ORIGINAL ARTICLE

Promoting specialised and access to quality care for premature babies through the establishment and decentralization of Kangaroo Mother Care Units in Zambia

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ABSTRACT

Background: The Neonatal unit at the Women and Newborn Hospital (WNH), University Teaching Hospital (UTH), Lusaka is a tertiary level referral hospital which receives neonates needing specialised care from all areas of Zambia. In 2021, daily patient census was more than 80 - 90 babies, stretching beyond the facility's optimal occupancy as equipment, infrastructure and human resource capacity is only designed to accommodate 40 neonates at a time. Overcrowding of the facility led to suboptimal care as well as increased mortality due to cross infections. To decongest the neonatal unit and out-patient follow up clinics and reduce out of pocket costs for the families (who are often required to stay long distances from home for days or weeks at a time), we set up satellite Kangaroo Mother Care (KMC) units in some of the key delivery sites in Lusaka District that refer preterm babies to WNH. KMC, where preterm babies are carried by their mothers in direct skin to skin contact, remains a proven intervention in saving lives of preterm babies both in health care facilities and in the community, and in most cases reduce the need for an incubator which in the Zambian setting are largely inaccessible.

Methods: This innovation took a two-pronged approach. Firstly, the identification of health facilities that had the required space. Most of the facilities chosen had recently undergone refurbishment through Ministry of Health and Japan International Cooperation Agency (JICA) support. Secondly, training was conducted for health workers

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identified to oversee these new satellite KMC facilities, thereby enabling care to be brought closer to home, and reducing the number of referrals to Women and Newborn Hospital. Funding for training and implementation was carried out using funds from the International Community Access to Child Health (ICATCH) grant.

Post training, the staff from WNH engaged with the implementation phase through weekly mentorship and supervision. Stable preterm babies would be transported from WNH to the satellite KMC facilities closest to their homes to continue KMC.

Results: Since commencing the transfer of premature babies from the tertiary hospital to the district hospitals in May 2021 to October 2022, a total of 233 patients were referred to the new satellite KMC units from Women and Newborn Hospital. The total admissions to these facilities which included in-house admissions was 255. The average weight of the patients referred to the satellite sites was 1.544kg (weight range 1.18 - 2.2kg). The mothers were mostly young mothers with an average age of 26 (age range 19 to 35) years. There was no mortality recorded during the hospital stay at the satellite facilities. We saw a reduced average length of stay in the hospital at the Women and Newborn Hospital KMC unit from 4-6 weeks to 2-3 weeks, a 33% reduction. The numbers of the premature babies reviewed weekly in the outpatient clinic at the tertiary hospital dropped by 50 % from 40-60, to 20 - 30 patients per week over a six-month period. Additionally, the numbers of premature babies reviewed weekly in the district hospitals increased, with 1-9 patients being reviewed in each satellite facility per week, and total reviews of 60 patients in all the facilities over the six-month period.

Conclusion: The decentralisation of KMC neonatal units is a promising development in the efforts to achieve neonatal survival targets in Zambia. This KMC project has demonstrated that, even on a small scale and with limited resources, the health system can be strengthened. With upskilling of staff and redesign of services delivered close to home we have seen a reduction in morbidity related to hospital stay and a reduction in neonatal mortalities. This family centred care in the form of KMC closer to home and community has advanced equitable access to quality care services for premature neonates.

INTRODUCTION

Neonatal Mortality remains the poorest performing indicator worldwide especially in the Sub-Sahara African region.[1,2] Much of the mortality is driven by the inadequate care given to the small and sick newborns.[3] To reduce neonatal mortality and achieve the 2030 SDG target 3.2.2 of less than 12/1000 live births, low cost and high impact interventions like Kangaroo Mother Care (KMC) need widespread implementation.[4,5]

In Zambia, Neonatal Mortality Rate (NMR) is 27/1000 live births as of the 2018 demographic Health Survey.[6] The commonest causes of mortality are prematurity, asphyxia, sepsis and congenital anomalies.[7] With limited specialised units to manage sick and small neonates, reduction in NMR has remained static.[8]

