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Original Research Article

Status of neonatal death in sick newborn care unit of a tertiary care hospital

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ABSTRACT

Background: In view of clusters of death in Sick New Born Care Units of tertiary care hospitals in recent past and few studies done so far in this field necessitates a research. The aim of the present study was to assess the factors associated with neonatal mortality and the infrastructure of the SNCU.
Methods: All sick neonates admitted in the SNCU during June and July 2017 were followed up till they were discharged or declared dead. Data were collected by facility observation, interview of parents/attendants and from patient case sheet with a predesigned a pretested questionnaire and were analyzed applying appropriate statistical methods.
Results: Prevalence neonatal death was 12 per cent among 250 sick neonates studied. Majority of neonatal deaths occurred among mothers having lower SE Status 25 (27.4), antenatal visits less than 4 times (22, 22%), undernourished neonates (24, 37.5%) all of which were significant. Majority of morbidity were of Prematurity, (110, 44%) followed by Birth Asphyxia (96, 38.4%) and Infections (35.2%) and leading cause of death was infection. There was a deficit of resources from 25% to 75% and no monitoring and supervision were done till date.
Conclusions: Health care delivery system at block level and below needs to be strengthened in terms of antenatal visits, improvement of nutritional status of mother. The resource constraint of SNCU at tertiary care hospital and surveillance and monitoring mechanism requires prompt action to make SNCU more effective.

Keywords: Antenatal visit, Awareness, Neonatal death, SNCU, Undernourished

INTRODUCTION

Neonatal death accounts for about 75% of infant death in our country and 41% of all global deaths among children below 5 years.[1] Neonatal mortality rate in India is high and stagnant.

In India under the umbrella of NRHM immediate care is given to the newborn at health facilities through Newborn Care Corner (NBCC) and Newborn Stabilization Unit (NBSU) for all newborns in Peripheral Health Centre.

In recent past, Special Care Newborn Units (SCNUs) have been set up at both district tertiary care hospitals. Despite all these measures Cluster of neonatal deaths within hours or a day at SNCUs of medical colleges across the country in recent past created hue and cry among political, social and health arena.[2-4] The inception of NBCC, NBSU and SNCU as a part of strategy of neonatal survival has been initiated in recent past and hence operation research in this arena are very less till date. In view of the significance of SNCU in reducing neonatal deaths and recent clusters of death in these units it is imperative to find out missing links from the community level to the medical college level of care. Sick neonates from 10 districts of Orissa including adjacent districts of Chhattisgarh and Jharkhand depend on VSS Institute of Medical Sciences and Research,

(VIMSAR), Burla . On this backdrop, a study on neonatal deaths in this SNCU has been taken up as a research project for students under the aegis of ICMR, New Delhi with the objective to assess the factors associated with neonatal mortality and the existing infrastructure.

METHODS

The study was designed as a 2 month follow-up study of patients admitted to the Sick Newborn Care Unit of VSS Institute of Medical Sciences and Research, (VIMSAR) from the month of June and July, 2014 was conducted in the. A regular follow up was done on each & every neonate registered and their prognosis was recorded everyday till the neonate was discharged or declared dead.

Inclusion criteria

- Sick Newborns of 0 to 28 days either from outside with or without referral (Out born) or those delivered in this Institute (In born) were admitted in the SNCU during June and July, 2014.
- Parents of the neonate willing to participate in the study.

Exclusion criteria

Sick newborn either admitted beyond this period or those left against medical advice or referred to higher centre were not included.

Primary End Points

The composite primary end point included either death or discharge alive of the sick newborn.

All neonates admitted to the SNCU during these two months who fulfilled the inclusion criteria were taken as the subject for the study

Mothers/ attendants were interviewed. Predesigned pretested questionnaire, Patient case sheet of the SNCU was used and methods of facility observation and interview were adopted.

Study Variables

These newborns were categorized as inborn if delivered by any route in the Teaching Hospital and out born if born outside. Most of the out born neonates were referred from peripheral health facilities both public and private or home delivered.

