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Review of Infant and Child Death in a Tertiary Care Teaching Institute in Surat

Rajiv Kumar Prasad[1], Rachana Prasad[2], Vibhuti Vaghela[3], Chetan B Chovatiya[4]

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Author's Affiliation:
[1]Additional Professor, Dept of Pediatrics; [2]Additional Professor, Dept of Community Medicine; [3]Assistant Professor, Dept of Pediatrics; [4]Resident, Dept of Pediatrics, SMIMER, Surat

Correspondence
Dr. Rachana Prasad
prrachana28@gmail.com

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ABSTRACT

Background: A systematic review of child Death (CDR) was required to improve the quality of neonatal health care to avoid more deaths in that particular group especially. So the present research was carried out to study the reasons behind neonatal mortality in the present tertiary care referral centre.

Material and Methods: A cross- sectional study by reviewing case paper of deceased children between 1-5 yrs died in a tertiary care hospital in Surat.

Results: Total live births were 7677, 197 died within 28 days, i.e neonatal mortality rate is 25.66 and 223 died within a year i.e. infant mortality rate is 29.04. Among the ELBW babies 68.1% died, in VLBW babies 29.5% died, in LBW babies 10.96% died and in normal weight baby 7.2% died. Out of total NICU admission 43.5 % were preterm, out of which 49.36% were extremely premature while 50.63% were premature. Out of total 197 neonatal deaths, sepsis was responsible in 69.54% cases followed by extreme prematurity or prematurity (52.1%).

Conclusions: Immediate cause of death was sepsis, HMD, MAS and birth asphyxia. Underlying cause was extreme prematurity, prematurity, sepsis and birth asphyxia. Contributory factors were ELBW, VLBW and LBW. Maturity and birth weight are two most important factors which needs emphasis for prevention of neonatal deaths.

Key words: Child death review, neonatal death, tertiary care referral centre

INTRODUCTION

Realizing the causes of death as key to tackling the burden of millions of child deaths in a resource poor country which lack effective vital registration systems for births, deaths and causes of death; it was set out to describe cause-specific child, infants and neonatal mortality. Child is the greatest resource of the country. Authorities and health professionals have the duty to investigate these deaths systematically and regularly. The burden is of 2.7 million neonatal deaths[1] and 2.6 million stillbirths[2].each year. A vast majority of these deaths are preventable.[3] Preventable child deaths are those where contributing factor is a modifiable factors, which if intervened timely can reduce the risk of child deaths in future[4]. These modifiable factors are care during labour and childbirth and the 1st week of life; and care for the small and sick newborn. The first day of life is the most dangerous day, when nearly half of neonatal deaths as well as disability occur.[5]

The three delays identified, which contribute in reducing preventable child deaths are delay in decision to seek care, delay in arriving at health activity and delay in providing of special care. Reducing maternal and newborn deaths is incorporated in Millennium Development Goals (MDGs) 4 and 5. Majority of them occur in developing countries[6].

Child Death Review (CDR) enables in understanding how and why children die. It provides data on causes of neonatal and child deaths, bottlenecks and key gap areas in child health care delivery services. Child Death Review is being undertaken at two levels, in the community level by ASHA/ AWW/ ANM/ Link worker/ Panchayat member and in the facility level by Medical Officer/Specialist on duty[7].

Most child deaths result from a chain of social, cultural and medical factors. Some of these are preventable[8]. Most important medical causes are neonatal sepsis, tetanus, pneumonia, birth asphyxia, respiratory distress syndrome, extreme prematurity, very low birth weight babies etc. The important non-medical causes are home delivery, lack of transport facility and skilled attendant at birth; cost of hospital etc. the important contributory factors are frequency of ANC visit, frequency of pregnancy and spacing between births, timeliness of referral etc. Non-administration of dexamethasone or betamethasone to the mother during preterm labour as well as for prevention of early onset postnatal sepsis due to PROM (pre-mature rupture of membrane), administration of antibiotics to the mother during premature/early rapture of membranes is few very important interventions found to be effective.[9.]

