a hindrance to KMC implementation in the facility(34).

On the other hand another study conducted in Kenyatta National Referral Hospital in Kenya pointed out that lack of adequate knowledge on safety of KMC among mother infant dyads was a barrier to KMC practice(30). This was also captured in our study where 22% of the participants

thought that inadequate knowledge among the mothers was contributing negatively to KMC practice in the facility. This could be attributed to the fact that most healthcare workers have not undergone kangaroo mother care training and that most hospitals in the country do not have enough bed space for continuous KMC. Intermittent KMC is the most practiced method for low birth weight and preterm infants.

In addition, approximately a third of the participants (30%), (20%), (20%) and (17%) of the participants pointed out that: good family support, availability of resources and infrastructure, adequate knowledge among healthcare workers and cooperative mothers as facilitators to KMC implementation in the facility respectively. This was similarly captured from a systematic review by Seidmana *et al* and from a study conducted in KNH, Kenya (33)(30) where the authors stated that positive perception and peer support among the mothers were noted to be promoters of KMC implementation in the facility. The reason could be that mothers find each other resourceful as they share their experiences about KMC.

From the 2 FGDs conducted in this study, similar themes were pointed out to the two systematic reviews of qualitative studies on barriers and enablers to KMC implementation (33)(39). This could have been attributed due to the fact that these studies also included studies from Africa which face similar challenges like in our setup.

It was evident from the discussions that peer support among the mothers and knowledgeable healthcare workers were great enablers to KMC implementation. The healthcare workers also expressed that inadequate infrastructure and uncooperative mothers were the major barriers pointed out. These findings agree with a study conducted in Nairobi, Kenya in a National Referral Hospital (30).

5.1: Strengths

This study has several strengths that include the study design, which was a mixed methodology of both quantitative and qualitative methods. This method provided strengths that offset weaknesses of both qualitative and quantitative research. It also provided detailed information on KMC.

The study was conducted in a County Referral Hospital in Kenya whereas the other studies were conducted in National Referral and sub county hospital. This has provided an overview of areas that need improvement. Purposive selection of participants was done to include all healthcare workers dealing with newborn care; this had limited the risk of selection bias.

5.2: Limitations

The major limitation of the study was that the training and the pre- and post-training questionnaires were administered online. Some of the participants had challenges accessing the questionnaires and logging in during the training. This led to few participants not submitting the informed consents and questionnaires and being left out of the study. The training was also conducted online hence it was difficult to demonstrate and practice the skills.

CHAPTER SIX: CONCLUSION

- Although the healthcare workers were able to define what KMC is before training, but they were unable to differentiate the two types of KMC: intermittent and continuous.
- There were knowledge gaps with regards to the components of KMC; kangaroo nutrition, kangaroo discharge and follow up.
- There was significant change in knowledge after training on correct modes of feeding for the low birth weight and preterm infants, discharge criteria and follow up with regards to KMC.
- There was no change in practice with regards to newborn care, Kangaroo mother care position and healthcare worker's support as noted from the observer's checklist before and after training.
- The FGDs revealed that adequate knowledge of KMC among HCWs and peer support among mothers were enablers to KMC implementation whereas uncooperative mothers and lack of adequate infrastructure in the facility were perceived to be barriers facing KMC practice.

CHAPTER SEVEN: RECOMMENDATIONS

- KMC sensitization seminars and continuous medical education should be conducted to enhance promotion of kangaroo mother care.
- Mothers-infant dyads should be counselled consistently and supported to continue to practice at the facility and on discharge.
- MOH and the relevant authority at the county level should expand the newborn units and create rooms for continuous KMC so that many mothers-infant dyads could practice KMC.

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APPENDICES

Appendix 1: Pre and post training questionnaire for health care workers

Gender

Age.....

Specialty.....

Department/ ward

Working experience in years.....

Recent KMC training: Yes () No ()

If yes, when.....

1) a) Is intermittent KMC practiced in the unit yes () no()

b) if yes describe criteria for eligibility

.....
.....
.....