According to the Ministry of Health weekly Maternal and Perinatal Death Surveillance Response (MPDSR) reports, Lusaka district continues to record the highest neonatal mortality in Zambia and most of these deaths occur in the Neonatal Unit at the Women and Newborn Hospital (WNH), the national tertiary level referral hospital for high-risk pregnant women and sick neonates.[9] The situation assessment carried out prior to this project implementation in 2020 showed that despite the relatively high number of hospitals surrounding WNH, neonatal care remains suboptimal as equipment, space and skilled human resource are insufficient to offer advanced neonatal care in these facilities.[10]

Neonates requiring specialist attention are referred to the WNH University Teaching Hospital from urban and peri-urban facilities. There are 12 government delivery facilities, with five being first

level hospitals that conduct operative deliveries in Lusaka. Following the Zambia maternal and neonatal referral guidelines of 2018, these facilities refer all premature babies weighing less than 1.5 Kg and all sick newborns of any weight to WNH.

Situation assessment

The district data identified Kanyama, Chawama, Matero, Chipata and Chelstone first level hospitals as having the highest numbers of deliveries (ranging from 5000 to 14 000 combined deliveries in 2018 and collective referrals of about 100 babies per month to the WNH neonatal unit. Most of these health facilities are largely run by midwives and medical officers, with few Obstetricians and Paediatricians (one per facility) and an overwhelming workload with a ratio of around 1: 10,000 patients per health worker. Although women mostly deliver in facilities nearest their home, intrauterine transfer is done to WNH if high risk. The population of Lusaka is about 3 million people, and the majority of those attending public facilities are not in formal employment (around 30% formally employed with constant income) with an average income of less than $10 per day.[6]

The WNH neonatal unit is overcrowded accommodating over 100 patients in a 40-bed capacity space on a given day. Once stabilized, the premature babies are transferred from the main NICU and admitted to the 26 bed Kangaroo Mother Care (KMC) unit prior to discharge. Admission criteria to the WNH KMC unit includes-stable preterm neonates not requiring respiratory support, feeding by nasogastric or cup or breastfeeding or all the three methods, increasing feeding volumes, not on intravenous fluids and weight 1kg and above. Kangaroo Care involves nursing the baby in skin-to-skin contact with the mother, throughout the day and night to provide warmth and nutrition.[11,12] KMC has been shown to encourage accelerated weight gain, reduced infections and early discharge from the hospital as this practice can be continued in the community after discharge.[13]

Despite WNH Neonatal unit having a 26 bed KMC unit, it is generally run at full occupancy, resulting in babies being discharged home directly from the NICU without this experience. Furthermore, babies are discharged at a weight of 1.4 kilograms instead of the World Health Organisation recommended 1.8Kg due to this limited space.[14] Post discharge, the babies are evaluated weekly in the outpatient clinic for feeding and weight gain. The twice weekly outpatient clinic is overcrowded with at least 50 patients per clinic seen by one or two doctors.

To reduce overcrowding, increase adherence to KMC, and help reduce mothers' out of the pocket expenses as they attend follow up visits at WNH outpatient clinic, we set out to create nurse-led KMC units at health facilities closest to the patient.[15,16] We also anticipated that this would also reduce neonatal mortality secondary to nosocomial cross infection caused by overcrowding.[17] The project objective was to assess the impact of implementation of Kangaroo Mother Care in Lusaka District on the neonatal outcomes at the Women and Newborn hospital neonatal unit and in the satellite KMC facilities.

METHODS

Study design: Implementation science and observational research pilot project.

Outcomes measures indicating successful implementation.

- Number of KMC beds in the district.
- Increasing numbers of patients seen at local KMC unit (both inpatient and outpatient follow-up clinic)
- A decongested outpatient follow-up clinic at the Women and Newborn Hospital

Steps for Implementation

The project was implemented in stages over a 12-month period using the following steps.

Step 1

The objective of this stage was to identify space, Paediatric nurses, Maternal Child Health Coordinators (MCH) and Public Health nursing staff at each of the identified facilities to collaborate in running the soon to be established KMC unit.

The final criteria for selection of these facilities were based on availability of space to accommodate the KMC unit, the willingness of the administration to allocate staff and resources to support setup and running of the satellite KMC unit.

Activities

We held a stakeholder meeting with the Ministry of Health (Director Public Health), Lusaka Provincial Health Office (Clinical Care Specialist) and Lusaka District Management Office to discuss the project's objectives and get buy-in on the proposed sites, with five facilities identified (Box 1)

Box 1: Identified facilities for the satellite KMC units.

