

# Outcome of premature neonates born in a tertiary neonatal intensive care unit in Nairobi, Kenya

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## Abstract

In this retrospective review, premature neonates less than 34 weeks gestation admitted to a tertiary neonatal intensive care unit (NICU) in Nairobi, Kenya from February 2012 to October 2015 were identified from medical records and database. There were 88 neonates admitted to the neonatal unit, out of which 78 survived. There were 10 pairs of twins and 1 set of triplets. The gestational age ranged from 26 weeks to 33.7 weeks gestation, with a mean gestation of 30.3 ( $\pm$  1.8) weeks, and a mean birth weight of 1,508 ( $\pm$  381) g. The smallest neonate who survived weighed 800 g. Smaller babies needed mechanical ventilation for a longer duration and stayed longer in NICU. Less than half of the neonates in our cohort received antenatal dexamethasone. We plan to have further discussion with the obstetricians to increase antenatal steroid use. Ten babies died during this period. With improved perinatal care in Kenya, we anticipate better survival and outcome of these preterm babies.

## Keywords

Neonatal Intensive Care, preterm, premature, Kenya, survival, gestation.

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## Background

In 2009, there were 42,013 neonatal deaths in Kenya, and neonatal death forms a significant proportion of under-five deaths after which child mortality starts to decline [1-3]. In 2002, Were et al. reported the overall neonatal survival of infants born below 2,000 grams at Kenyatta National Hospital, Kenya to be 62.6% [4]. None of the infants born less than 1,000 grams survived the neonatal period. The investigator commented that a significant proportion of deaths occurred in the first week of life due to lack of neonatal intensive care facilities and inadequate obstetric services [4].

A recent survey on the publicly funded neonatal services in 22 hospitals across Kenya found that most of these hospitals can provide basic neonatal interventions such as neonatal resuscitation, phototherapy, kangaroo care and commonly used antibiotics [1-3]. This survey identified birth asphyxia prematurity, low birth weight and neonatal sepsis as the main reason for admission and mortality in these neonatal units. However, tertiary neonatal services are very limited.

In 2006, one of the authors (A.P.) had the opportunity to undergo 12 months training in a tertiary neonatal intensive care unit in Queensland, Australia. Upon his return to Kenya, he developed tertiary neonatal services at The Nairobi Hospital. Currently, this neonatal unit has six level 3 intensive care cots. There are 4 neonatal consultants currently working in the unit, who are supported by resident neonatal doctors (registrars), with 1-to-1 nursing patient ratio. In 2012, a prospective neonatal database was established, and this report reviews the outcomes of babies admitted to the unit.

## Method

In this retrospective review, premature neonates < 34 weeks gestation, needing admission to the neonatal intensive care unit (NICU) from February 2012 to October 2015 were identified from medical records and database. This study was approved by the Nairobi Hospital's Ethics Committee. Data is presented as mean (SD) or median (IQR) where appropriate. Statistical analysis was carried using MedCalc® Statistical Software version 16.4.3 (MedCalc® Software bvba, Ostend, Belgium).

## Results

88 neonates were admitted to the neonatal unit, out of which 78 neonates survived. There were 10 pairs of twins and 1 set of triplets. The gestational age ranged from 26 weeks to 33.7 weeks gestation, with a mean gestation of 30.3 ( $\pm$  1.8) weeks, and a mean birth weight of 1,508 ( $\pm$  381) g. 29 out of 78 (37%) of the babies received antenatal steroids. All babies received at least one dose of surfactant. The median duration of respiratory support on mechanical ventilation was 14 (IQR: 7-18) hours and median duration on CPAP was 8.1 (IQR: 1-18) hours. The median time taken to reach full enteral feeding (150 ml/kg/day) was 5 (IQR: 5-7) days. The mean duration of stay in hospital was 37 ( $\pm$  17) days, and the median discharge weight was 1,900 (IQR: 1,808-1,926) g. None of the babies received total parenteral nutrition and only expressed breast milk was used. Smaller babies needed mechanical ventilation for a longer duration (correlation coefficient: -0.22,  $p$  = 0.04) and stayed in the neonatal unit for a longer duration (correlation coefficient: -0.83,  $p$  < 0.0001).

We carried out subgroup analysis on very low birth babies (birth weight < 1,500 g). There were 26 babies in this group. The smallest neonate who survived weighed 800 g. The mean BW was 1,138 ( $\pm$  174) g, and the mean gestational age was 28.2 ( $\pm$  1.1) weeks. Mothers of 14 neonates received at least one dose of antenatal steroids. All neonates received one dose of surfactant at birth and required mechanical ventilation for a median duration of 16.1 (IQR: 7.5-19.0) hours followed by CPAP (duration 16.0 [IQR: 10.2-29.0] hours). Total parenteral facilities were not available, hence early enteral feeding was commenced and full enteral feeding (150 ml/kg/day) was reached in 6 ( $\pm$  1.3) days. The average length of stay in hospital was 52.8 ( $\pm$  12.8) days with average weight at the discharge of 1,911 ( $\pm$  94) g. No babies developed necrotizing enterocolitis. The only set of triplets were born at 31 weeks of gestation (weights of 1,760 g, 1,180 g and 1,670 g) and were discharged after 41 days in the hospital. Ten babies died during hospitalisation (5 from neonatal sepsis, 4 from pulmonary haemorrhage and 1 from aspiration pneumonia).

## Discussion

In Africa, the outcome of premature neonates varies from country to country [1-3]. The outcome of extremely preterm babies admitted to tertiary

NICU in South Africa, for example, ranged from 26.5% to 34% [4]. To the best of our knowledge, this is the first report from a neonatal unit providing tertiary neonatal services in Nairobi, Kenya. Due to the limitation of services and support, only babies born at 26 weeks gestation or more were provided intensive care. This audit revealed that less than half of the mothers of babies admitted to the neonatal unit received antenatal steroids, and the reason for this is yet to be determined.

The data presented here is from a privately run neonatal intensive care unit. Private health insurance, although limited, has been expanding over the last 10 years. In 2007, approximately 25% of Nairobi residents reported having private health insurance, while membership in regional areas was as low as 5% [5]. We believe the number of women undergoing treatment for infertility has been increasing, and this could be a reason why 25% of our admissions were twins.

Challenges that were faced when developing this service were the lack of equipment, trained medical and nursing staff. Over the years, in-house training of nurses and registrars has helped alleviate this challenge to some extent. There has been a recent increase in the availability of training in perinatal medicine in the region [6], and we envisage the number of trained clinician in perinatal medicine to increase in the next few years.

## Conclusion

To our knowledge, this is the first time that data from a tertiary NICU in Kenya is presented. Less than half of the neonates in our cohort received

antenatal dexamethasone. We plan to have further discussion with obstetricians to increase antenatal steroid use. With improved perinatal care in Kenya, we anticipate better survival and outcome of these preterm babies.

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## Declaration of interest

The Authors have no conflict of interest to declare. Funding: nil.

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