Many interventions has been started under national health mission focusing on newborn like Janani Suraksha Yojna (JSY), integrated management of neonatal and childhood illnesses (IMNCI), facility based – IMNCI (F-IMNCI), Navjaat Shishu Suraksha karyakram (JSSK), facility based newborn care (FBNC), home based newborn care (HBNC) and Rashtriya Bal Swasthya Karyakram (RBSK).[10]

MATERIAL AND METHODS

This study has been conducted in a tertiary care teaching hospital of Surat city catering a population of more than 5000000. This is the referral centre of 34 urban health centres. Our centre has grade III nursery and all the staff has been trained in all the measures which include immediate newborn care, care of healthy newborn as well as care of small and sick newborn. This includes well equipped NICU (assisted ventilation, surfactant use, and surgery), F-IMNCI, NBCC, NBSU, SNCU, and NSSK. This study was done during the period of one year i.e. from October 2016 to November 2017. Keeping babies at institution for >= 48 hrs is mandatory in our set up to provide immediate newborn care. This study group comprise of all those babies who were admitted in NICU during this period.

The review was done according to Child Death Review, Operational Guidelines, Child Health Division, Ministry Of Health and Family Welfare, Govt of India , Aug 2014[7]. This data comprises of facility based review of deaths of neonates (0-28 days) according to the above said guidelines. The data was collected retrospectively from the case sheet to evaluate the trend and determinants of infant and child mortality.

This quantitative data was analyzed, for the causes of infant and child mortality using SPSS version 2016. The deaths were classified according to ICD – 10 codes. The causes of death are analyzed according to international certificate of death as immediate or direct cause, underlying cause and contributory factor.

RESULTS

Total admissions during this period in NICU was1252, out of which 697 (55.67%) were male, 555 (44.33%) were female. So there is male preponderance. Total number of live births during this period was 7677, out of these 197 died within 28 days, 223 died within one year and 240 within 5 years. So the neonatal mortality rate in this group is 25.66, infant mortality rate is 29.04 and $U\text{-}_5$ mortality is 31.26. Out of total infant deaths, the share of deaths due to neonates was roughly 88.34%.

As expected about 16.7% neonatal deaths occurred within 24 hours and 56.8% occurred within a week, rest 26.3% occurred in late neonatal period.

Table 1 Age Distribution of total neonatal deaths

Age	Total (n=197) (%)
<1d	33(16.7)
1-7 d	112(56.8)
8-28 d	52(26.3)

Table 2 Place of birth of the neonates

Place of birth	Frequency (n=197) (%)
Medical college hospital	128(64.9)
Private	50(25.38)
Home	10(5.07)
Subcentre	5(2.53)
PHC	4(2.03)
Total	197(100)

Table 3 Birth weight and mortality in NICU

Birth weight	Admission (N=1252) (%)	Death (N=197) (%)
<1000 gm ELBW	69 (5.5)	47(23.8)
1000-1499gm VLBW	200 (15.9)	59(29.9)
1500-2499 gm LBW	529 (42.2)	58(29.4)
>=2500 gm	454 (36.2)	33 (16.7)

Table 4: Direct, underlying and other significant conditions leading to death in neonates:

Conditions (ICD-10 code)	Immediate	Underlying	Antecedent	Significant	Total (197) (%)
Sepsis (P36)	107	27	-	3	137(69.5)
HMD (P28.9)	48	9	-	-	57 (28.9)
Extreme prematurity (P07.2)	5	60	-	-	65 (32.9)
Prematurity (P07.3)	4	34	-	-	38 (19.2)
Birth asphyxia (P21.9)	12	15	-	-	27 (13.7)
MAS (P24.01)	16	2	-	-	18 (9.1)
Congenital malformation (Q00-99)	3	5	-	-	8 (4.06)
ELBW (P07.03)	-	-	-	46	46 (23.3)
VLBW(P07.15)	-	-	-	55	55 (27.9)
LBW (P07.18)	-	-	-	39	39 (19.7)

Out of the total 197 neonatal deaths, there was male preponderance with 119 (60.4%) male and 78 (39.6%) female.

Approximately 65% of the delivery occurred in this hospital, 25.38% occurred in private nursing homes and 5.07% at home.

Out of total 1252 admission in NICU, only 454 (23.8%) were normal weight babies, rest 798 (76.2%) were either low birth weight or very low birth weight or extremely low birth weight babies.

Out of total 69 ELBW babies (< 1000gms), 47 (68.1 %) died. Among 200 VLBW babies (1000-1499 gm) 59 (29.9%) died and among 529 LBW babies (1500-2499 gm), 58 (10.9%) died. And among normal weight babies out of total 454, 33 (7.2%) died. In extremely low birth weight babies 22 babies (31.8%) could be saved also.