- Kanyama first level hospital
- Msisi Mini-Hospital
- Chipata first level hospital
- Chelstone first level hospital
- Levy Mwanawasa Hospital (referral)

The District Principal Nursing Officer was tasked to identify the nursing staff to be situated in the unit and the facility management instructed to identify the space for a KMC unit of 5 to 10 bed capacity.

There was follow-up after one week for feedback from the initial meeting with a task force led by a Lusaka District focal point person who visited the sites for a detailed situational assessment.

Step 2

The objective during this stage was to train the identified staff in implementation of KMC and identification of danger signs, and to introduce the documentation that would accompany implementation. Admission criteria to the satellite KMC units was agreed and disseminated accordingly.

Activities

The identified staff underwent a 5-day training consisting of didactic lectures and hands-on training on KMC, neonatal care and identification of danger signs. The training was conducted by the WNH staff and the two nursing officers from the district facilities who are trained in KMC. Participants also spent 5 days working on the KMC unit at Women and Newborn Hospital with an experienced nurse to gain practical experience. To ensure standardised evaluation and care of patients, the following documents were designed and implemented:

- A one-page follow-up protocol to be used in the facility KMC unit
- A register of the patients to be followed up in the outpatient clinic of each facility was prepared
- Agreed criteria for admission to a district KMC unit (Box 2)

Box 2: Criteria for admission to a district KMC unit

- **Baby:** Must be >1200g, able to cup feed and not requiring any form of respiratory support
- **Mother/Caregiver:** must be in agreement with doing KMC, must be able to breastfeed, and must live within the catchment area

Human Resource

The identified nurse at each of these facilities was the focal point person who ensured implementation of the project. The nurse was responsible for teaching all other members of the nursing team at the facility to:

- record and interpret vital signs
- use the KMC scoring chart appropriately

- safely implement cup and nasogastric tube (NGT) feeding
- identify danger signs and refer in a timely and appropriate manner

A Medical Officer (Neonatology Post graduate fellow) visited the facility once a week to conduct a ward round, review out-patients and enhance training of staff.

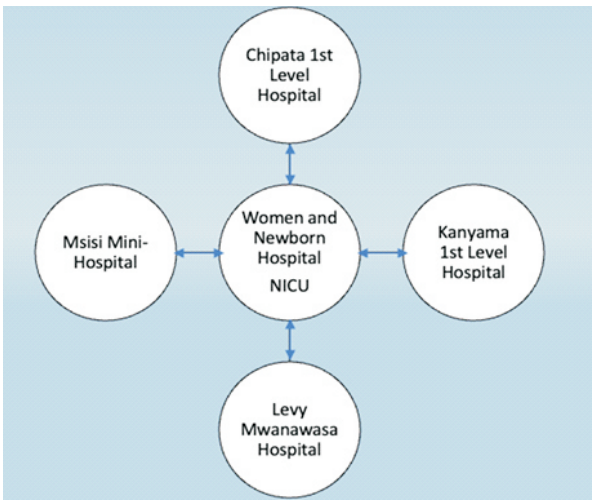
The Sister-in-Charge of the Maternal and Child Health (MCH) department at the facility supported the implementation of KMC at the satellite unit and was responsible for liaising with administration where additional requirements arose (including need for more nursing staff, furniture etc.).

Step 3

The objective in this stage was to set up and begin the day-to-day running of the satellite KMC units, whilst maintaining open lines of communication with the tertiary referral unit at WNH.

Activities

A link was created between the satellite KMC facility and the Women and Newborn neonatology unit by use of telephone calls to the KMC units to alert them of patients being referred to their facility. The proposed patient flow is shown in the diagram below. (Fig 1)



A District Community Newborn Focal Point Person from WNH was responsible for allocating personnel (doctors and nurses) to conduct once a week ward rounds and oversee the outpatient clinic at the satellite KMC facilities to provide technical support.

The new KMC unit register was reviewed weekly to assess how the unit was functioning. Then the WNH follow-up register was also reviewed weekly to see the impact of the intervention in terms of reduced number of follow-up patients seen in the WNH outpatient clinics.

Data Collection

Throughout the implementation stage, data was gathered in three key areas to help with review of the success of the project. The key areas were in the KMC satellite unit - staff training and patient numbers, and then at WNH – the number of patients being followed up in the routine outpatient clinic.