The explanatory variables included community level contextual variables, socioeconomic and proximate determinants, covering maternal, neonatal, pre-natal, delivery, and post-natal factors such as gestational age, age of neonate, sex, place and mode of delivery, maternal complications if any, clinical features, weight, and resuscitation history of the neonate, weight and height of the mother from their respective patient case sheet and their BMI (Body Mass Index), number of antenatal visits, place of delivery and other factors mentioned in the questionnaire. Updated BG Prasad socioeconomic classification scale, January 2014was used to assess the socioeconomic status of the parents of the neonates.

Statistical analysis

All the data thus collected were compiled, tabulated and analyzed in the department of community medicine. Statistical tools used in this study for interpretation of the findings included chi-square test, relative risk.

RESULTS

A total of 250 neonates were admitted to the SNCU in the month of June and July out of whom 154 were male. Among them 140 were born outside or out born. Prevalence of neonatal mortality was 12 per cent.

Out of the knowledgeable (240, 96 %,) majority knew this from the Government health care providers (120, 50%). Majority of parents of the 140 out born sick neonates (45, 32%) had sought health care for the first time from PHC and for 28 per cent of them first contact was SNCU of the district hospital. It was found that five leading presenting clinical features were lethargy (20.4%), denial of feeding (18.3%), convulsion (15.9%) and respiratory distress (12.8%).

Table 1: Association of socio demographic factors with neonatal mortality.

Factors	Criteria	Total	Death
			No (%)
Geographical location	Rural	108	22 (20.4)
	Urban	142	08 (5.6)
Socioeconomic Status	Higher	159	05 (3.1)
	Lower	91	25 (27.4)
Time taken for neonate admission since onset of sickness (Hours)	<24	200	16 (8.0)
	>24	50	14 (28.0)

Out of the socio demographic factors as per Table 1 proportion of neonatal deaths occurred more among mothers who took more than 24 hours since onset of sickness for admission in SNCU i.e. 14 (28.0) followed by mothers of lower socioeconomic status i.e. 25 (27.4) and rural mothers (22, 20.4%).

Majority of neonatal deaths in relation to maternal factors (Table 2) were found among mothers who had delivery with complications i.e. 21 (26.3), mothers with history of inadequate antenatal visits (22, 22%).

However, the percentage was 14.3% among underweight mothers (18) and out born neonates (20).

Table 2: Association of maternal factors with neonatal mortality.

Factors	Category	Total	Death
			No (%)
BMI of mothers	underweight	126	18 (14.3)
	Normal	124	12 (9.7)
No. of antenatal visits	Inadequate	100	22 (22.0)
	Adequate	150	08 (5.3)
Mode of delivery	Normal	102	12 (11.8)
	Assisted	148	18 (12.2)
Place of birth	Out born	140	20 (14.3)
	Inborn	110	10 (9.1)
Complications during delivery	Present	80	21 (26.3)
	Absent	140	09 (6.4)

Leading neonatal factors for higher percentage of their deaths according to Table 3 were among undernourished, 24 (37.5) followed by neonates of 0-14 days (25, 20.8%).

Table 3: Association of neonatal factors with neonatal mortality.

Factors	Criteria	Total	Death
			No (%)
Age (days)	0-14	120	25 (20.8)
	14-28	130	05 (3.8)
Sex	Male	154	18 (11.7)
	Female	96	12 (12.5)
History of resuscitation	Present	96	18 (18.8)
	Absent	142	12 (8.4)
Nutritional status of sick neonate	Normal	186	06 (3.2)
	Undernourished	64	24 (37.5)

Majority of morbidity were of Prematurity, (110, 44%) followed by Birth Asphyxia (96, 38.4%) and Infections (35.2%). Neonate having two or more morbidity is counted in each category. Hence, the sum may be more than the total neonates in the study population

On further analysis, it was observed that out of 30 deaths, leading cause of death was infection (33.3%).

Deficit of staff compared to norm ranged from 40% to cent per cent. In terms of bed there was 25% deficit and 25% to 75% shortage of equipments were also present. There was no provision of Special radio diagnostic Dept. and laboratory for neonates, Special room for invasive procedure, Isolation room (for infected babies) and availability of central oxygen at SNCU. Even 24 hrs water supply was also not available.