2) What is the minimum time a KMC session should take?

I. 60 minutes

II. <60 minute

III. I don't know

3) What are the benefits of KMC to:

i. Infants

.....

.....
.....

ii. Mother

.....
.....

4) a) Is there a written feeding policy /guideline for babies in the nursery /neonatal room

Yes () No ()

b) If yes how often are babies fed:

i. 2-3 hourly

ii. <2-3 hourly

iii. I don't know

5) When do you decide to feed via

I. Nasogastric tube.....

II. Cup.....

III. Breastfeeding.....

6) a) How often should babies be weighed?

I. once every day

II. alternate days

III. I don't know

b) What is the ideal weight gain in grams /kg /day?

a) 10grams b) 15grams c) I don't know

7) What criteria is used to discharge the baby on KMC

a) Baby factors

.....
.....

b) Maternal factors

.....
.....

8) How frequent are follow up of babies after discharge on KMC done?

a) Weekly

b) 2 weekly

c) I don't know

9) Until what weight are they followed up?

a) 2500g

b) 3000g

c) I don't know

10) Can babies be readmitted into KMC Yes () No ()

If yes what do you think is the criteria for readmission into KMC?

.....
.....

11) What do you think are the barriers to KMC implementation in your unit?.....

12) What are the facilitators to KMC implementation in your unit?.....

Appendix 2: Observer’s checklist Observation in KMC practice before and after training using the following tool

Question	Criteria	(Yes)	(No)
1	<p>Is the baby correctly placed in KMC position:</p> <ul style="list-style-type: none"> • Baby is vertical • Baby is on direct skin to skin contact • The legs are flexed in frog position • The chin is in contact with the mother’s chest • The baby is firmly fixed to mother’s chest using tight band 		
2	<p>Are HCW offering support to mothers practicing KMC:</p> <ul style="list-style-type: none"> • Are HCW demonstrating KMC • Are the HCW supporting in breastfeeding: attachment, positioning and feeding 		
3	<p>Is newborn care practiced among mothers on KMC:</p> <ul style="list-style-type: none"> • Is hand hygiene done before and after feeding /handling of the infant • Are cups and feeding utensils cleaned before and after feeding? <p>Is umbilical cord care with 4% chlorhexidine done?</p> <p>Are babies’ vitals, weight and feeds recorded and monitored?</p>		

OPTIONAL SESSION 14. Kangaroo Mother Care

Objectives

At the end of this session participants will be able to:

- Describe when and how to use kangaroo mother care.
- Assist and support a mother using kangaroo mother care.

Session preparation

REQUIRED BY FACILITATOR

- Training file
- Slides/overheads 14/1 – 14/14

REQUIRED BY PARTICIPANT

- **PCPNC Guide**
- 1 copy local or PCPNC Referral form
- From Participant's Workbook:**
 - Handouts – Session 14
 - Worksheet – session 14
 - Answer sheets for Session 14 (only to be given after worksheet is completed)

MATERIALS FOR DEMONSTRATION AND GROUP EXERCISE

Each group of 4 participants requires:

- 1 baby doll
- Baby clothes, including: sleeveless vest/ shirt which opens down the front, hat and socks
- Example of local binders or 1 long piece of cloth for use as a binder or a long scarf.

PREPARATION FOR DEMONSTRATION

Ask for a volunteer or prepare a participant before the session to demonstrate how a baby is put into the correct position for KMC and how to place a binder.

Session outline

LECTURE LENGTH 60 minutes

0:00	Introduce the session	5 minutes
0:05	The advantages of kangaroo mother care	10 minutes
#:15	When to start KMC	10 minutes
#:25	Kangaroo mother care: The practical issues	10 minutes
#:35	The mother's activities during KMC	5 minutes
0:40	Feeding the baby	5 minutes
0:45	How long should KMC last?	5 minutes
#:50	Group exercise	10 minutes

Clinical practice preparation

REQUIRED BY FACILITATOR

- Checklist
- Instructions and Task sheet
- **PCPNC Guide**

REQUIRED BY PARTICIPANT

- Task sheet
- Examination Recording form (2 copies)
- Breastfeeding Observation form 2 (2 copies)
- Notebook and pen/pencil
- **PCPNC Guide** (1 copy between 2 participants)
- Name badge

REFERENCE MATERIALS

- **PCPNC Guide**
Pregnancy, Childbirth, Postpartum and Newborn Care: A guide for essential practice
- Kangaroo Mother Care: A practical guide. Geneva, WHO, Dept. of Reproductive Health and Research (RHR), 2002.



