

Long-term outcome of preterm infants discharged home on kangaroo care in a developing country

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Summary Several hospital-based studies have shown the beneficial effect of kangaroo care on preterm infants. Long-term outcome was studied in 297 preterm infants born at Harare Hospital weighing 500–1800 g, discharged home on kangaroo care and followed up for 12 months. Of these, 79 (26.6%) died, 141 (47.5%) survived to complete follow-up and 77 (25.9%) were lost to follow-up. Of those who died, median birthweight was 1460 g, median age at hospital discharge 7 days, median weight at discharge 1400 g and median age at death 66 days. Of those who completed follow-up, median birthweight was 1575 g, median age at hospital discharge was 6 days and median weight at hospital discharge was 1500 g. Of those who were lost to follow-up, median age at loss to follow-up was 70 days, median birthweight was 1540 g, median age at hospital discharge was 5 days and median weight at hospital discharge was 1500 g. The hospital re-admission rate was 22.9% with 8.8% mortality. Maternal mortality and chronic morbidity rates were 4.7% and 7.4%, respectively. On comparing those who died with those who completed follow-up, mother's age <20 years, birthweight <1500 g and maternal mortality and chronic morbidity were significant risk factors for infant mortality. Age at discharge and weight at birth and on discharge were not significantly associated with infant mortality.

Introduction

Provision of adequate neonatal care for low birthweight infants remains a major challenge in most developing countries where birth and death rates are high. The kangaroo care method has been shown to be safe and effective and to reduce the duration of hospital stay,^{1–7} and some studies strongly suggest that it leads to better breastfeeding practices, mother–infant bonding and growth and survival.^{2,8–10} Several studies that have documented good outcomes in preterm infants using the kangaroo care method have been based in a hospital setting. Data on the

long-term outcome and factors associated with mortality in preterm infants discharged home from hospital on kangaroo care in sub-Saharan Africa are scanty. We therefore conducted a study to determine these factors.

The objectives of the study were to determine the 12-month survival of preterm infants with birthweights between 500 and 1800 g who were born and discharged from a tertiary level hospital on kangaroo care, and to identify factors associated with mortality after discharge from hospital.

Material and Methods

A prospective, descriptive study was conducted. All preterm infants born at Harare Hospital Maternity Unit (HHMU) weighing

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500–1800 g, admitted to Harare Hospital neonatal unit (NNU) between January and May 2000 and discharged from hospital using the kangaroo care method (KCM) were followed up and studied. HHMU is a tertiary level referral and teaching hospital with approximately 20,000 deliveries a year. It has a 100-bed neonatal unit (including a neonatal intensive care unit with four beds) and a 12-bed kangaroo care unit (KCU). All infants born weighing <1800 g, once stable, are sent to the KCU where mothers are taught how to breastfeed and keep their babies warm using KCM. Infants are discharged home from this unit if they are breastfeeding well and mothers are confident and comfortable about using KCM at home. Mothers are advised to keep their babies in the kangaroo care position at all times, except for brief periods when they have to use the bathroom. They are advised to stop KCM when the infant weighs ≥ 3000 g. Fathers are also encouraged to participate in KCM, starting before discharge, if they are available.

Sample size calculations for this study were based on the 1998 NNU statistics. Using these data, 1264 (23%) of 5397 neonatal admissions weighed ≤ 1800 g, 352 (28%) of whom died in hospital and 912 of whom survived to be discharged home. Given an expected mortality rate of 25% after hospital discharge, a worst acceptable frequency of 30% and a confidence interval of 95%, the Epi Info statistical package gives a sample size of 224 infants for a population survey. Thus, recruiting infants over a 5-month period provided the required sample size and allowed for a loss-to-follow-up rate of 30%. Consecutive preterm infants weighing 500–1800 g at birth and admitted to the NNU were identified by two trained research nurses recruited for the study and followed up for 12 months. The two research midwives were engaged full-time by the project and trained to identify eligible infants and collect the necessary data. Information was recorded on a standard data collection

form that captured in-hospital and follow-up data. The study variables included mother's age, parity, antenatal booking status, mode of delivery, date of delivery and the infant's birthweight, estimated gestational age at birth, age at discharge from hospital, weight at discharge and illnesses while in hospital. While data on estimated gestational age (EGA) were collected, this variable was not analysed since EGA was based on a history of the last menstrual period which is unreliable in our population. Birthweight was therefore deemed more objective. During follow-up, information pertaining to maternal health, frequency of illness in the infant and survival of both infant and mother was documented.

Mothers were fully informed about the study and the need to adhere to follow-up until infants were 12 months of age. The guiding principle for the researchers was to do no harm. No necessary treatment was withheld from any infant because of the study. Infants benefited from this unusually prolonged period of follow-up by specialists. Parents' travel expenses incurred during follow-up were re-imbursed to minimise loss to follow-up. Permission to conduct the study was granted by the hospital superintendent.

Data were cleaned and entered into the Epi Info version 6.04 statistical package for analysis. Frequencies, odds ratios and 95% confidence intervals (95% CI) were calculated.

Results

A total of 490 infants with birthweights between 500 and 1800 g were born alive at Harare Hospital and admitted to the NNU during the recruitment period of January to May 2000. Of these, 193 (39.4%) died in hospital and 297 were discharged on kangaroo care. Of the 297 infants who were discharged on kangaroo care, 79 (26.6%) died during follow-up, 141 (47.5%) completed 1 year of follow-up and 77 (25.9%) were lost. Of those who died after being discharged, the median birthweight was

1460 g, median age at discharge was 7 days, median weight at discharge was 1400 g and median age at death was 66 days (Table 1). Of those who completed follow-up, the median age of the mothers was 25 years, the median birthweight of the infants was 1575 g, median age at discharge was 6 days and median weight when discharged was 1500 g.