DISCUSSION

In present study, out of 250 sick neonates 154 (61.6%) were males and prevalence of mortality was 12 per cent. In a study conducted in a tertiary care hospital, Delhi, neonatal mortality was 20%. [5] Majority of parents were aware about SNCU from these health care providers namely ASHA, Angan Wadi Worker and Health Worker (120, 48%). In our study, 110 newborns admitted in the SNCU were inborn and 140 sick neonates were out born. Among these out born, only 22% of them were taken for the first time to private clinic. Whereas most of the respondents selected Tea-garden management run hospitals as their choice of preference for treatment of a sick child in SNCUs of Assam.[6] Out of the admitted young infants 8 types of clinical features were observed. Out of them, lethargy (200, 20.4%) was the commonest type followed by denial of feeding (180, 18.3%), convulsion (156, 15.9%) and respiratory distress (126, 12.8%). As per IMNCI, presence of any one of these manifestation is related to possible serious bacterial infection.[7]

We have tried to find out the association between geographical location i.e. urban and rural with neonatal death. After analysis of data we found that higher percentage of rural neonates (20.4%) died compared to that of urban counterparts (5.6%). This difference was found statistically significant (χ^2=12.6 at df=1, p<0.0001).

The families of neonates were classified higher and middle higher together; lower middle and lower as lower socio-economic status. Then we analyzed the data to find out any association between socioeconomic class and neonatal death. We observed that majority of the prevalence of neonatal deaths occurred among lower SE Status 25 (27.4) compared to that of higher SES 05(3.1). This difference was statistically significant (χ^2=32.4 at df=1, p<0.0005). Relative risk was 8.7.

Authors grouped the neonates into two categories based on the approximate time taken by the parents to get their neonates admitted at SNCU since the onset of disease. Authors found that neonates of those parents who took more than 24 hours to reach SNCU died most (14, 28%) which was 16 (8%) only among those who took less than a day to get their babies admitted. This difference was found significant. (χ^2=15.15 at df =1, p<0.0005).

We classified mothers into two groups- BMI less than 18.5 Kg/ meter square as underweight and those with18.5 Kg/ meter square and above as normal. More deaths occurred among neonates of underweight mothers (18, 14.3%) than those with normal BMI (12, 9.7%). This difference was not found statistically significant. (χ^2square= 1.25, P<0.05). Similar results were revealed by the National Family Health Survey (NFHS)-3 data.[8]

Mothers having history of less than 4 visits in this study were taken as inadequate. We found that neonates of those mothers who made antenatal visits less than 4 times died more (22%) compared to their counterparts with 4 or more antenatal visits (5.3%). This difference was found significant (χ^2=15.8, p<0.0005). In a Study conducted in Kathmandu it was found that peri natal mortality was 16

times higher among no ANC or inadequate ANC than that in the group with more than 4 visits.[9] An analysis of District Level Household Survey (2007-2008) conducted in India too revealed results similar to present study.[10]

In our research, we put assisted delivery and Caesarian section together and tried to find out the association between modes of delivery and neonatal death. Percentage of neonatal death was slightly higher (18, 12.1%) among mothers who had delivered either through assistance or caesarian section compared to that of normal delivery 12 (11.7%). This difference was not significant (χ^2=0.009, P>0.05). In contrast, a study conducted at USA revealed that neonatal mortality rates were higher among infants delivered by cesarean section (1.77 per 1,000 live births) than for those delivered vaginally (0.62).[11] In their study they have considered infant mortality unlike ours for which results might be different.

More deaths occurred among out born neonates (20, 14.4% death) compared to that of inborn neonates (10, 9.1%). However, this difference was not significant (χ^2= 1.5, P>0.05). Similar results were obtained in a study conducted at tertiary care hospital at Jamuhar.[12] However, better outcome in the babies who were born at tertiary care SNCU was most likely due to the timely perinatal interventions and the early availability of effective neonatal intensive care.