**Appendix 4: Focus group discussion for the health care providers
Focus group demographic detail questionnaire**

Section 1: General information

1. Gender: a. Male b. Female
2. Age..... Years
3. Cadre
4. For how many years have you worked in the medical field.....?

1. Focus group discussion topic guide for healthcare providers
2. Welcome and thank you for volunteering to take part in this focus group. You have been asked to participate in this group as your point of view is important to us.

Introduction

The aim of this discussion will be to explore your experience, opinions and perceptions of kangaroo mother care practice in your neonatal unit so as to determine the factors that facilitate or act as barriers to practice. The information obtained from this study will be used to provide information to the hospital in order to improve your future experiences. The focused group discussions will take about an hour.

Anonymity:

Despite being taped or voice recorded, I would like to assure you that the discussion will be anonymous. The tapes and audio recording will be kept safely in a locked facility until they are transcribed word for word. The notes taken during the focus group will not record individuals' names. Try to answer and comment as accurately and truthfully as possible. Kindly refrain from

discussing the comments of other group members outside the focus group. If there are any questions or discussions that you do not wish to answer or participate in, you do not have to do so; however please try to answer and be as involved as much as possible.

Ground rules

- Only one person speaks at a time. If someone is talking please wait until they have finished before you start.
- There are no right or wrong answers
- You do not have to speak in any particular order
- When you do have something to say, please do so, regardless of other group members' opinions
- You do not have to agree with views of other people in the group.
- Does anyone have any questions? (answers)
- Ok , let's begin

Questions

1. What is the importance of kangaroo mother care practice in preterm babies?
2. What is your opinion on the current practice of kangaroo mother care in your newborn unit?
3. What experiences have you had when applying kangaroo care in your unit?
 - a) Positive experiences?
 - b) Challenges?
4. What do you think can be done to improve the mothers' experience in the care of her preterm baby in the Newborn Unit?

5. What assistance or support do you need to help you provide better kangaroo care services to the mother infant dyads in your unit?

Conclusion

Thank you for participating. This has been a very successful discussion. Your opinions are valuable assets to this study. We hope you have found the discussion interesting. I would like to remind you that any comments featuring in this report will be anonymous. Before you leave please hand in your completed personal details questionnaire.

HCWs' consent list for FGD

Participants	Consent given Yes	No

Appendix 5: Video clips links

- a) <https://globalhealthmedia.org/portfolio-items/keeping-the-small-baby-warm/?portfolioCats=191%2C94%2C13%2C23%2C65>
- b) <https://globalhealthmedia.org/portfolio-items/wrap-designs-for-skin-to-skin-care/?portfolioCats=191%2C94%2C13%2C23%2C65>
- c) <https://globalhealthmedia.org/portfolio-items/carrying-your-baby-skin-to-skin/?portfolioCats=191%2C94%2C13%2C23%2C65>
- d) <https://globalhealthmedia.org/portfolio-items/continuous-skin-to-skin-care/?portfolioCats=191%2C94%2C13%2C23%2C65>
- e) <https://globalhealthmedia.org/portfolio-items/feeding-with-a-nasogastric-tube/?portfolioCats=191%2C94%2C13%2C23%2C65>
- f) <https://globalhealthmedia.org/portfolio-items/cup-feeding-your-small-baby/?portfolioCats=191%2C94%2C13%2C23%2C65>
- g) <https://globalhealthmedia.org/portfolio-items/breastfeeding-the-small-baby/?portfolioCats=191%2C94%2C13%2C23%2C65>

Appendix 6: Health care providers consent form

PARTICIPANT EXPLANATION FORM

Introduction

I am Dr. Tauhida Abubakar, a postgraduate student undertaking a Masters of medicine degree in Pediatrics and Child health at the department of Pediatrics and Child Health in the University of Nairobi. I am conducting research as part of the requirements for qualification. I am going to give you information on the study and invite you to be part of the study. Please feel free to ask any questions.