Of those who were lost to follow-up (25.9%), the median age at loss to follow-up was 70 days. Median birthweight was 1540 g, median age at discharge from hospital was 5 days and median weight at discharge was 1500 g. Defaulters were followed up at home and common reasons for loss to follow-up were divorce, loss of employment or death of a parent, in which case there was relocation of parent(s), making them untraceable beyond the address given in hospital.

Maternal mortality and chronic morbidity rates were 4.7% and 7.4%, respectively. Of the 297 infants, 68 (22.9%) required re-admission to hospital, 8.8% of whom died.

The median age at which weaning foods were started was 6 months. Most mothers reported that they breast-fed exclusively before this time.

Factors significantly associated with infant mortality after hospital discharge were mothers aged <20 years (OR 1.68, 95% CI 1.13–2.51), birthweight <1500 g (OR 1.42, 1.0–2.01), death of the mother (OR 1.97, 1.11–3.51) and chronic illness in the mother (OR 2.67, 1.96–3.64) (Table 2). Neonatal intensive care included the use of continuous positive airway pressure and intermittent positive-pressure ventilation, where indicated.

The mean frequency of illness was two attacks per year. The common reasons for seeking health care were acute respiratory infections, including pneumonia, diarrhoea, fever and poor weight gain.

Discussion

This study set out to determine outcome in infants born weighing 500–1800 g at a tertiary level hospital and the factors associated with mortality over a 12-month period. There was an unacceptably high fatality rate in hospital in the study population, the reasons for which need further investigation. Possible explanations might include rapidly declining quality of neonatal care in this hospital coupled with poor maternal health owing to HIV. Mothers in this population seek antenatal care late and if they deliver prematurely a significant number of pregnancies would be unbooked. This trend is worsening as socio-economic conditions decline.

Of those who died during follow-up, mortality occurred mainly around 2 months of age. This is usually the time when mothers are advised to stop kangaroo care as most of these infants will have reached 3 kg weight. This finding is disturbing, given the efforts and resources that will have gone into getting this preterm infant this far in life. What actually contributes to death at this time is unclear and needs further investigation. Unfortunately, there was no comparable group of infants who were discharged not on KCM in this institution. Compliance with KCM is very high in this population as

TABLE 1. General characteristics of study participants.

	Died after discharge	Lost to follow-up	Completed follow-up
Birthweight (g)	1460 (915–1620)	1540 (950–1700)	1575 (850–1700)
Weight at discharge (g)	1400 (830–1560)	1500 (1040–1630)	1500 (910–1650)
Age at discharge (d)	7 (1–14)	5 (1–9)	6 (1–13)
Age at death/lost (d)	66 (3–98)	70 (1–127)	

All values are median (25th and 75th quartiles).

TABLE 2. Risk factors for mortality after discharge from hospital.

	Died, <i>n</i> = 79	Completed follow-up, <i>n</i> = 141	RR (95% CI)
<i>Residence</i>			
Rural	8	7	1.54 (0.93–2.56)
Urban	71	134	
<i>Mother's age</i>			
<20 y	18	17	1.68 (1.13–2.51)
≥20 y	48	109	
<i>Parity</i>			
0	36	48	1.35 (0.95–1.91)
1–7	43	92	
<i>Booking status</i>			
Unbooked	42	63	1.26 (0.88–1.79)
Booked	36	77	
<i>Mode of delivery</i>			
Breech	7	11	1.11 (0.60–2.05)
LSCS	12	19	
NVD	60	111	
<i>Birthweight</i>			
<1500 g	42	55	1.42 (1.00–2.01)
1500–1800 g	37	84	
<i>Male</i>			
	39	60	1.14 (0.80–1.62)
<i>Female</i>			
	40	76	
<i>ICU care</i>			
Yes	8	7	1.54 (0.93–2.56)
No	71	134	
<i>Age at discharge</i>			
<4 d	21	49	0.78 (0.51–1.17)
≥4 d	58	92	
<i>Weight at discharge</i>			
<1500 g	49	68	1.42 (0.98–2.06)
≥1500 g	30	72	
<i>Mother's condition</i>			
Died	5	3	1.97 (1.11–3.51)
Chronic illness	11	2	
Well	63	136	2.67 (1.96–3.64)

n < 79 and 141 for some variables because of missing information.

it is easy to convince mothers that it is the best way to keep their baby warm. Indeed, it is the only method taught before hospital discharge.

High maternal chronic morbidity and mortality rates were observed and this impacted negatively on infant outcome. This finding advocates strategies to improve maternal health in all programmes aimed at reducing infant mortality, such as the Pre-

vention of Mother-To-Child Transmission of HIV programme. The role of infections such as HIV/AIDS in maternal health was not investigated in this study.

The fact that birthweight and mother's age predicted mortality was not surprising, but the fact that age and weight at discharge were not predictors of mortality was unexpected. Possible explanations might include the high small-for-gestational-age rate in this unit.

These data suggest that birthweight and mother's age and health are critical to the 1st-year survival of preterm infants after discharge from hospital on kangaroo care and should be taken into account. The fact that weight and age at discharge were not significant predictors of mortality should be interpreted with caution.

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