

## A 4 YEAR REVIEW OF NEONATAL OUTCOME AT THE UNIVERSITY OF BENIN TEACHING HOSPITAL, BENIN CITY

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### ABSTRACT

**Background:** Neonatal morbidity and mortality rates reflect a nation's socio-economic status, the efficiency and effectiveness of health care services. This important indicator is useful in planning for improved health-care delivery. A four year review of neonatal outcome was therefore conducted in the special care baby Unit (SCBU) of University of Benin Teaching Hospital (UBTH).

**Methods and Subjects:** The study was done between 2003 and 2006 and sought to review the morbidity, mortality, salvage rate of low birth weight babies and outcome of all inborn and outborn babies admitted into the SCBU of UBTH. The biodata, birth weight, sex, APGAR scores and reasons for admissions and outcome were abstracted from case notes/admission records.

**Result:** A total of 3075 babies were admitted to the unit during the period under review. 2602 (84.6%) were in-born while 473 (15.4%) were out-born. There were more males 1676 (54.6%). There were 855(27.8%) preterm babies of which 803(26.1%) were low birth weight babies. Neonatal sepsis, severe birth asphyxia, pre-maturity and neonatal tetanus were the most common morbidities suffered by the neonates. Mortality was recorded amongst 625 (20.3%) babies. Mortality rate was significantly higher amongst the out-born than in born babies, P value <0.0001.

**Conclusion:** The neonatal mortality rate in this study is high. The morbidity profile observed in the study is attributable to preventable causes. Of note is the contribution of NNT to morbidity and mortality. Strengthening of linkages in perinatal care, improving maternal emergency obstetric care and neonatal resuscitation skills are proposed measures to reduce neonatal mortality.

**Key Words:** Neonatal mortality, morbidity, Prematurity, birth asphyxia, Neonatal tetanus.

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### INTRODUCTION

In developing countries, the neonatal morbidity/mortality pattern, the burden of low birth weight babies and neonatal outcome are important indices for adequate health care planning.<sup>1,2</sup> Most studies on neonatal mortality in Nigeria are hospital based.<sup>1,3,4</sup> Although they are limited in providing an accurate picture of the neonatal mortality of the general population which is reported to be 50/1000 live births in Nigeria,<sup>3</sup> periodic reviews of hospital based data can however inform about changes in rates and pattern. Besides, morbidity and mortality patterns may differ from one locality to another.<sup>3,4</sup> It may also change from time to time within the same locality depending on population growth, economic status, competent referral services, improved maternal and neonatal emergency/intensive care services.<sup>5,6</sup> Global advances in neonatal intensive care in the developed world have resulted in improved outcome of the preterm and low birth weight babies.<sup>7-9</sup> In resource poor countries, these high technology

facilities such as incubator and ventilators are unavailable. Thus low birth weight deliveries and prematurity continue to contribute significantly to neonatal mortality.<sup>10,11</sup>

The last audit of the neonatal morbidity and mortality pattern at the University of Benin Teaching Hospital (UBTH), Benin City, Nigeria was over a decade ago.<sup>13</sup> Since then, there have been increases in patient influx without a corresponding increase in number of incubators and other equipments. With this in view, this study aims at evaluating the pattern, salvage rate, and neonatal outcome of neonatal admissions in UBTH, Benin City over a four years period.

### SUBJECTS AND METHODS

This is a retrospective study of all the babies admitted into the SCBU of UBTH, Benin City between January to 2003 and December 2006. Their casenotes/ records were reviewed and the following data were abstracted; booking status of the mother with reference to UBTH, sex and APGAR scores of the babies, gestational age by dates or by Dubowitz and Dubowitz scoring where it was done, birth weight, the reasons for admissions and outcome.

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Salvage rate is the proportion of a category of babies who survived from their illnesses and was consequently discharged home.

The diagnosis and severity of birth asphyxia was based on the APGAR scores at the first and fifth minute of life. Babies who scored 6, 4 or 5, and 3 and less all in the first minute attracted clinical assessment of mild, moderate and severe birth asphyxia respectively. In addition babies who scored less than 5 in the fifth minute were classified as having severe birth asphyxia. In the outborn babies, the assigned APGAR scores from the referring facility were compared with the clinical picture of the baby at presentation. One consistent with severe birth asphyxia was reclassified as such irrespective of initial APGAR scores assigned at the referrer facility.

### STATISTICAL ANALYSIS

The data were coded and entered into Microsoft excel sheet, 2006 and data analyzed using GraphPad instat 3. Simple proportions and mortality rate were presented in percentages. Differences in proportions was tested using Fisher,s exact test or Chi-square test. Data was analysed using microsoft excel 2006. P value at 95% confidence interval was set at 0.05

### RESULTS

Over the four year period under review, 3075 babies were admitted into the unit. Of these, 1676 (54.6%) were males while 1397 (45.4%) were females, giving a M:F= 1.2:1. While 2602 (84.6%) of the babies were in-born, 473 (16.4%) were out-born. The mothers of 2122 (69%) of the babies were booked while 453(31%) were unbooked. Table 1.