The data was gathered by recording the number of staff trained and included assessment of the nurses' self-perception of capacity and preparation.

At the KMC satellite units, weekly meetings with data review analysed parameters such as number of patients (in admission in KMC; seen as outpatients post discharge; numbers of patients who kept their follow-up appointment and the number who required referral back to WNH due to the presence of complications and danger signs.

Weekly meetings were also undertaken at WNH to analyse the numbers of patients being reviewed in the outpatient clinics.

Clinical audits were undertaken to identify areas for improvement in care provided.

Impact of intervention

The impact of interventions was done by auditing the registers in all respective areas.

The impact of intervention was measured by comparing the:

The number of patients that would present to the outpatient clinic in the Women and Newborn Hospital before and after the project implementation, the numbers of premature babies reviewed weekly in the district hospitals to show the increase in the population of preterm babies that had survived at home post discharge from the KMC unit and returned to the district clinic for review, the average length of stay of the preterm babies in the hospital at the Women and Newborn Hospital KMC unit, the number of deaths in the satellite KMC units which would indirectly reflect on the reduction of neonatal deaths in the overcrowded tertiary neonatal unit.

Summary of Project Implementation

Working with the Ministry of Health, Provincial Health Office, the District Management Team and each of the facilities, space for KMC was identified in five facilities and a needs assessment was done to help budget for the requirements. The teams involved in the implementation process underwent a five-day intensive training in the care of preterm babies, principles and practice of KMC, identification of neonatal danger signs, and neonatal resuscitation

Patients not requiring NICU care and ready to be admitted to the KMC ward were engaged to find out details of their home address and the nearest health facility. The WNH KMC staff got in touch with the said facilities via telephone call to enquire about availability of bed space. Upon referral from the WNH, the mother was transported in the hospital ambulance with a discharge summary note to take to the local clinic for continued admission and follow up. If the baby changed condition whilst at the satellite facility, the nurses trained in identification of danger signs would call for an ambulance to refer the patient back to the WNH NICU. When discharged from the health facility, patients were followed up weekly at the same facilities instead of the patients reporting to WNH. The facility nurses would also link the babies to the community health workers for continued follow-up upon discharge from the KMC unit and from the facility follow-up clinic. A register was created for record keeping and follow-up. Doctors and nurses at WNH KMC unit paid weekly visits to support implementation of KMC in the facilities, conduct ward rounds and review patients in the outpatient clinics.

A joint meeting of all focal point persons of the KMC facilities was held to share experiences, mortality audits and clinical case discussions to consolidate the project implementation.

RESULTS

Summary Table of Situational Assessment (pre-implementation and post-implementation)

Facility	KMC Bed capacity	Status	Date operational	Special Baby Care Unit Space
Chipata First Level Hospital	5 beds	Functional	October 2021	Available
Kanyama First Level Hospital	4 beds	Functional	October 2021	Available
Msisi Mini Hospital	4 beds	Functional	September 2021	Not available
Levy Mwanawasa Hospital	12 beds	Functional	May 2021	Available
Chelstone Zonal Hospital	5 beds	Non-Functional	February 2022	Not available
Matero Level Hospital	0 beds	No space		Available
Chilenje First Level Hospital	0 beds	No space		Available

Training

A total of 29 health care workers underwent the five-day intensive training conducted by staff from the Women and Newborn Hospital. These included Paediatric nurses, midwives, registered nurses and doctors who were involved in the delivery and care of the newborns at the satellite KMC facilities. The training was very useful and eye opening for the staff.

Facility statistics

The average age of mothers referred to these facilities were 26 years old, and the babies weighed approximately 1.544kg.

Chipata First Level Hospital (2021-2022)

Chipata first level hospital has a functional 5 bed KMC unit. The nurse in charge in a Paediatric and Child Health nurse.

	Oct	Nov	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Admissions	09	09	07	10	08	07	08	16	12	06	09	09
Discharges	04	06	07	07	05	05	07	13	11	03	05	07
Deaths	00	00	00	00	00	00	00	00	00	00	00	00
Length of stay												
< 7days	07	04	03	07	06	03	07	14	12	-	08	09
>7 days	02	05	05	06	04	01	07	09	04	03	05	05
Weight in grams												
1000-1499	02	01	01	03	06	05	01	06	02	03	02	02
1500-2499	07	08	06	07	02	02	06	10	06	02	07	05

Total referrals from Women and Newborn Hospital-110

In-house admissions -10

Total admissions -120

No admissions in January due to COVID 19

Kanyama first level hospital (2021 -2022)

Kanyama First Level Hospital has a functional 4 bed KMC unit. The nurse in charge is a midwife.