Present analysis revealed that proportion of death was higher (21, 26.3%) among mothers with history of complications than those without any complication (6.4%). (χ^2=16.98 at df 1, P<0.0005) which was consistent with the findings of District Level Household Survey (2007-2008).[13] Neonates of different age were shown in two groups-0-14 days and 14-28 days. Majority i.e. 25 (20.8%) died out of those admitted during first two weeks than those of 14-28 days (3, 3.8%). This difference was found significant. (χ^2= 17.05, P value= 0.000036, P<0.0005). As per WHO (2006) the first day and first week of life are very crucial period of life as survival is considered.[14]

We found that percentage of death among female neonates was slightly higher (12.5%) compared to their male counterparts (11.7%). However, the difference was not significant (χ^2= 0.037, P=0.84, P<0.01). Factsheet of UNICEF 8 reveals that girls have lower mortality in the neonatal period. In recent years, slower decline in NNMR among girls has been observed and this might be the reason that the difference of neonatal mortality among boys and girls in our study are less and not significant.[8]

First one minute of the life of a newborn is very important. If respiration is not established, resuscitation measures are of paramount importance for neonatal survival. [15] It was noticed that percentage of death of neonates was higher among those who required resuscitation at birth (18.7%) than the neonates who required no resuscitation 12 (7.8%) (χ^2=6.7, P= 0.009512, P<0.05).

Birth weight is the single most important criterion for determining the neonatal and infant survival. Babies with a birth weight of less than 2500 g irrespective of the period of their gestation are termed as Low Birth Weight (LBW) and babies less than 1500 grams are called very low birth weight (VLBW).[16] We grouped both LBW and VLBW (Weight<1500gram) together and termed undernourished. We found that undernourished neonates died more (24, 37.5%), than normal neonates (6, 3.2%). Undernourished babies were found to die 12 times more than normal neonates. The significance of this difference was reaffirmed again by computing chi square test (χ^2=52.9 P<0.00001)

We have combined pneumonia, meningitis or other infections under infections and similarly few conditions like hypoxic ischaemic encephalopathy (HIE) under asphyxia. In the present study majority of morbidity were of Prematurity, (44%) followed by Birth Asphyxia (38.4%) and Infections (35.2%). Research conducted in Bihar revealed that major causes of the morbidity were low birth weight (LBW) (39.8%), prematurity (38.6%), neonatal sepsis (23.3%).[17] We observed that out of 30 deaths, majority was due to infection (33.3%), followed by birth asphyxia (30%) and prematurity (23.3%). These findings are similar to that of SNCU toolkit which reflects mortality pattern of the country.[18] Present finding was consistent with the national averages. In a study at JIPMER, systemic infections were found to cause 52.3% of the deaths, followed by birth asphyxia and injuries (29.23%).[19]

As per mortality survey under the aegis of the Million Death Study Collaborators three causes accounted for 78% (0·79 million of 1·01 million) of all neonatal deaths in India: Prematurity and low birth weight; neonatal infections, comprising neonatal pneumonia, neonatal sepsis, and CNS infections and birth asphyxia and birth trauma.[20] There may be slight variation of leading causes of neonatal death in terms proportion. But, everywhere especially in developing countries like ours, prematurity; infection and birth asphyxia are the leading causes of neonatal mortality. All these neonatal causes of deaths are 52% of total under five deaths. Again, globally more than one third of child deaths are attributable to under nutrition. Resources in terms of human, material and infrastructure may have an impact on any program. Deficit ranged from 25% to 75 per cent as far as availability of doctors, nurses, supporting staff or bed, instruments were concerned against the norm prescribed for SNCU.

On further observation, we found that there was no provision of Special radio diagnostic Department and laboratory for neonates, Special room for invasive procedure, Isolation room (for infected babies) and availability of central oxygen at SNCU. Even 24 hrs

water supply was also not available. This SNCU was established in the state during 2010. Since then no monitoring and supervision has been made. Monitoring strengthens health care delivery system. Inadequate resources and heavily tasked personnel affect the quality of care which again is more important in a place like SNCU where neonates admitted are fighting against death.[21]

Awareness about SNCU and choosing government health care as first contact was satisfactory. However, awareness about danger signs by the people, steps to ensure least 4 antenatal visits, improvement of nutritional status of mother and provision of health check up at regular interval for timely intervention so as to prevent complications during pregnancy are certain issues that need to be addressed at PHC and CHC level of health care system. This may reduce the overload on the resource constraint SNCU at tertiary care hospital. Surveillance and monitoring mechanism is also the need of the hour to make SNCU efficient enough to reduce neonatal death.

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