Study title:

EFFECT OF TRAINING ON IMPLEMENTATION OF KANGAROO MOTHER CARE IN MURANGA COUNTY REFFERRAL HOSPITAL

Purpose

The purpose of this study is to determine effect of training on knowledge and practice of kangaroo mother care among health care workers in Murang'a County Referral Hospital.

Procedures

You have been requested to participate in this study as a health care provider working in Murang'a County Referral Hospital. If you accept to participate in this study you will be asked to participate in online training on KMC using zoom platform. As part of the training you will also be requested to complete online pre and post training questionnaire. Some of the study participants will be selected to take part in focused group discussions.

Risks

No invasive procedures or tissue sampling will be obtained from you as part of the study.

Benefits

The information obtained from this study will be used to provide information to the Ministry of Health, county director of health and the hospital. This will help improve practice of KMC in the hospital and also your future experiences in the newborn unit as you assist mother infant dyads in the process.

Compensation

No incentive or compensation will be given to you for participating in the study but the cost of internet bundles used for the training will be met by the study. This is estimated to be nearly Kenya shillings 300.

Cost

You will not incur any costs by participating in the study.

Confidentiality

All data that will be collected in this study will be collected confidentially and will be used in research purposes only.

Voluntary participation

Participation in this study is entirely voluntary. You may withdraw from the study at any point without any form of discrimination.

CONSENT FORM

I confirm that I have read and understood the above information about the study. I have had the opportunity to ask questions. I agree to take part in the above study.

Signature of the participant.....

Date

I declare that I have explained to the participant the study purpose and procedure. I have also allowed the participant to ask questions regarding the study.

Signature.....

Date

If you have any questions please feel free to contact:-

1) Dr. Tauhida Abubakar (principal investigator)

P.O BOX 35227- 00200, Nairobi

Tel. 0703399913

2) KNH/University of Nairobi Ethics and research review committee

P.O BOX 20723, Nairobi.

Tel. 020 726300

Appendix 7: Mother- infant dyads consent form

Participant explanation form

Introduction

I am Dr. Tauhida Abubakar, a postgraduate student undertaking a Masters of medicine degree in Pediatrics and Child health at the department of Pediatrics and Child Health in the University of Nairobi. I am conducting research as part of the requirements for qualification. I am going to give you information on the study and invite you to be part of the study. Please feel free to ask any questions.

Study title:

EFFECT OF TRAINING ON IMPLEMENTATION OF KANGAROO MOTHER CARE IN MURANGA COUNTY REFFERRAL HOSPITAL

Purpose

The purpose of this study is to determine effect of training on knowledge and practice of kangaroo mother care among health care workers in Murang'a County Referral Hospital

Procedures

If you accept to participate in the study, you will be observed on how you practice kangaroo mother care before and after training. You may also be asked questions on how you take care of your newborn in terms of hand hygiene , cord care and breastfeeding.

Risks

No invasive procedures or tissue sampling will be obtained from you or your baby as part of the study.

Benefits

Any information obtained in the study that is pertinent to the care of your baby will be promptly passed on to your primary physician.

Compensation

No incentive or compensation will be given to you for participating in the study.

Cost

You will not incur any extra costs by participating in the study.

Confidentiality

All data that will be collected in this study will be collected confidentially and will be used in research purposes only.

Voluntary participation

Participation in this study is entirely voluntary. You may withdraw from the study at any point without any form of discrimination.

CONSENT FORM

I confirm that I have read and understood the above information about the study. I have had the opportunity to ask questions. I agree to take part in the above study.