Majority of the babies 2031 (66.0%) were term, while 855 (27.8%) were preterm. In 97 (3.2%) of the babies, the gestational ages were not provided in their files. The birth weight distribution of the babies showed that most of them 2179 (71%) were normal birth weight, the least 93 (3.0%) were 4000g and above. Table 1.

Over half of the babies 1738 (56.5 %) had normal APGAR scores, 590 (19.2%) had severe birth asphyxia, 510 had moderate birth asphyxia and 129(4.2%) had mild birth asphyxia. The APGAR scores of 108 (3. 5%) babies were not recorded. The

majority of the babies 2327 (75.7%) were discharged home, while 625(20.3%) mortality was recorded, table I. Of the 2162 inborn admissions, 440(20.3 %) died while 185(64.2 %) of the 288 outborn babies died. The difference was statistically significant,  $p = <0.0001$ , 95% CI 0.15, 0.21. The average daily number of babies on admission in the unit was 30, in a 25 bedded unit showing a bed occupancy rate of 120%. (The resuscitaires doubled as beds).

There was a gradual yearly increase in admission of babies from 2004, with declining mortality rate amongst the inborn over the same period. This trend was not seen amongst the outborn babies, table 2. The difference in yearly mortality rate between inborn and outborn babies was statistically significant. The values are shown in table 2.

The salvage rate of babies weighing 2500 g and more was high being >80.0% and least 63.1% amongst babies weighing between 1500 2499g. Curiously, it was high amongst babies who weigh 1000 1499 g. Table 3. This pattern was also reflected in the mortality distribution by gestational age. While mortality was least in babies whose gestational ages were 37 42 weeks (17.4%), it was highest in those between 34 36 weeks (35.5%). Table 4.

Table 5 showed yearly distribution of low birth weight babies (babies whose weight was >2500gm) by admissions and mortality, the mortality amongst outborn babies were significantly higher than the inborn LBW babies for 2003 and 2005. The difference in the overall mortality amongst LBW between inborn and outborn babies was not statistically significant  $p = 0.602$ , 95% CI 0.05, 0.07. The out-born low birth weight admissions were persistently low when compared to the in-borns while mortality from these babies was well above 40% for most years, table 5.

Neonatal sepsis (NNS) was the commonest morbidity in the study population, accounting for 38.5 %. Presumed neonatal sepsis (PNNS) constituted 31.8% and confirmed sepsis 6.7%. While other morbidities of prematurity and its complications and severe birth asphyxia (SBA) constituted 33.4% and 20.0% mortality rates respectively, neonatal tetanus had the highest mortality rate of 58/98 (59.2%). Table 6)

Table 1: Characteristics of the Study Population.

Characteristic	Inborn (%)	Outborn (%)	Total
No of babies	2602(84.6)	473(15.4%)	3075
Males	1408(84.4)	268(16.0%)	1676
Females	1192(85.4)	205(14.6)	1397
Term babies	1519(74.8)	512(25.2)	2031
Preterm	754(88.2)	101(11.8)	855
Post term	78(84.7)	14(15.3)	92
Unknown	22(22.7)	75(77.3)	97
Normal birth weight	1864(85.6)	315(14.4)	2179
Low birth weight	690(86.0)	113(14.0)	803
> 4000gm	80(86.1)	13(13.9)	93
<b>Outcome</b>			
Discharge home	1909(82.0)	418(18.0)	2327
Discharge against advice	75(61.0)	48(39.0)	123
Death	440(70.4)	185(29.6)	625

Table 2: Mortality Distribution amongst inborn and outborn Admissions.

Year	Inborn		Outborn		p value	95% CI
	Adm (%)	mortality(%)	adm (%)	mortality(%)		
2003	716(27.3)	123(17.2)	125(26.4)	53(42.4)	0.0001	0.09, 0.21
2004	503(19.3)	154(30.6)	119(25.2)	55(46.2)	0.031	0.009, 0.15
2005	638(24.6)	108(16.9)	176(37.2)	55(31.3)	0.0012	0.04, 0.15
2006	746(28.8)	55(7.4)	53(11.2)	22(41.5)	0.0001	0.16, 0.29
<b>Total</b>	<b>2603(100.0)</b>	<b>440(16.9)</b>	<b>473(100.0)</b>	<b>185(39.1)</b>	<b>&lt;0.0001</b>	<b>0.10, 0.17</b>

Table 3: Distribution of Babies by birth Weight and Mortality.

Birth weight (grams)	Admissions	Mortality	% Mortality	salvage rate (%)
4000 & >	93	17	18.3	81.7
2500 – 3999	2179	368	16.9	83.1
1500 – 2499	249	92	36.9	63.1
1000 – 1499	301	74	24.6	75.4
<1000	151	52	34.4	65.6
Unknown	102	22	21.6	78.4
<b>Total</b>	<b>3075</b>	<b>625</b>	<b>20.3</b>	<b>76.7</b>

Table 4: Distribution of Babies by Gestational Age and Mortality.

