

PATTERN OF NEONATAL MORTALITY IN A TERTIARY HEALTH FACILITY IN UMUAHIA, SOUTH EAST, NIGERIA

ABSTRACT

Background:-

Neonatal mortality rates are highest in Sub-Saharan Africa, with Nigeria inclusive. And so the aim of the current study was to audit the pattern of neonatal deaths.

Study Design: A cross sectional retrospective descriptive study was undertaken.

Place and Duration of Study: The study was carried out at the Newborn Special Care Unit (NBSCU) of Federal Medical Centre (FMC), Umuahia with a review of the admissions and mortality register between 2000 and 2010.

Methods:

A review of the admissions and mortality register of the NBSCU between 2000 and 2010 was undertaken. Total admission over the period was 2,756 comprising 1541 (55.9%) males and 1215 (44.1%) females. Total deaths was 440, comprising 235 (53.4%) males and 205 (46.6%) females.

Data extracted from the register included socio-demographic variables, birth weight, diagnosis/cause of death, duration of hospitalization, place of delivery (inborn/out-born), source of referral.

Results:

An overall case fatality rate of 16.0% per 100 live births was reported in the current study with mean age at death being 4.7+ 6.0 days (0.01- 28 days).

Majority of the cases were out-born, 263 (56.8%) compared to in-born, 177 (40.2%).

Forty two percent (185 cases) of the deaths occurred with 24 hours of hospitalization while 25.9% (114 cases) passed on after 72 hours of admission.

The leading probable direct causes of neonatal deaths were birth asphyxia (141), premature delivery (133), neonatal sepsis (58), severe neonatal Jaundice (41), and neonatal tetanus (14).

Most deaths (42.0%) occurred in the first 24hours irrespective of the cause of death.

Conclusion:

High rate of neonatal mortality, most of which are largely preventable as observed in the index study still abound in our locale.

High cost effective maternal and newborn interventions could be applied even at community levels where most of the deliveries occur to save lives of the newborns.

KEY WORDS: Neonate, Mortality Rate, Pattern.

INTRODUCTION

Neonatal mortality is increasingly important because the proportion of under - five deaths that occur during the neonatal period is increasing as under five mortality declines.¹

Every minute seven newborn babies die worldwide (415 newborn babies every hour).²

Nearly 4.7 million mothers, newborns and children die each year in Sub-Saharan Africa;¹ 1,208,000 babies die before they reach one month of age.³ The vast majority of neonatal deaths occur in South Asia and Sub-Saharan Africa.^{4,5} Half of the 3.3million neonatal deaths in year 2009 were in five countries: India, Nigeria, Pakistan, China and Democratic Republic of Congo.

And neonatal mortality constitutes 40% of under- 5mortality and approximately 57 percent of infant mortality.⁴The neonatal mortality rate in Nigeria is 40 per 1000 live births. This is largely higher than the 33 per 1000 live births overall in Africa.⁶ Various rates have been reported by different researchers in Nigeria ranging from 19.4 percentage ⁷ to 37.6 percentage ⁸ among hospitalized newborns and in a rural community respectively.

The fourth goal millennium development goal (MDG 4) aims to reduce mortality rate in children under the age of 5years (U5MR) by two thirds between 1990 and 2015. Infants less than 1 month old account for about 40% of deaths of children under the age of 5years globally.⁹ Achieving MDG4 will therefore need to include reducing deaths during the neonatal period.¹⁰

With less than 2 years left to achieve the United Nations Millennium Development Goals (MDGs) for maternal and child health, most African countries are currently unlikely to meet their MDG targets.

The three main causes accounting for 88% of newborn deaths in the region include: Infections (including sepsis/pneumonia, tetanus and diarrhoea); intra-partum related conditions (birth asphyxia); and preterm births. ⁴ Up to 90% of newborns who die are low birth weights (less than 2500grams) including preterm babies who have the greatest risk of deaths.

