

Setting up Kangaroo Mother Care at Queen Elizabeth Central Hospital, Blantyre – A practical approach

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Introduction

Kangaroo Mother Care (KMC) is a method of caring for preterm and low birth weight infants. It involves nursing the baby, as soon as it is medically stable, in continuous skin-to-skin contact with the mother (or substitute mother). This method is begun in hospital and can be continued at home. It has become popular in resource poor settings as it requires minimal equipment, and has been shown to facilitate early discharge home.¹

Queen Elizabeth Central Hospital (QECH) is the teaching hospital of the College of Medicine of Malawi. It serves as a referral unit for the southern region of Malawi and a district hospital for the Blantyre area. Its neonatal nursery admits around 2000 neonates per year. Approximately half of these have a birth weight of less than 2000g.

Prior to November 2003, all babies with a birth weight of less than 2000g born at QECH, or in the surrounding district were admitted to the neonatal nursery. Once breast or cup feeding was established and the baby was free of other serious illness, the baby was discharged home providing his weight was greater than 1500g. Due to the high number of low birth weight infants in Malawi (20% of all births are with a birth weight of less than 2500g – DHS 2000) this policy resulted in considerable overcrowding in the nursery. After discharge the babies were followed up fortnightly until they reached a weight of 2000g. This was carried out at QECH in a patient attendant run clinic. If any baby was found to have problems in the clinic they were referred to the paediatric A+E department for further assessment. Only 33% completed follow up. Previous research into KMC has suggested lower rates of serious illnesses, hospital acquired infections and re-admission rates when compared with conventional care²⁺³. KMC has also been shown to increase the prevalence and duration of breastfeeding, however in our setting where breastfeeding is almost universal this is of less importance. KMC has also been associated with shorter hospital stays. In this setting, where patients often live far from the Central Hospital, have other children at home and difficulty maintaining food supplies when in hospital, this is an important advantage. The decision was therefore made to start KMC.

Getting started

Initial discussions took place at a senior level, as to the feasibility of opening a new ward when staffing is already a critical issue in most of our departments. This was a long process requiring collaboration between the obstetric and paediatric staff.

Next a suitable space was allocated. KMC requires a room with separate washing facilities and ideally an isolated area for readmissions. At QECH the most suitable space was found to be on the postnatal ward. Two bays were partitioned off from the main ward using a low wall and glass window. This created a 9-bedded ward. Thus allowing easy monitoring of the ward from postnatal ward and requiring minimal construction work. We currently have no isolated re-admission facility.

There were initial concerns as to who would staff the ward in view of the nursing staff shortages. A decision was reached to staff the ward using patient attendants with the support of the nurses on neonatal nursery and postnatal ward and one clinician. All staff to be involved attended a 1-week theoretical and prac-

tical training course run locally by Saving Newborn Lives (SNL) at Zomba Central Hospital.

WHO makes recommendations of equipment required to commence Kangaroo Care⁴. We were unable to meet all the suggested requirements e.g. 2 – 4 bedded rooms with curtains around the bed space to allow for privacy, bathrooms with towels, separate dining area for the mothers, or comfortable bedside chairs. We had 9 beds with heads reclined to 45° and provided a bedside locker and wooden stool for each bed. Although we initially used the recommended triangular piece of cloth for securing the baby in the KMC position, we found that the mother's usual 'chitenje' was just as effective, and had the advantage of not requiring any extra 'kit'. We provided bed sheets, blankets and extra cloths for those requiring them during their stay on the ward, but aimed to show the mothers how they could carry out KMC easily at home without any extra equipment. Other equipment required was soap for hand washing and washing nappies, a washing line for drying of the nappies, thermometers, weighing scales (digital ones with 10g intervals were kindly donated), graduated feeding cups and an admissions register.

Drugs most often prescribed, and stocked on the ward were 0.5% GV paint, Zinc oxide cream and tetracycline eye ointment. The initial cost of setting up the ward was approximately \$11,790. After setting up the ongoing running costs were low.

