

Original Research Article

Assessment of existing referral system of newborn in Madhya Pradesh, India

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ABSTRACT

Background: The objectives of present study was to assess referral system of newborns, bed occupancies of referring facilities and receiving facility and assessment of rationality of referrals made by referring facilities to receiving facility leading to congestion at receiving facility. The study was conducted in Department of Pediatrics, Special Newborn Care Unit, Kamla Raja Hospital, Gajra Raja Medical College, Gwalior, Madhya Pradesh, India.

Methods: This study was a prospective observational study which was conducted for a period of one year. Referred newborns fulfilling inclusion criteria were enrolled in study, and their receiving characteristics, bed occupancies of referring facilities and receiving facility, number of rationale and irrational referrals at receiving facility were statistically analysed.

Results: Total referred newborns enrolled in the study was 2000. As receiving SNCU, of institute caters not only its nearby places, but also to distant districts of Madhya Pradesh, Rajasthan and Uttar Pradesh. SNCU wise receiving was in order of SNCU Morar (20.60%), Morena (19.40%), Bhind (5.70%), Dholpur (5.35%), Shivpuri (4.40%), Chattarpur (3.10%), Datia (1.20%), Sheopur (0.40%) and Jhansi (0.30%). Referring SNCU wise bed occupancy was in order of SNCU Guna (189.16%), Shivpuri (154%), Morena (72.33%), Bhind (71.63%), Sheopur (69.32%), Morar (64.15%) and Datia (62.11%). Referring SNCU wise case fatality was in order of SNCU Jhansi (100%), Sheopur (100%), Chattarpur (56.45%), Bhind (38.59%), Shivpuri (35.22%), Morena (33.76%), Dholpur (27.10%), Datia (25%), Morar (22.08%).

Conclusions: Discordant bed occupancy at referring SNCU and receiving SNCU and low rationality of referrals are reason for congestion at receiving SNCU. Optimum utilization of beds and cordant bed occupancy between referring and receiving SNCU may improve the working conditions in SNCU and newborn outcome. Referral system should be close loop system with the provision of Down Referral.

Keywords: Bed occupancy, Down referral, Newborn morbidity, Newborn mortality, Newborn referral, Special newborn care unit

INTRODUCTION

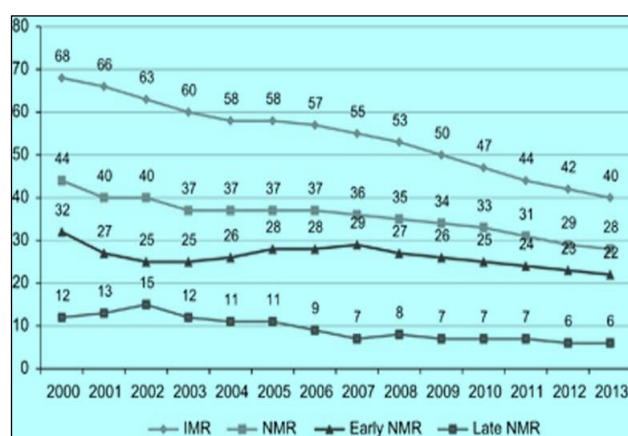
A newborn infant, or neonate, is a child under 28 days of age. During these first 28 days of life, the child is at highest risk of dying.¹ It is thus crucial that appropriate feeding and care are provided during this period, both to

improve the child's chances of survival and to lay the foundations for a healthy life.² Neonatal mortality is the predominant cause of high infant and under five mortality rates. Globally every year four million babies die in the neonatal period (1st 4 weeks of life), 75% of the neonatal deaths occur in the first week of life and at least 50% occur in the first day of life.³ While India contributes to

nearly 20% of total live births while contribution of India to neonatal mortality is 30%.⁴

Several initiatives have been launched by the Ministry of Health and Family Welfare (MOHFW) including Janani Suraksha Yojana (JSY).⁵ A key intervention that has resulted in phenomenal growth in institutional deliveries. More than one crore women are benefitting from the scheme annually and the outlay for JSY has exceeded 1600 crores per year.