It is unfortunate that most of these deaths are preventable with such simple actions/care like warmth, feeding, hygiene and early treatment of infections.¹¹

Worldwide, birth asphyxia, birth trauma, infections, prematurity, and malformations, are the major causes of early neonatal deaths while sepsis, pneumonia, meningitis, diarrhoeal disease and tetanus account for most of the mortality during the rest of the neonatal period.⁵

High neonatal mortality rate remains a problem in developing countries including Nigeria where the economic situation and poor planning of health services have led to little appreciable advancement in neonatal care.¹² Neonatal mortality is therefore a reflection of the effectiveness of obstetric and neonatal services in any particular community.¹³

Adequate training and retraining of personnel involved in deliveries with provisions of equipment required for neonatal resuscitation of newborns with intra-partum asphyxia has shown a significant decrease in deaths attributable to birth asphyxia.^{10,14,15}

Evidence from several observational studies shows that facility – based basic neonatal resuscitation may avert 30% of intrapartum- related neonatal deaths.¹⁶

However, other interventions to reduce neonatal deaths should include improvements in obstetric care and immediate care of the newborn afterbirth. It has been reported that basic emergency obstetric care (providing antibiotics, oxytocics, anticonvulsants, removal of placenta and retained products, assisted vaginal delivery and newborn care in healthcare centres) and comprehensive emergency obstetric care (blood transfusion caesarean sections, care to sick and low birth weight newborns in district hospitals) and skilled birth care can reduce intra-partum deaths by 25 – 85%.¹⁸

It is pertinent therefore that periodic audit of neonatal admissions and deaths be carried out to determine the impact of current preventive measures and newer challenges to neonatal survival, so that effective preventive measures could be applied. The aim of the current study was to audit the neonatal deaths at the newborn special care unit, of Federal Medical Centre, Umuahia over a ten year period, so that priority areas requiring improved planning of neonatal services could be identified.

MATERIALS AND METHODS

This study was undertaken in the newborn special care unit (NBSCU) of Federal Medical Centre, Umuahia, Abia State, South East, Nigeria.

The Centre serves as a major referral centre for patients from within Abia State and also some surrounding states of Imo and Rivers. The newborn babies basically are referred in house from the Department of Obstetrics and Gynecology and out-born (those babies born before arrival to the hospital). The NBSCU has three sections: for inborn (delivered in FMC, Umuahia), out-born (referrals) and an isolation section for very ill-newborns all geared towards reduction of cross infection within the nursery. About 1500 deliveries are recorded annually in the Centre.

It is a tertiary hospital base audit analyses of neonatal admissions outcome.

Data on newborns that died during the period under review (from 1st January, 2001 to 31st December, 2010) were extracted from the admissions/mortality register.

Data extracted from the case record files included: age on admission (in hours), gender, place of delivery (inborn/out-born), diagnosis(es) at presentation, cause of death, duration of hospitalization and age at death.

Babies born before 37 completed weeks of gestation are generally regarded as preterm delivery while birth asphyxia is defined as history of failure or delayed onset of spontaneous respiration after birth or 5 minutes APGAR score < 7, or history of delayed cry or need for resuscitation for > 10 minutes in full term babies.^{18,19}

Usually the registrar on duty admits and first assesses the presenting newborn and is subsequently reviewed by a senior registrar and the supervising consultant.

Socioeconomic classification of the study population was not ascertained as most of the case record files did not capture information on parental educational backgrounds and occupation/employment status.

Ethical clearance for the study was sought from Research and Ethics Committee of Federal Medical Centre, Umuahia.

The data retrieved were collected with the aid of a structured study proforma and entered into a personal computer and analyzed using SPSS Version 18. The level of significance was set at 5%.

RESULTS

Total number of neonatal admissions over the period was 2,756 comprising 1541 (55.9%) males and 1215 (44.1%) females.

Total deaths was 440, comprising 235 (53.4%) males and 205 (46.6%) females. The neonatal mortality rate during the period of review was 159 per 1,000 live births.

Mean age at death was 4.7 ± 6.0 days (0.01-28 days). One hundred and eighty five (42.0%) of the deaths occurred within the first 24 hours, 141 (32.1%) died after 24 hours, but within 72 hours while 144 (25.9%) died after 72 hours, but within 28 days.

One hundred and seventy (40.2%) were out-born indicating that place of confinement of the mothers had a significant effect on outcome of delivery ($\chi^2 = 55.33, p < 0.01$).