Regarding gestation age, out of total 1262 admissions in NICU, 555(43.9%) were preterm, out of which 274(49.4%) were extremely premature (less than 34 weeks) and 281(50.6%) were premature (34 -37 weeks).

So from the table it is clear that out of total 197 deaths, sepsis was responsible in 137 (69.5%) cases directly or as underlying cause or as significant factor. Next is HMD which is responsible for 57 (28.9%) deaths directly or as underlying cause or as significant factor, then extreme/ prematurity is responsible for 103 (52.1%) directly or as underlying cause or as significant factor and rest by birth asphyxia, MAS and Congenital malformation.

DISCUSSION

Child Death Review (CDR) is a strategy to understand variations in causes of child deaths and thereby initiate specific child health interventions. Analysis of child deaths provides information about the medical causes of death, helps to identify the gaps in health service delivery and social factors contributing to child deaths.[11]

Regarding age distribution it was found that 73.6% neonatal death occurred in early neonatal period while 26.6% occurred in late neonatal period with male preponderance, similar to what is seen in other studies too[12].[13].

Approximately 95% deaths occurred in health facility, which is much higher than other studies[11]. This may be due to proper implementation of IMNCI, increased referral of sick new born to tertiary health care centre as well as increase number of hospital delivery due to implementation of JSY Scheme. Out of total, private hospitals catered 25.3% patients. But the area where improvement is occurrence of home delivery because in a city where there are 34 UHCs, 2 tertiary care centre and multiple private hospitals, home delivery is not justified. This needs awareness regarding health care system and emphasis on minimum ANC visits.

Neonatal, infant, and child mortality rates in our setting was found to be 25.66, 29.04 and 31.26 respectively. If we compare neonatal, infant deaths rates with the national or state average it is much less. But if we compare with global neonatal mortality rate which is 19/1,000 and child mortality rate which is 43/1000 live births.[14]This needs improvement.

Deaths within 1st week of life are 73.6 % of total neonatal deaths occur, which is similar to other studies. But the share of deaths of neonates out of total infant deaths is 88.3%, and out of total U-5 deaths it is 82%, which is high in comparison to other studies. This may be due to the fact that our centre is a tertiary care centre where critical cases are referred. But this also needs to be explored. Another fact is that as the main bulk of death in U-5 is due to neonatal and infant death, decreasing neonatal and infant death will automatically bring down U-5 death rates.[15]

Remarkable progress has been made in recent decades to reduce the number of child deaths worldwide, but neonatal mortality rates have declined at a slower pace.[16]

Regarding birth weight, out of total deaths, 42.2% were low birth weight babies, 23.8% babies were ELBW babies (less than 1000gm) while 30% were

VLBW babies (1000-2499 gm). If we compare with other studies, the proportion of LBW babies is quite high, but here the reason is that the percentage is calculated out of total admissions in NICU, where denominator is not general population but high risk group that are more probable to die due to various perinatal conditions. This is reflected in other studies also.[17] But if we compare the birth weight with mortality, we can see that roughly equal share of deaths is contributed by ELBW and VLBW while in contrary to normal belief, a little lower rate is contributed by ELBW. The reason here may be constant monitoring and care of these children as they are kept in NICU for a longer period of time. In fact out of total 69 admissions among ELBW in NICU, 22 (31.9%) babies could be saved. This is quite remarkable. This also needs exploration.

In our study the main cause of death among neonates is sepsis which is responsible for 137 (69.54%) deaths as directly or underlying cause or as significant factor. So further study is needed to find out the cause behind sepsis as well as its management is most important to prevent maximum neonatal death.. Next is HMD 57 (28.9%), then extreme prematurity 65 (32.9%), then prematurity which contributes 38 (19.28%) deaths, which is similar to other studies[18].

CONCLUSIONS

Based upon the above observations it was concluded that Sepsis, HMD, MAS, birth asphyxia, extreme prematurity, prematurity, ELBW, VLBW and LBW were important reasons for neonatal deaths. As sepsis is responsible for maximum deaths further study is needed to find out the reason behind that. Death due to HMD, MAS and birth asphyxia also needs further exploration. Maturity and birth weight needs emphasis. As most deaths occurred between 1-3 days, during this period all precautionary measure needs to be taken intensely during this period. Approximately 32% of babies with birth weight less than 1000 gm could be saved, is appreciating and it needs analysis for the reason behind this success.

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