Gestational Age (weeks)	Admissions	Mortality	% mortality	% salvage
= 27	190	62	32.6	67.4
28 – 30	461	99	22.5	78.5
31 – 33	97	25	23.8	74.2
34 – 36	107	38	35.5	65.5
37 – 39	1523	265	17.4	82.6
40 – 42	508	89	17.5	82.5
>42	92	27	29.3	70.7
Unknown	97	20	20.6	79.4
<b>Total</b>	<b>3075</b>	<b>625</b>	<b>20.3</b>	<b>79.7</b>

Table 5: Yearly Distribution of LBW and Mortality amongst Babies.

Year	Inborns admissions	Inborn mortality	Outborn admissions	Outborn mortality	p value	95 CI
2003	142(24.4)	50(35.1)	16(13.7)	15(93.8)	0.017	0.05,0.40
2004	133(22.8)	58(43.6)	22(18.8)	15(68.2)	0.25	-0.06,0.27
2005	147(25.1)	37(25.2)	70(59.8)	6(8.6)	0.016	0.02,0.22
2006	162(27.7)	33(20.4)	9(7.7)	4(44.4)	0.25	
	<b>584</b>	<b>178</b>	<b>117</b>	<b>40</b>	<b>0.602</b>	<b>-0.05, 0.07</b>

Table 6: Morbidity and Mortality Distribution in Admitted Babies.

Morbidity	Admissions (%)	Mortality	Cumulative %
Neonatal sepsis -	1186(38.6)	211(33.7)	17.7
Prematurity	636(20.7)	209(33.4)	32.8
Severe birth asphyxia	676(22.0)	125(20.0)	18.5
Neonatal jaundice & complications	184(6.0)	11(1.8)	5.9
Neonatal tetanus	98(3.2)	58(9.3)	59.2
Hypoglycaemia	193(6.3)	0(0.0)	0
Congenital anomalies	58(1.9)	6(1.0)	10.3
Others – polycythaemia, respiratory	44(1.4)	5(0.8)	11.4
Distress syndrome etc			
<b>Total morbidities</b>	<b>3075(100.0)</b>	<b>625(20.3)</b>	<b>20.3</b>

## DISCUSSION

In the present study, there were relatively more admissions compared to the last audit conducted in the study locale 10 years previously as shown by the yearly admission numbers.<sup>11</sup> This may be a reflection of the increase in the nation's population between the two audits<sup>12</sup> and thus referral of more sick neonates to the study centre. The overall mortality of 20.1% in this study is higher than the 11.5% of 2001 audit<sup>13</sup> and the 2.05% of one conducted in 1985.<sup>14</sup> This unexpected increase in mortality over years may be consequent on the disproportionate increase in admission in comparison with infrastructural development and availability of trained personnel to match the growing number of admissions. This is borne out by the current bed occupancy rate of over 100%. With the resulting overcrowded situation, intensive care for very sick infant especially premature babies can be suboptimal leading to poor outcome of the small babies. Also the increasing cost of care for a sick neonate may have caused delay in presenting and therefore administering care, also leading to poor neonatal outcome. These may have contributed to the increased mortality rate. Mortality was significantly higher amongst outborn than inborn babies, a finding consistent with other studies.<sup>3,4,11,13</sup>

The low birth weight rate of 27.8% in this study is marginally lower than the 33% obtained in the last audit. These high LBW rates in this study and previous audit could be due to higher obstetric interventional deliveries for various reasons, this has been shown to be the case in a Brazilian study.<sup>15</sup> Since there is not much difference over the years in the proportion of LBW babies, the salvage rate of such babies in a neonatal unit is imperative to reducing neonatal mortality. The overall salvage rate of 68.9% of LBW babies in this study is lower than the 84% of the last audit. This decline in salvage rate over time could be accounted for by the decline in infrastructure. The need to improve the outcome of small babies would be met with the proper management of pregnancies and better referral of pregnant women to bigger centres for better management. Although low technology such as Kangaroo mother care have been advocated for managing small LBW babies, the management of very sick LBW babies is better done in incubators and in the neonatal intensive care unit. The active practice of kangaroo mother care for the stable VLBW babies may suffice in bridging the technology gap in the nursery as has been shown in other facilities and countries.<sup>16,17</sup> There is an urgent need to address the neonatal mortality rate with a view to meeting the fourth end decade goal of reducing child mortality by two-third in 2015.

The causes of mortality in this study as in other

studies in Nigeria remain largely preventable. Their persistence may indicate the poor effort at addressing them. This is exemplified by the high number and high mortality rate of neonatal tetanus in this study, a disease that was supposed to have been eliminated by the year 2000. The persistence of this scourge beyond 2000AD has been similarly reported in other studies in Nigeria.<sup>18-19</sup> Improvements in the use of antenatal services, immunization coverage and the hygiene of the delivery services offered by the traditional birth attendants are suggested ways of reducing the scourge and possibly eradicating it.<sup>18-20</sup>

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