Signature of the participant.....Date.....

I declare that I have explained to the participant the study purpose and procedure. I have also allowed the participant to ask questions regarding the study.

SignatureDate.....

If you have any questions please feel free to contact:-

- 1) Dr. Tauhida Abubakar (principal investigator)

P.O BOX 35227- 00200, Nairobi

Tel . 0703399913

- 2) KNH/University of Nairobi Ethics and research review committee

P.O BOX 20723, Nairobi.

Tel. 020 726300

TARATIBU ZA MAELEZO KWA MSHIRIKA

Utangulizi

Jina langu ni Dr. Tauhida Abubakar Mohamed. Mimi ni mwanafunzi katika Chuo Kikuu Cha Nairobi. Ninafanya utafiti wakubaini athari ya mafundisho kwa kutekeleza huduma ya kangaroo kwa wahudumu wa hospitali. Nitakupatia maelezo kuhusu uchunguzi wangu naniakualika uwe mmoja wa washirika. Tafadhali jiskie huru kuuliza swali lolote lile.

Lengo: Athari ya mafundisho kwa kutekeleza huduma ya kangaroo kwa wahudumu wa hospitali ya kaunti ya Murang'a.

Utaratibu : Ukikubali kushiriki katika utafiti huu, utaangaliwa namna unavyoitekeleza huduma ya kangaroo. Unaweza pia kuuliza maswali namna unavyo muangalia mtoto wako kwa usafi wa mikono, kitovu na namna unavyonyonyesha.

Hatari: Hakuna taratibu vamizi au sampuli itachukuliwa kutoka wewe au mtoto wako wakati wa utafiti.

Faida: Daktari wako ataelezwa taarifa yoyote ambayo ni muhimu kwa huduma ya mtoto wako, itakayopatikana wakati wa utafiti.

Malipo: Kushiriki katika utafiti huu hautakuwa na malipo yoyote kwa mshiriki.

Gharama: Hatalipishwa gharama yoyote ya ziada kwa kushiriki katika utafiti.

Usiri: Ujumbe wowote ambao utakusanywa utakuwa wa siri. Nambari ndizo zitatumika badala ya jina lako kuchambua matokeo yako. Wale wanaofanya uchunguzi ndio tu wataweza kusoma majibu ama ujumbe wowote utakao kukusanywa..

Ushiriki pasipo lazima: Kushiriki katika utafiti huu ni kwa hiari yako. Ukifika mahali ujiskie hutaki kuendelea unaweza kujitoa bila ubaguzi wowote.

TARATIBU YA IDHINI/RUHUSA

Nimesoma na nimeelewa kabisa taarifa kuhusu utafiti huu. Nimekuwa na nafasi ya kuuliza maswali na yamejibiwa kwa ukamilifu. Nimekubali kushiriki katika utafiti huu.

Sahihi ya Mshirika:

Tarehe :

Mimi nabaini kwamba nimeeleza mshiriki lengo na utaratibu wa utafiti. Na nimempa mshiriki nafasi ya kuuliza maswali yoyote.

Sahihi

Tarehe

Kama kuna swali lolote, jiskie huru kuwasiliana nami.

1) Dr. Tauhida Abubakar (principal investigator)

P.O BOX 35227- 00200, Nairobi

Tel . 0703399913

2) KNH/University of Nairobi Ethics and research review committee

P.O BOX 20723, Nairobi.

Tel. 020 726300

Appendix 8: Study budget

Category	Item	Units	Unit cost	Total cost(Kshs)
Proposal development	Draft copies	9 copies	500	4500
	Final proposal copies	6 copies	500	3000
	Ethics committee fee	1	2,000	2000
Data collection	Research assistants	1	5,000	5,000
	Consent forms	30	20	6,000
	Training internet cost	57	300	17,100
Data analysis	Statistician	2	30,000	60,000
Thesis write up	Printing draft copies	9 copies	500	4500
	Printing final copies	6 copies	500	3000
Miscellaneous				20,000
Total				125,100