Breakdown of initial start up costs

Building work	\$ 10,000
Lockers/ stools/ cupboard	\$ 250
Blankets/ sheets/ chitenje	\$ 750
Training of staff	\$ 300
Weighing scales	\$ 200
Digital Thermometers X2	\$ 30
Cups/ buckets/ cleaning materials	\$ 100
Wall Heaters X4	\$ 160
TOTAL	\$ 11,790

After training and prior to opening the ward we devised our own local protocols adapting existing resources from WHO⁴.

Starting out – in practice

We started with one patient attendant who managed the ward 8am - 5pm, assisted by the postnatal and nursery nurses when necessary and a daily doctor's ward round. At weekends the ward was covered by the KMC trained nurses on a rota. At nighttime the ward was unsupervised, but the mothers told to immediately take their baby to nursery if they noticed any problems or 'danger signs' (see box). After 2 months a second patient attendant was recruited. The patient attendants then covered the ward during the weekdays as previously and the weekends between 8am – 12pm. The daily doctor's ward round was used as a training time for the patient attendants, who by 2/ 3 months were able to confidently manage the ward, the feeding prescriptions, minor symptoms and to appropriately discharge babies

home. They were also confident at recognizing 'danger signs' in the babies, referring back to nursery when necessary and teaching mothers how to recognize them as well. From this time doctors' ward rounds were held twice a week on Tuesdays and Fridays. Babies were only reviewed on other days at the patient attendant's request.

Starting out – practical lessons learned

- **Feeding.** We soon found that the mothers were not able to sustain 2 hourly feeding for a prolonged period of time. In many cases we found that the mothers were giving the 2 hourly prescribed amount about 8 times in a 24-hour period. Hence we changed to 3 hourly feeds regardless of current weight, provided the baby could tolerate the increased volume. No clinical problems with hypoglycaemia were seen. All babies tolerated the increased volumes with no increased risk of vomiting or milk aspiration. There was no difference in the weight gain of the infants between the 2 regimes.
- **Admission criteria.** We trained all nursery staff to identify only stable, non-sick infants and mothers for transfer to the ward. The patient attendants provide the final checkpoint when they go to collect a baby for transfer to the ward and can with training/ experience easily identify if a mum/ baby is not yet ready for the ward; and reassess them the next day.
- We initially had an admission weight criteria of 1200 - 1800g. This was a good starting point, but we found that babies greater than 1800g could benefit from KMC (especially in the cold season and in primigravida mothers) and that certain babies less than 1200g (especially those that are small for gestational age) did very well in KMC.
- **Keeping the system flowing.** With only 9 beds available in our KMC ward, we have to ensure that all babies are discharged home from KMC as soon as they meet the discharge requirements. Having the patient attendants responsible for discharging the patients ensured that they went home when they were ready, rather than waiting for the next doctor's ward round.
- **Coping with sick neonates.** We aimed to avoid admitting sick infants to the KMC ward, but we were initially concerned as to what would happen if an infant became sick during their stay. The patient attendants were trained to recognize simple potential 'danger signs' in the babies and they also taught these to the mothers. During the first 6 months period we had 43 readmissions to nursery (16% of admissions) (Harare, Zimbabwe, reported a 28% readmission rate⁵) In each case it was felt that the patient attendant/ mother had transferred the baby back at an appropriate time. We encouraged the mother to be looking out for danger signs herself, as after discharge she will need to decide when to seek medical advice. Once the babies were stable they returned to the KMC ward, even if they still required some ongoing treatment e.g. parenteral antibiotics.
- **Coping with sick mothers.** This provided one of the greatest challenges. Mothers in KMC were frequently told to move back onto the open postnatal ward merely to receive twice daily oral medication. Obstetricians were also reluctant to review the mothers in KMC ward. Mother's often missed out on the hospital food provided, as they were not alerted to its arrival. Addressing these issues involved working closely together with staff on postnatal ward.
- **Using grandmas/ guardians** - in the case of mothers too sick to carry out KMC, or after a maternal death, using a surrogate person allowed these babies to benefit from KMC whether the baby will be going home or to an orphanage

once ready for discharge.