	Oct	Nov	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Admissions	09	07	-	09	04	08	10	05	03	08	07	01
Discharges	07	06	-	10	06	06	10	06	03	09	09	04
Deaths	00	00	00	00	00	00	00	00	00	00	00	00
Length of stay												
< 7days	04	07	-	06	04	03	08	03	00	02	04	0
>7 days	03	01	-	04	00	04	03	03	03	07	03	05
Weight in grams												
1000-1499	07	07	-	04	00	03	04	00	03	06	02	01
1500-2499	02	01	-	06	04	00	06	06	00	02	05	03

Total referrals from WNH-71

In-house admissions –10

Total admissions –81

No admissions in January (2021) due to COVID 19

Msisi Mini-Hospital (2021-2022)

Msisi Mini Hospital has a 4 bed KMC unit. The nurse in charge is a General(enrolled) Nurse

	Sep	Oct	Nov	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Admissions	04	07	02	-	06	05	09	10	08	06	02	03	04	11
Discharges	03	05	03	-	06	05	09	10	08	06	02	03	04	11
Deaths	00	00	00	-	00	00	00	00	00	00	00	00	00	00
Length of stay														
< 7days	04	01	02	-	00	05	08	06	06	05	02	03	03	09
>7 days	00	05	00	-	00	00	01	04	02	01	01	00	01	02
Weight in grams														
1000-1499	02	02	00	-	03	02	02	03	02	03	02	03	01	07
1500-2499	02	05	02	-	03	03	07	07	06	05	00	00	03	04

Total referrals from WNH-52
In-house admissions -25
Total admissions -77
No admissions in January due to COVID 19

Levy Mwanawasa Hospital 2021

Levy Mwanawasa Hospital is tertiary level hospital with a level I NICU.

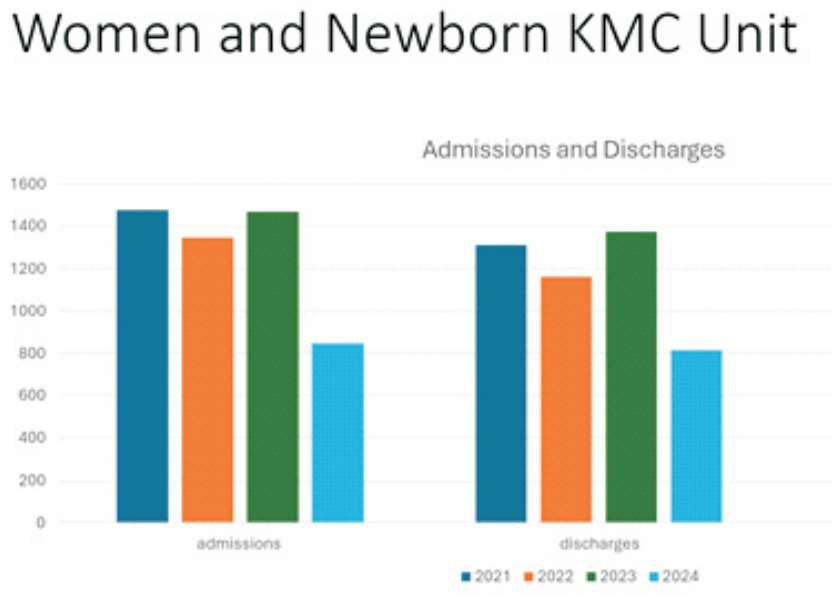
	May	Jun	Jul	Aug	Sep	Oct	Nov
Admissions	21	15	11	03	17	11	08
Discharges	18	10	08	02	15	08	07
Deaths	00	00	00	00	00	00	00
Length of stay							
< 7days	12	03	07	01	17	09	04
>7 days	09	12	04	00	00	02	05
Weight in Grams							
1000-1499	12	09	06	03	07	03	05
1500-2499	08	04	03	00	10	08	04

In-house admissions -86
During implementation, a 12 bed KMC unit was created but later reduced to a 6-bed unit.
All admissions were in-house.

