

Care of the Sick Newborn in a Cottage Hospital Level in a Developing Country

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Abstract

Introduction: Neonatal morbidity and mortality are high in Nigeria. The establishment of more centers that could offer adequate management of high-risk pregnancies and neonates is essential. **Objectives:** This study seeks to describe sick newborn care at the cottage hospital level in Southern Nigeria with the aim of drawing lessons that may be useful to similar environments. **Subjects and Methods:** A description of facility upgrading and staff training in perinatal care at a public-private partnership cottage hospital with a robust community health insurance scheme in Nigeria is made. A retrospective descriptive study of the morbidity and outcomes of admitted neonates in the facility between March 2016 and February 2017 was made. **Results:** Out of 3630 babies born in the facility (302 per month), 189 were admitted, yielding an admission rate of 52.1/1000 live births. The main morbidities were neonatal hypoglycemia (32.4%), preterm low-birth weight (24.9%), neonatal sepsis (22.8%), and neonatal jaundice (12.7%). Sixteen of the 109 neonates died giving a mortality rate of 8.5%. The main causes of deaths were birth asphyxia (7 or 43.8%), meconium aspiration (6 or 37.5%), and congenital malformation (3 or 18.8%). **Conclusion and Recommendations:** The neonatal admission and mortality rates are quite low in this cottage hospital and similar to the situation even in developed environments. This salutary scenario is probably due to good antenatal and perinatal care, and a robust community health insurance scheme which enhances services uptake and public-private partnership which engenders infrastructure expansion and maintenance. This model is recommended for the hospitals in our region.

Keywords: Cottage hospital, morbidity, newborn care

INTRODUCTION

Globally, neonatal deaths accounted for 38% of childhood deaths in 2000.¹ In Nigeria, neonatal mortality rate stagnated at 41/1000 live births between 1990 and 2013,² the major causes being birth asphyxia, prematurity, and low birth weight.^{3,4}

Improvement of the quality of maternal and child health services,² and more specifically, the establishment of more centers that could manage high-risk pregnancies and neonates are needed.³

This article describes the efforts at improved sick newborn care in a Community Cottage Hospital in Nigeria. It is hoped that the aspects of our experience can serve as a model for similar communities.

SUBJECTS AND METHODS

This was a retrospective, descriptive study of all ill neonates managed at the Obio Cottage Hospital (OCH) Obio/Akpor

Local Government Area (LGA) of Rivers State in Southern Nigeria from March 2016 to February 2017. OCH was established in 1978 by the government of Rivers State as a Primary Health Center providing preventive and curative health care services mainly to the indigenes of Obio/Akpor LGA of the state. In 2008, Shell Petroleum Development Company (SPDC) started supporting the facility as part of its social infrastructure programme. SPDC upgraded and rehabilitated the facility, converting the four bed health center operating in a twin bungalow with 13 staff to a 56 bed facility

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with staff strength of 164, including 13 doctors and 58 nurses. It has an Obstetrics and Gynaecology Department with antenatal care (ANC), delivery services, and an obstetrics theater. It also has a children's ward. A small neonatal unit was established in 2016, equipped with three infant incubators, four cots, three oxygen concentrators, and bubble continuous positive airway pressure ventilation, and exchange blood transfusion sets, pulse oxymeters among other basic equipment. The obstetric theater is equipped with radiant warmers and neonatal resuscitation sets. Annually, the SPDC engages an obstetrician and a pediatrician on sabbatical appointment to oversee services in the facility.

To activate the newborn unit, the medical and nursing staff were put through basic training with focus on antenatal care, labor management including active management and use of partograph, neonatal resuscitation, incubator care, feeding of the newborn, and exchange blood transfusion, among others. Solar power had been introduced to ensure the uninterrupted power supply in the hospital. This has been described elsewhere.⁵ SPDC had also introduced a Community Health Insurance Scheme in the center in 2010 which has markedly improved access to services. This has been described in previous publications.^{6,7}

All neonates managed in the newborn unit, children's ward, and with their mothers in the postnatal wards in the period were recruited into the study. Their gender and indications for admission, places and modes of delivery, clinical and laboratory diagnoses, management and outcome were documented.