■ Danger signs in kangaroo babies

- Difficulty breathing, chest in-drawing, grunting, breathing too fast.
- Frequent and long periods of apnoea (not breathing)
- Baby feeling cold, and temperature low despite rewarming.
- Difficulty feeding the baby- the baby stops feeding or vomits.
- Convulsions.
- Diarrhoea.
- Yellow skin (jaundice)
- Baby is very sleepy, floppy.

Common problems encountered

- Mother producing insufficient breast milk

We found that contrary to popular belief that a mother always has enough breast milk for her baby, there were frequent problems. A possible reason for this is acute/chronically sick mothers. HIV prevalence in Malawi in women attending antenatal clinic in Blantyre in 2003 showed an HIV prevalence of 29%⁶. In view of the fact that HIV positive women are more likely to deliver prematurely⁷, the actual infection rates amongst KMC mothers is likely to be higher.

Another contributing factor is that hand expressing is required for prolonged periods of time whilst awaiting the infant to be sufficiently mature to be able to take all his requirements from sucking at the breast. It is often painful, technically difficult, very time consuming and not as effective as a term infant sucking!

Compromise

- We avoided the use of formula and mixed feeding in view of the high HIV prevalence in our group. It is not sustainable when discharged home due to the cost and preparation difficulties, (except in orphans going to orphanage on discharge). In our nursery we found that preterm infants often had diarrhoea when formula feeding was given. During the first 6 months 10 infants received formula milk whilst on KMC ward (3.6% of admissions) 3 due to insufficient maternal milk, 7 due to maternal death. 2 of these (twins) developed diarrhoea whilst on the ward (1 died) and 4 after discharge (all 4 died). We also have only a limited supply of formula milk – lactogen - which is a milk aimed at 'hungry babies >3.5kg' and is hence even with ideal preparation facilities not suitable for this group of low birth weight babies. Of note we saw no episodes of diarrhoea either as an inpatient, or during outpatient follow up in infants receiving expressed breast milk via a cup.
- We used advice and encouragement of the mother – regular fluids/ food intake, the need for regular expressing and expressing technique. This was successful in most cases. Any infection/ illness was treated in the mother (interestingly we saw no cases of mastitis amongst our group)
- Metoclopramide has been shown to be effective in improving lactation⁸. In the few cases where the above efforts were unsuccessful we prescribed metoclopramide to the mother in conjunction with ongoing support and encouragement. (Approximately 2% of admissions in the first 6 months). The results were disappointing.

Mother concerned that the baby is too small to take home, or that people will laugh if I do kangaroo at home

- We found that the most effective way to ensure that KMC continues at home is to involve the grandma during the admission.
- Our talks and informal discussions carried out on the ward were aimed at equipping the mothers with the support of the guardian to have the confidence to continue KMC at home.
- Some mothers were unwilling to practice skin-to-skin at home. As there is no home heating and a mother needs to take smaller babies out of KMC position to feed them, the babies get cold very quickly. Most mothers, although reportedly continuing skin to skin at home, said they felt embarrassed coming into town with their shirt opened at the top in kangaroo skin-to-skin position.

Baby cold on follow up visit

Difficulties with continuing skin to skin as outlined above.

Compromise

- All babies to have at least 2 hats prior to discharge (the smaller ones may need to wear them both at the same time) and booties.
- Other clothes may be worn, but should be left open at the front and the baby placed skin-to-skin on the mother's naked chest. That way, when the baby is taken out of KMC position e.g. mother cooking, using bathroom or to feed the very small infant, the clothes can quickly and easily be done up at the front and the baby wrapped suitably in a blanket. Even if mothers refused to skin-to-skin we found that placing the baby clothes-to-clothes in the kangaroo position was still more effective at keeping the baby warm than the traditional wrapping of the baby in many cloths (and blanket if affordable) or worse placing the baby in a chitenje tied on the back.
- Just prior to our 'cold season' we received a donation of blankets, which we cut into 3's (the perfect size for kangarooing) and gave to mothers who did not have a blanket to use for kangarooing.