Aggregated statistics 2021-2024

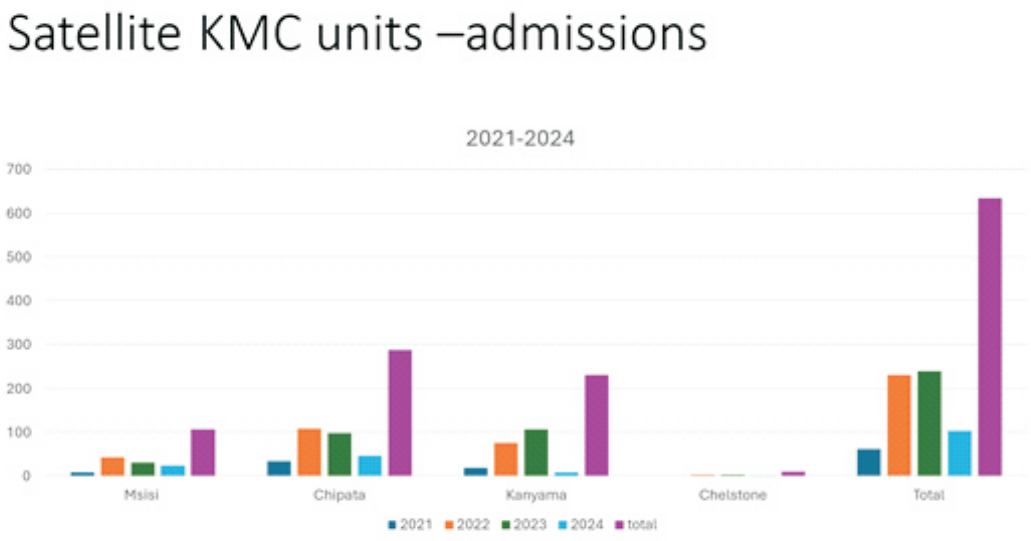
Women and Newborn KMC Unit

Year	2021	2022	2023	2024
Admissions to KMC	1476	1346	1469	847
Discharges from KMC	1312	1163	1375	814
% Discharges	88	86	93	96



Satellite KMC Units

Facility	Oct-Dec 2021	2022	2023	Jan-June 2024	Total Admissions
Msisi Mini Hospital	08	43	31	24	106
Chipata FLH	35	108	98	47	288
Kanyama FLH	18	76	106	09	231
Chelstone Zonal Hospital	00	04	04	02	10
Total Number of patients admitted	**61**	**231**	**239**	**104**	**635**



Summary results

In the first year of the project implementation, a total of 233 patients were referred to the new satellite KMC units from Women and Newborn Hospital. The total admissions to these facilities which included in-house admissions was 255. There was 0% mortality during the stay in the satellite KMC facilities. Only two out of the very low birth weight babies were sent back to WNH for treatment when they developed sepsis and required respiratory support.

A review of data from September 2021 to October 2022 reveals that the commencement of transfer of premature babies from the tertiary hospital to the district hospitals had seen a reduced length of stay in the hospital from 4-6 weeks to 2-3 weeks; a reduction of 33%, with most babies staying for less than a week in the satellite KMC units**.** The numbers of the premature babies being reviewed weekly in the outpatient clinic at the tertiary hospital dropped by 50 % from 40 -60, to 20-30 patients per week over a six-month period. Additionally, the numbers of premature babies reviewed weekly in the district hospitals increased, with 1-9 patients being reviewed in each satellite facility per week, and total reviews of 60 patients in the facilities over the six months period. The average weight of the patients referred to the satellite sites was 1.544kg (weight range 1.18 to 2.2kg). The mothers were mostly young mothers with an average age of 26 years (age range 19 to 35 years). The aggregated statistics from 2021 to 2024 has shown a progressive increase in the number of patients admitted to the satellite KMC units.

DISCUSSION

In a previous study that was done at WNH KMC unit, results showed that KMC is a feasible intervention that can improve neonatal outcomes among preterm infants in Zambia. The study findings showed a promising, practical approach to scaling up KMC in Zambia.[4]

Achievements of our project

One major achievement of the KMC satellite clinic project was the increase in capacity that this project generated. Because increasing bed capacity was also coupled with upskilling of health care staff in the satellite facilities, capacity for delivery of equitable health services closer to home was also increased. Alongside skills in KMC, skills in neonatal resuscitation and identification of danger signs were

imparted not only to skilled health workers but also Community Health Workers.