The data were extracted from the case files and entered into a spreadsheet and checked for accuracy. Data were then transferred to Starta 12 software (STATA corp, Texas, USA) and analyzed using simple proportions and tables. Ethical approval was obtained from the Research Ethics Committee of the University of Uyo Teaching Hospital, Akwa-Ibom State, Nigeria.

RESULTS

During this period, 3630 babies were delivered at the OCH. Of these 2405 (66.3%) had vaginal delivery and 1225 (33.7%) were delivered by cesarean section.

One hundred and eighty-nine neonates were admitted in the facility during the period; 109 (57.7%) were males while 80 (42.3%) were females. This gave a neonatal admission rate of 52.1/1000 live births.

All the admitted neonates were delivered at OCH; 80 (42.3%) by spontaneous vaginal delivery, 98 (51.9%) by cesarean section, and 1 (0.5%) by assisted vaginal delivery. There was no information for 10 (5.3%) babies.

The mean birth weight was 3.0 ± 0.8 kg. One hundred and sixteen or 61.4% had normal birth weight (2.5–4.0 kg), 51 (27.0) were low birth weight, and 1 (0.5%) very low birth

weight (1.0–1.4 kg). Eighteen (9.5%) were macrosomic (>4.0 kg). There was no extreme low birth weight. There was no record for three (1.6%) infants.

Indications for admission/special care

Table 1 shows the indications for admission/special care of the neonates. About a third (32.4%) was managed for neonatal hypoglycemia, about quarter each for preterm low birth weight (47 or 24.9%) and neonatal sepsis (43 or 22.8%). The other important indications for admission were perinatal asphyxia (29 or 15.3%), neonatal jaundice (24 or 12.7%), and birth asphyxia and meconium aspiration (9.2%).

Outcome

The mean duration of stay in care was 6.5 ± 1.8 days with 170 (89.9%) staying 7 days or less and 19 (10.1%) more than a week. One hundred and fifty-four (81.5%) were discharged home; 4 (2.1%) referred to tertiary hospital while 8 (4.2%) left against medical advice. Sixteen (8.5%) died giving a neonatal mortality rate for this facility of 4.4/1000 live births. There was no information on outcome for 7 (3.7%). The important identified causes of deaths [Table 2] were birth asphyxia (7 or 43.8%), meconium aspiration (6 or 37.5%), and congenital malformations (3 or 18.8%). Causes could not be identified for 2 or 12.5% of the neonates. Four (25.0%) of the deaths occurred within the first 24 h of admission and 11 (68.8%)

Table 1: Sociodemographic and delivery characteristics of neonates in care at Obio Cottage Hospital ($n=189$)

Variable	Frequency (%)
Sex	
Male	109 (57.7)
Female	80 (42.3)
Age group at birth/weeks	
<36	58 (30.7)
36-40	110 (58.2)
>40	21 (11.1)
Mean age at birth \pm SD	37.3 \pm 2.6
Mode of delivery	
SVD	80 (42.3)
CS	98 (51.9)
Assisted VD	1 (0.5)
Nil response	10 (5.3)
Outcome	
Discharged	154 (81.5)
Dead	16 (8.5)
LAMA	8 (4.2)
Referred	4 (2.1)
Nil response	7 (3.7)
Duration of stay in hospital	
\leq 1 week	170 (89.9)
>1 week	19 (10.1)
Mean duration of stay \pm SD	6.46 \pm 1.82

LAMA – Left against medical advice, SVD – Spontaneous vaginal delivery, CS – Cesarean section, VD – Vaginal delivery, SD – Standard deviation