One hundred and fifty one (57.4%) of the out born patients who died were delivered in secondary health facilities including private hospitals, 74 (28.1%) were born in primary health centres and maternity homes, 36 (13.7%) were delivered at home while 2 (0.8%) were delivered in prayer houses. More than half of the babies (294) who died were delivered through spontaneous vertex delivery, 97 by emergency caesarean section, while 26 had no record of method of delivery.

Out of the 440 neonates that died, 400 had their birth weight recorded of which 52.8% (211) were low birth weight.

Table I shows the demographic characteristics of neonates during the period of review.

The leading probable direct causes of neonatal deaths were complication of birth asphyxia (141), preterm delivery (133), neonatal sepsis (58), severe neonatal jaundice (41, and neonatal tetanus (14).

Table II shows the probable direct causes of neonatal deaths at the medical centre over the period, 2000-2010. Most deaths (42.0%) occurred in the first 24 hours of life irrespective of the cause of death. Sixty five (46.1%) of the 141 deaths due to complication of birth asphyxia occurred within the first 24 hours of life so also 51 (38.3%) of the 133 deaths due to preterm delivery.

Table III depicts the duration of hospitalization (age at death) of the neonates who died and their probable cause of death. There was no significant difference in the age at death with respect to the probable cause of death $\chi^2 = 32.76, p = 0.06$.

Table I: Demographic characteristics of neonates (mortalities)

Live births		Survived		Died			
2,756		2316		440			
Birth weight							
		Low (2<2.5kg)			Normal (2.5kg)		Total
Survived		683 (30.8%)			1532 (69.2%)		2215
Died		211 (52.8%)			189 (47.2%)		400
Sex							
		Male			Female		
Survived		1306 (56.4%)			1010 (43.6%)		
Died		235 (53.4%)			205 (46.6)		
Place of birth							
		Inborn			Out-born		
Survived		1379 (59.5%)			937 (40.5%)		
Died		177(40.2%)			263 (59.8%)		
+method of delivery	Spontaneous	C/S (elective)	C/S (emergency)	Instruments		Breech extraction	Others
	294	15	97	5		3	26
+Facility of delivery	Home	*PHC	*SHC	*THC		Prayer house	Others
	31	69	141	174		2	23
+Duration of hospitalization		≤24 hours		>24, hours	≤72	>72hours, ≤28 days	
		185		141		144	

PHC- primary health care, SHC = secondary health care, THC=tertiary health care

+ refers to patients who died

Table II: Probable direct causes of neonatal deaths

Disease	(N)	%
Asphyxia	141	32.0
Preterm	133	30.2
Neonatal sepsis	58	13.2
Severe neonatal jaundice	41	9.3
Neonatal tetanus	14	3.2

Neonatal meningitis	12	2.7
Meconium aspiration syndrome	8	1.8
Surgical conditions	8	1.8
Multiple congenital anomalies	7	1.6
Pneumonia	5	1.1
Severe anaemia	3	0.7
*Miscellaneous	10	2.3
Total	440	100.0

*Haemorrhagic disease of newborn, cyanotic congenital heart disease, HIV related, Birth trauma

Table III: Time of death from probable direct causes of death

Cause of death	Time of death			Total
	Within 24 hrs	>24 hrs, ≤ 72hrs	>72 hrs, ≤ 28days	
Birth asphyxia	65	58	18	141
Preterm	51	40	42	133
Sepsis	23	16	19	58
Severe jaundice	20	10	11	41
Tetanus	5	2	7	14
Meningitis	5	2	5	12
Meconium aspiration syndrome	6	2	0	8
Surgical conditions	4	1	1	6
Multiple congenital anomalies	2	3	2	7
Pneumonia	1	2	2	5
Severe anemia	1	2	0	3
Miscellaneous	5	4	7	16
Total	184	142	114	440

$$\chi^2 = 32.76, p = 0.06$$

DISCUSSION

The overall neonatal case fatality rate of 16.0% observed in the current study is quite high. It is however, higher than the, 13.0%²⁰ reported in Ilesha, South-West Nigeria and lower than 19.4%⁷ in a similar study in Nnewi, South-East Nigeria. All three studies are hospital based and do not represent the actual magnitude of the problem in the general population. However, the emphasis of the current study is to highlight the pattern of neonatal mortality in our locale from a tertiary hospital point of view and sensitize the authority to review the existing facilities and programmes linked with newborn services for optional service to save newborn lives.