The development of satellite KMC facilities but maintaining remote and on the ground support from the tertiary level NICU staff in turn led to safe implementation of KMC in the district and in turn resulted in decongestion of WNH NICU and WNH KMC unit. Of note, there was a decrease in outpatient follow-up reviews at WNH as these were decentralised to the district KMC facilities. There was also an increase in stable preterm and low birth weight neonates admitted directly to the satellite facilities after birth.

In a cross-sectional, mixed-method research design study done across four countries namely Malawi, Rwanda, Uganda and Mali, institutions that fared better had a longer history of kangaroo mother care implementation or had been developed as centres of excellence or had strong leaders championing the implementation process. Important factors identified in implementation are training and orientation; supportive supervision; integrating kangaroo mother care into quality improvement; continuity of care; high-level buy in and support for kangaroo mother care implementation; and client-oriented care.[18]

Although this was not quantified, there was reduced cost for the health facilities, both the tertiary and district, due to quicker discharge/ shorter length of stay. There was a 13% reduction in the length of hospital stay at the tertiary institution and most babies stayed for less than a week in the satellite KMC units. Additionally, the mother was empowered to become primary care giver earlier, thereby reducing the burden of caregiving on the health workers and the system. Having the mother-infant dyad close to home reduced out of pocket costs for the family and provided a model for family-centred care where emotional and physical support by the father and other close relatives is more easily provided.

In a review that included thirty studies to examine barriers and facilitators to kangaroo mother care practice at health systems level, health worker experiences and perspectives of mothers and their families were evaluated. Strong local leadership was essential to overcome barriers of inadequate space, limited budget for supplies, inadequate staffing, lack of guidelines and policies and insufficient supportive supervision. Workload burdens, knowledge gaps and staff attitudes were highlighted as challenges at health workers' level, which could be supported by sharing of best practices and success stories. Support for mothers and their families was also identified as a gap.[20] These factors were not easily picked up in our project but should be evaluated as the implementation process continues.

Our project increased opportunity to raise awareness in the local community that preterm babies can survive when cared for in KMC with resulting strengthening of community KMC post discharge. Of the cohort referred to the satellite KMC units, there were no mortalities recorded, indicating that this is a safe method of step-down care and discharge with follow-up. Of the two cases who required referral back to the tertiary level unit, one died (weighed 1.18kg at referral due to insistence to be discharged by the mother who had poor social support) and the other one was discharged to go home.

During project implementation it was noteworthy that peripheral facilities be equipped to stabilise pre-referral babies who were not meeting the criteria for KMC satellite care. As such, UNICEF through Ministry of Health procured essential equipment such as phototherapy machines, CPAP machines and oxygen concentrators for two of the first level facilities. This resulted in bringing Special Care (Level 2) nearer home and subsequently reduced the need for such cases to be referred to WNH.

Although community health workers are not on the government payroll and are usually paid in kind by facilities, their important role was noted during the

implementation phase, with their presence making a difference in the facilities. Their roles included follow–up of the mother or guardian upon discharge, reminding caregivers of review dates, facilitating conversations about KMC in the community (IEC) and assisting the health workers in the facility (e.g. weighing the babies, supervising mothers for 2-hourly feeds, cleaning of rooms and feeding equipment)

Challenges

Neonates were not prioritized for transport even though a referral system is in place. There was no 'neonatal-friendly' ambulance to transport neonates to and from WNH and district KMC units. The available ambulance had no personnel trained in advanced neonatal care / stabilisation before transfer.

Staffing also proved challenging, for example there was no Paediatrician in any of the district KMC units. In some facilities, like Msisi Mini Hospital, there is no medical officer despite high patient load in maternity services (>100 deliveries monthly). Additionally, there were inadequate nurses and nutritionists. Most facilities did not have CHAs, and those that did, had no supportive system for the Community Health Workers, making the system unreliable.

Most district facilities were lacking consumables and equipment, with most resuscitaires non-functional and neonatal oxygen tubing lacking. There were also no suctioning machines for neonates, no equipment for advanced neonatal care, heaters, phototherapy machines, preterm formula and no essential drugs such as vitamin K, phenobarbitone, 10% dextrose, adrenaline, aminophylline, and multivitamin syrup and iron supplements recommended for preterm babies.