Table 2: Indications for admission/special care of neonates at Obio Cottage Hospital

Indication*	n=189, n (%)	Fatality (case fatality rate) (%)
Neonates hypoglycemia	60 (31.7)	0 (0.0)
Preterm LBW	47 (24.9)	3 (6.4)
Neonatal sepsis	43 (22.8)	0 (0.0)
Neonatal jaundice	24 (12.7)	0 (0.0)
Asphyxia	29 (15.3)	7 (14.3)
Meconium aspiration	20 (10.6)	6 (30.0)
Respiratory distress syndrome	11 (5.8)	0 (0.0)
Macrosomia	7 (3.7)	0 (0.0)
Congenital malformation	5 (2.7)	3 (60.0)
Congenital malaria	3 (1.6)	0 (0.0)
Postdate neonate	2 (1.1)	0 (0.0)
Very LBW	1 (0.5)	0 (0.0)
Congenital laryngomalacia	1 (0.5)	0 (0.0)
Transient tachypnea of the newborn	1 (0.5)	0 (0.0)

*Some had more than one indication. LBW: Low birth weight

within 48 h: one (6.3%) each occurred from the 3rd day to the 6th day of admission, and one (6.3%) on the 14th day of admission.

DISCUSSION

The delivery of 3630 babies over a 12-month period (302/month) in this cottage hospital indicates a high level of patronage. This may be attributed to the high level of patient satisfaction at the facility earlier reported^{7,8} and the community health insurance also described elsewhere. In this scheme, community members pay a yearly premium of ten thousand naira only to access care all year round at the facility.^{6,7} The cesarean section rate was 33.7%. In Sokoto, Northern Nigeria, Daniel, and Singh reported an overall cesarean section rate of 11.3% with the highest rate of 44.6% among the primipara.⁹ In Makurdi, in the middle belt of Nigeria, Hembah-Hilekaan *et al.*¹⁰ recorded a rate of 19.3% in 630 deliveries, and Eleje *et al.*¹¹ a rate of 18.5 at Nnewi, Eastern Nigeria. The cesarean section rate of more than 30% in the current study, therefore, appears relatively high and warrants investigation. This was not within the scope of this study. Interestingly, a similar rate of 30.3% was recently reported at the University of Port Harcourt Teaching Hospital, a tertiary facility in the same city.¹²

The admission rate in the present study was 52.1/1000 live births. This compares favorably with an admission rate of 43.1/1000 normal-birth-weight-newness and overall rate of 64.0–77.9/1000 live births over a 6-year period for the United State newborns.¹³ In Australia, the nationwide admission rate from 1999 to 2002 was 89/1000 live births for term babies of primiparous women and 63/1000 live births for those of multiparas.¹⁴ Sandal *et al.*¹⁵ reported an overall admission rate of 97/1000 live births at Ankara, Turkey. The low admission rate at OCH is likely indicative of the quality of perinatal services in the center and patronage of ANC services, particularly following the community health insurance scheme earlier reported.^{6,8}