Majority of the cases occurred among the males, in conformity to other similar reports.^{7, 21, 22, 23.}

It is likely that the higher risk of mortality in male neonates may be due to large proportions of neonatal deaths occurring in the first week of life, which is the time when gender differences in neonatal mortality are more pronounced.²⁴ The biological factors that have been implicated with this increased risk of neonatal deaths in male infants include immunodeficiency,²³ increasing the risks of infectious diseases in males, late maturity²¹ resulting in a high prevalence of respiratory diseases in males, and congenital malformations of the urogenital system.²⁵

Case fatality rate was lower among babies delivered in the hospital (inborn) compared to the out-born (born before arrivals, or referred babies) confirming previous reports by other workers.^{7,26.}

Some of the babies could have been transported from rural areas with challenges of hypothermia and contamination before getting to the Facility and hence increasing mortality in them.

In the current study it was observed that some of the mothers had the deliveries of their babies conducted either at homes or prayer houses by traditional birth attendants and in some cases by auxiliary nurses/midwives. This practice has been associated with increased morbidity and mortality in the newborns.²⁷ The practice could either be due to poverty or failure of the health system. Birth weight has been shown to be a strong predictor of newborn survival/outcome. In the current study low birth weight was associated with higher mortality as in other similar studies.^{7, 8, 26.}

The leading probable direct causes of neonatal deaths in our series included birth asphyxia, preterm delivery, sepsis, jaundice and tetanus and mirror other reported pattern of neonatal mortality elsewhere in Nigeria.^{7, 20, 27, 28} and indeed Sub-Saharan Africa.²⁹

Most of these causes are largely preventable with simple actions/care. It was observed that most of the mortality occurred within 24 hours of hospitalization, majority of which were due to perinatal asphyxia. It has been shown that basic training on newborn resuscitation skills and proper newborn resuscitation immediately after birth has proved to reduce mortality among babies born with asphyxia by up to 40%.^{14, 15, 16, 30}

However, there was no significant statistical difference in the age at death with respect to the probable cause of death ($\chi^2 = 32.76, p = 0.06$).

Also, prematurity was found to be the second most important cause of death in the current study. Management of premature babies requires highly specialized equipment, highly trained personnel and financial support.^{31,32} Despite the challenges of meeting these in our environment, some specific and simple measures have been identified which could be implemented to reduce deaths related to low birth weight and prematurity in low income countries.^{33,34,35} among others. These include prophylactic use of steroids during premature labour, antibiotics for premature rupture of membranes, early breastfeeding, treatment of infectious, Kangaroo mother care, prevention of hypothermia. All these if effectively implemented and sustained will help in reducing the neonatal mortality rate in our setting.

Globally, neonatal tetanus accounts for 7% of neonatal deaths but accounts for up to 20% in Nigeria, one of the 27 countries that account for 90% of the global burden of the disease.^{9,36,37} It is not surprising therefore that some babies in our series passed on as a result of neonatal tetanus.

Neonatal tetanus has been identified as a disease of poverty, the uneducated and adverse social and environmental circumstances.³⁸ All these variables for propagation of tetanus infection are in operation in our locale, and hence the need to highlight it and ensure that effective tetanus vaccination and early and appropriate prophylaxis of at risk neonates is the rule.

Neonatal deaths resulting mainly from preventable causes namely birth asphyxia, neonatal infectious including tetanus, prematurity/low birth weight among others are still the leading causes of neonatal mortality in our setting. Neonatal mortality rate is a critical index of under

5 mortality.⁴ And significant reduction in neonatal mortality will go a long way in ensuring that Nigeria meets the MDG 4 for child health. Knowledge of the existing pattern of neonatal mortality is key to determining which measures to be applied to reverse the unacceptable trend of newborn deaths in our setting.

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COMPETING INTRESTS:

All authors declare that there are no competing interests.