Oral/ nappy candidiasis

- This was frequently encountered both in the first 2 weeks of life (especially in those that had received parenteral antibiotics) and also during the follow up period. Premature babies have a higher incidence of candidiasis, but the very high incidence we observed was more than expected. Possible reasons for this are that the warm, damp nappy environment in KMC position may increase the risk (mothers usually use small squares cut from their chitenje as a nappy, although the more wealthy ones may use a terry toweling nappy with a pair of plastic knickers over the top.) Also the high HIV prevalence (with mother to child transmission of HIV as no prophylaxis is currently being used) may contribute further.

Solution

- Advise the mum on regular nappy changes to keep the baby as dry as possible.
- Treat with 0.5% GV paint to the mouth and nappy area twice a day.

Other Skin rashes - especially in the neck crease.

Many infants were seen with broken down skin in this area. This is likely to be due to the baby's hat strings that get soaked in milk during messy cup feeding and then not changed as the baby is placed back in the warmth of KMC

position.

Solution

- Mums knit hats on the ward to take home. We encourage them to knit extra ones to allow them to wash the hats and keep them as dry and clean as possible.
- We used 0.5% GV paint and occasionally zinc oxide cream in these cases.

Poor growth

Growth rates were slow compared to standard growth charts. Average growth rate whilst on the ward was 10.9g/kg/day and after discharge was 28.1g/day (range 2.6 - 60.4g/day). This compares with a study from India showing mean growth rates of 20 - 30g/day during the first 20 weeks of life in infants with a birth weight of 1000 - 2000g.⁹

This may be due to inadequate volumes of feeds being given, or may reflect the fact that we are using unfortified breast milk even in the most preterm of surviving infants (29-30 weeks gestation). Babies whose mothers decided to stop cup feeding on discharge and breast feed exclusively when the baby was still <1800g had slower weight gains than those continuing breast feeding with added cup top ups, so we now advise mothers to breast feed with cup top ups until they reach 1800g, after which point we advise exclusive breast feeding.

Clinical anaemia

This was frequently seen in our babies during follow-up. In view of their prematurity and low birth weight, it is likely that many of these babies also have other vitamin deficiencies e.g. vitamin D, E, C and B₆. Oral iron supplementation was used in selected cases due to a limited supply, but we plan to introduce universal iron and multi-vitamin supplementation to all KMC babies.

Babies not attending follow-up visits

WHO recommends following up KMC babies twice a week until 37 weeks of post-menstrual age and one follow-up visit per week after that age. Although our babies have an approximate gestational age calculated at birth using an external gestational age estimation score, we do not routinely use this for guiding care and follow-up, and use weight cut offs instead. We felt, even at the planning stage, that this regime would be unfeasible in our setting where the mothers come from a wide surrounding area often involving a long walk on foot and an expensive minibus fee to get to clinic. We initially hoped to follow up the mothers and babies 1 week after discharge and then 2 weekly until they reached 2500g when they would be discharged from follow-up. We found that even this was too onerous for most of the mothers and they voted with their feet coming to clinic instead after 2-3 weeks, or when the child was sick. Overall 70% of the mothers returned at some stage for follow up.

Compromise

We have changed our policy to follow up the babies 2 weeks after discharge and then 2 weekly until 1800g and then 3 weekly until 2500g.

We hold our clinic on a Tuesday morning, but we advise the mothers that they can come any day if they are concerned about their baby.