The manual data collecting registers was incompletely filled in making data collection for analysis suboptimal.

Generally, there may have been a selection bias to facilities that were willing to set up the KMC units which may result in the good outcomes seen in the project.

Future Prospects

Support from facility management and leadership and well-trained medical staff are of great significance to the successful integration of KMC into daily medical practice, while the parents of preterm infants and other family members should be educated and encouraged in KMC practice.[19]

After the first year of successfully running of the KMC units in the initial 5 facilities, this can be rolled out to the rest of the delivery facilities in Lusaka and other districts in the country, if sufficient investment and leadership is available. Widespread implementation of KMC has the potential to ultimately result in reduced neonatal mortality and morbidity in the country.

In the meantime, we endeavour to continue implementation of KMC district units in Lusaka district and province, whilst gathering further data of its beneficial impact as well as learning from the challenges presented through regular audit and quality improvement.

We have also recognized that it is possible for milder cases of conditions such as RDS to be adequately cared for in the district through opening of Special Care Baby Units and NICUs to stabilise premature babies and avoid transfer to WNH. To achieve this, there will be need to lobby for additional equipment and staff along with a budget for training through MoH and Partners. Attention to the incorporation of CHAs in the recruitment of health care workers is one method of boosting staff support and community links in the district KMC units.

Internationally there is a move towards recognition of the value of early father involvement in neonatal care, so moves to assess the cultural barriers to the implementation of Kangaroo Father care as part of family centred care need to be made and addressed (19).

There is urgent need of neonatal friendly ambulance and prioritizing of neonatal transfers to reduce on neonatal mortalities both in the capital city and the distant rural districts.

CONCLUSION

The decentralisation of KMC neonatal units in Lusaka District, Lusaka Province, Zambia is a promising development in the efforts to achieve neonatal survival targets in Zambia. This KMC project has demonstrated that, even on a small scale and with limited resources, the health system can be strengthened. With upskilling of staff, strong leadership and redesign of services delivered close to home, we have seen a reduction in morbidity related to hospital stay and a reduction in neonatal mortalities. This family centred care in the form of KMC closer to home and community has advanced equitable access to quality care services for premature neonates.

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Collaborating Partners/funding involved with KMC District implementation

- International Community Access to Child Health (ICATCH) project funding was used partly in procurement of 4 industrial heaters for the Kanyama and Chipata first level Hospitals KMC units. The same grant was used in a 5-day training held in April 2020 to train Health workers that were going to run the KMC units.
- MOH/JICA: The refurbishment of the first level Hospitals paved way to creating space for the establishment of the KMC units. The ministry also gave a go ahead in this pilot programme in Lusaka District.
- LPHO/MOH: Procured much required linen, beddings and pillows for the KMC units.
- MOH/UNICEF: procurement of essential equipment e.g. Phototherapy machines, Diamedica CPAP machines, Oxygen concentrators etc.

Step 1: Pre-Implementation	
Stakeholder meeting with MoH	Director of Public Health, Clinical Care Specialist, and Lusaka District Health Management team
Identify health facilities	Kanyama, Msisi, Chipata, and LM-UTH
Identify space for a KMC ward	5-10 beds
Identify personnel	Paediatric Nurse, MCH Coordinator, and Public Health Nurse
Step 2: Training	
• Training	5-day didactic training (lectures and hands-on) on KMC, ECSB, including identification of danger signs Trained nurses were responsible for training their facility staff (e.g., record and interpretation of vital signs, use of the KMC scoring chart, cup and nasogastric tube (NGT) feeding, identification of danger signs and referral procedure)
• Follow-up visits	Weekly follow-up visits were organized by WNH NICU Neonatologist/Fellow

Step 3: Implementation	
• Implementation of KMC Ward	KMC guidelines KMC scoring chart Bag and mask resuscitator Referral/linkage to WNH NICU
Step 4: Monitoring and Evaluation	
• Monitoring	# of KMC admissions # of admitted preemies # of referrals to WNH NICU # of postnatal visits at site (by those admitted to the KMC ward) # of postnatal visits at WNH outpatient follow-up clinic (by those admitted to the KMC ward at the satellite site)

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Author contributions

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