The important causes of neonatal morbidity in the present study were hypoglycemia, birth asphyxia, low-birth-weight sepsis, and neonatal jaundice, in that order. This is similar to the pattern in the region but with some important differences. In Ife, Western Nigeria, neonatal jaundice, (45.6%) low birth weight (18.6%), birth asphyxia (14.2%), and neonatal sepsis were the main causes of neonatal morbidity among inborn neonates.¹⁶ In Calabar, South-South Nigeria, the major causes were sepsis (27.4%), jaundice (21.0%), and low birth weight.¹⁷ In two studies from Northern Nigeria, the main causes were sepsis and birth asphyxia, accounting for about a third each.^{18,19} Sepsis did not rank high at OCH and the numbers and proportion with asphyxia were comparatively low. This pattern contrasts with the reports from Calabar,¹⁷ Azare,¹⁸ and Birnin Kudu¹⁹ where sepsis and asphyxia topped the ranking. Apart from the relatively low incidence of jaundice at OCH, the morbidity pattern is more akin to the situation at a tertiary health facility in Ife, Western Nigeria, and may be reflective of the quality of ante-natal and perinatal care at the center. Neonatal hypoglycemia in this study was defined as a random blood sugar < 2.2 mmol/L.²⁰ The Nigerian studies from Ife,¹⁶ Calabar,¹⁷ Azare,¹⁸ and Birnin-Kudu¹⁹ did not mention hypoglycemia. This may be because at OCH all newborns are routinely screened for hypoglycemia with the first 24 h of life, which may not be the case in these other centers but should be recommended. However, Frank-Briggs in a study of cord blood glucose recorded a prevalence of hypoglycemia of 28.3% in Port Harcourt, same city as this study.²¹ Dedeke *et al.*²² recorded a point-of-admission neonatal hypoglycemia rate of 32.7% among sick babies, being associated with 32.7% of the deaths. At Tamale, Ghana, Walana *et al.*²³ reported that hypoglycemia was responsible for 1.3% of the neonatal mortality while contributing 1.7% to morbidity.

At OCH, hypoglycemia did not contribute to mortality, probably because of early detection arising from routine checks. The mortality rate among admitted neonates in Tamale, Ghana, was 16.0% with prematurity/low-birth weight being the main contributor (44.8%). This contrasts with a mortality of 8.5% at OCH with low-birth weight ranking low. This may be reflective of good ANC at OCH. Although small in absolute numbers, the high ranking and case-fatality rate of meconium aspiration require attention. Similarly, the mortality rate of 8.5% at OCH is a lot better than the 22.1% reported at Kampala, Uganda and attributed mainly to prematurity and its complications, and birth asphyxia. In Nnewi, Eastern Nigeria, a mortality rate of 19.4% was reported with prematurity (30.7%), asphyxia (24.1%), sepsis (19.3%) being the main contributors.³ In Calabar, South-South Nigeria, a mortality rate of 19.3% was recorded with neonatal tetanus (20.9%) septicemia (19.6%), birth asphyxia (23.3%), and low birth weight (19.0%) the main culprits.⁴ Neonatal tetanus is certainly preventable with good antenatal and perinatal care and was not reported at OCH. The burden of prematurity and sepsis in our resource-limited environments can be reduced with high uptake of antenatal and perinatal care.

It has been asked if facility-based neonatal care in resource-limited environments is keeping pace with the current challenge to reduce neonatal deaths in resource-limited environments.²⁴ Experience at OCH, South-South Nigeria indicates that enhancing ANC would reduce the burden in the limited neonatal units in our region. Improvement in the infrastructure of the facility and the community health insurance scheme for the catchment community have made ANC attractive and accessible to the community.^{6,7} Provision of regular electric power supply, which is a rarity in hospitals in developing countries,⁵ has further enhanced utilization and services of the center. The public-private partnership has enhanced expansion and maintenance of the facility, and the availability of high caliber staff.

Training and retraining of staff on focus ANC, conduct of labor, and peri-natal have reduced the need for intensive neonatal care. Thus, the basic equipment of the neonatal unit was able to largely cope with the burden of neonatal morbidity. It has been argued that simple and basic equipment can salvage neonates in our region.²⁵

CONCLUSION

Neonatal admission, neonatal morbidity, and mortality rates at OCH, South-South Nigeria are good and comparable to the rates even in more developed environments. Public-private sector partnership, high uptake of ANC hinged on community health insurance care, training and retraining of staff, and basic affordable and sustainable equipment may have contributed to this scenario. Effective newborn care is feasible even at the cottage hospital level. We recommend this model to similar environments.

This study covered only a single year period, which is a limitation. A study covering more years will need to be conducted to ensure a larger study population and detect any trend.

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Conflicts of interest

There are no conflicts of interest.

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