The death of a KMC baby during inpatient stay

This is a very distressing event for the mother, other mothers and the staff on the kangaroo ward. Unfortunately 4 babies were found dead in KMC position in our first 6 months. On each occasion the baby had been seen by the clinician and patient

attendant in the previous 24 hours and no danger signs were identified at that time. The baby was reported to have been well and taken the previous feed well. In no case did the mother identify any concerns in her baby prior to death. 2 of the deaths occurred in relatively small and premature infants (29/40 1040g day 9) and (31/40 1130g day 8), and 1 in a 33/40 1470g baby on day 3 which had reportedly slipped out of kangaroo position under the mother's breast whilst the mother was sleeping and may have suffocated. The other case was an 880g infant with a birth weight of 1000g who was 43 days old and had failed to thrive. The mother was unsupported in the pregnancy and displayed negative emotions towards the child. Concern was raised amongst the other inpatients at the time that she may have intentionally harmed her baby.

Milk aspiration and choking episodes

This was a big problem in the first 3 months of kangaroo care accounting for 6/27 (22%) readmissions to the nursery. During this period the babies were being fed using large plastic beakers, which was technically very difficult. After the first 3 months we used smaller cups with 5mls gradations. These cups allowed more accurate measurement of feed volumes, and had soft, malleable edges making slow, controlled cup feeding easier. Mothers also received more information in their introductory talk about the potential danger of aspiration and how to avoid it. These measures markedly reduced the number of choking episodes experienced (only 1/17 readmissions to the nursery in the second 3 months – this baby had a severe cleft palate and feeding was technically very difficult).

Babies under follow up requiring re-admission

This was found to be less of a problem than expected. 16/258 (6.2%) of the babies discharged home required readmission to hospital. Sick infants were readmitted to paediatric nursery if they required medical treatment. It is known that low birth weight infants have increased infant morbidity. It is unclear in this setting whether the burden of admissions has been increased by an early kangaroo discharge policy.

Compromise

Babies with unsatisfactory weight gain were managed in the community with support and advice to the mothers, provided that they were otherwise well. They were followed up more frequently where possible. 45/258 (17.4%) of babies had a weight loss, or a weight gain of <10g/kg/day at the first follow up. All were managed at home with extra advice. 40/45 (89%) returned for a second follow up visit the remaining 5 died (none from the weight loss group). At the second visit 10/40 (25%) still had a weight gain of <10g/day. One baby was readmitted to the neonatal unit for advice and assessment and was later discharged and thrived at home; the remainder all returned for a 3rd visit with improved weight gain and were finally discharged from follow-up well. Overall 40/45 (89%) survived to discharge from follow up this is no different from the 86% overall survival amongst all babies followed-up.

Overall

In the first 6 months after opening the Kangaroo Ward we had 272 admissions. 43 (15.8%) of these required readmission to the neonatal nursery. 14 of these died. Overall 258 Kangaroo babies were discharged home well. A total of 233 (90.3%) were followed up to 2500g. Of these 32 (12.4%) had died post discharge from the ward. In 11/32 (34.4%) of cases mothers had sought appropriate medical attention (from health centre or Kangaroo

Ward) prior to the death. In the remaining 21 cases 5 babies were found dead having previously been asymptomatic; 4 became sick at night-time when travel to health facility not possible; 2 had no transport and were too far from nearest health centre; 4 didn't realize how sick their baby was; the cause was unknown in the remaining 6.

The mother's attitude to the ward was generally positive. They reported enjoying being with their baby, and being able to care for him from an early stage. The mothers of very low birth weight infants (<1500g) reported enjoying the fact that they were discharged home early. Many commented on liking the follow up clinic and the chance to have their baby weighed, examined and their worries addressed. During the first 6 months only 2 mothers refused to be admitted to Kangaroo Ward and 2 patients absconded – in one case the reason was unknown, in the other it was because we refused to supply artificial formula (lactogen) for her baby.

The response by the staff on the neonatal nursery was also positive. After the opening of the Kangaroo ward, and the policy of aiming to keep term infants rooming in with their mothers wherever possible, the nursery had fewer inpatients. The nurses reported that this allowed them to concentrate on providing good nursing care to the sickest infants.

The patient attendants on the Kangaroo Ward reported enjoying working on the ward and the chance that they had for responsibility and caring directly for the mothers and babies. They reported the satisfaction of working with these mothers and then seeing them coming back to follow up clinic with big healthy babies.

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