But as per annual statistical report of national statistical data of ICMR (Indian Council of Medical Research), if we compare trend of mortality of infant over a decades and newborns mortality over a decade, authors can very well appreciate that the decrease in mortality of newborn over a decade is not as much decreased compared to infants mortality and also trend of ENM (Early Neonatal Mortality) over a decade's is static (Figure 1).⁶



Source: National Institute of Medical statistics, Indian Council of Medical Research.

Figure 1: Trend of infant mortality rate and neonatal mortality rate.

Both these facts reflects poor perinatal care of existing newborn care system and newborn referral system, which makes dream of INAP (India Newborn Action Plan) a distant dream, which is expecting India will achieve the goal of single digit NMR (Neonatal Mortality Rate) by 2030.⁷ The reason could be, if we emphasize facility based newborn care which provides essential and emergency newborn care at the level of NBCC (Newborn Care Corner), NBSU (Newborn stabilizing Unit), District Hospital SNCU (Special Newborn Care Unit) and Medical College SNCU, these receiving facilities i.e. Medical College SNCU receives maximum proportion of their referrals from District Hospitals SNCU.⁸

If there is not efficient prioritization, triage and rationality in referrals by DH SNCU to MC SNCU and also if there is lack of down referral from MC SNCU to DH SNCU, then it would be exorbitant burden on MC SNCU, and it could be reason for weakening of the pillar of FBNC (facility based newborn care) which is supposed

to be most important pillar of the FBNC and ultimately newborn care at all levels of existing system of FBNC will be shattered/bite the dust.⁹ Emphasis on neonatal care is very much required in today's perspective as majority of neonatal mortality takes place in the first 28 days of life i.e. neonatal period and addressing Sustainable Developmental Goal-3 to decrease the neonatal mortality to 12/1000 live births by 2030. The ENAP (Every Newborn Action Plan) recently endorsed by the World Health Assembly calls for NMR <10/1000 live births by year 2035 in all countries.⁷

The SCNU of Gajra Raja Medical College was established as a joint venture of Government of Madhya Pradesh, UNICEF and NHM (National Health Mission). Being part of the medical college, it caters not only to Gwalior but also the adjoining districts of Rajasthan and Uttar Pradesh. It provides advanced respiratory support like CPAP, mechanical ventilation, surfactant administration as well as exchange transfusion. So, this SCNU is a vital link in the efforts to decrease NMR (neonatal mortality rate) of Gwalior as well of the entire state of Madhya Pradesh. Discrepancy in mortality and morbidity profile of extramurals as compared to intramurals makes the major chunk!!

In year 2016, there were 5161 newborns admitted in Special Newborn Care Unit (S.N.C.U.), Kamla Raja Hospital, Gwalior. Out of total newborns admitted, 2143 babies were intramurals (i.e. delivered in same hospital) and 3026 babies were extra murals (i.e. delivered in other hospitals and referred from their). Extramurals morbidity was approximately 16% higher than intramurals morbidity. Total mortality was 26.11%, 936 (around 30.93%) of extramurals and 414 (20%) of intramurals. Most of the neonatal deaths were early neonatal deaths 1183 (87.63%) in total 1350 mortality. Early Neonatal mortality of constitute around 86.53% of total mortality of extra murals. Even though the mortality of referral facility following decreasing trend over the past few years, but the percentage of early neonatal deaths is remaining constant over the years.

In SNCU, Kamla Raja Hospital, Gwalior although overall neonatal mortality is following decreasing trend over last 4 years (i.e. 31.04% in 2013, 24.80% in 2014, 26.62% in 2015 and 26.11% in 2016). Observed mortality of extramurals were more as compared to intramurals mortality, and this scenario is consistent over years. Although numbers of extramural admissions increasing every year and mortality of extramurals had decreased over last 4 years, i.e. 4% decreased as compared to last year's hospital statistics. Difference in mortality of intramural and extra murals exists every year, as per hospital statistics mortality of extra murals was found higher than intramurals mortality.

All such facts led to foundation of this study, to explore newborn referral system apart from poor logistic factors

involved, but also to study rationality and bed utilization at referring and receiving facility.¹⁰

METHODS

The present study was carried out with the objective of finding out the causes of neonatal morbidity that leads to high bed occupancy in the referral centre and causes of neonatal mortality, and what are the factors that predicts outcome of referred newborns brought directly or referred from smaller hospital in the region. Significant number of bed occupancy and higher mortality of extramural newborns in the referral centre led the foundation of this study.

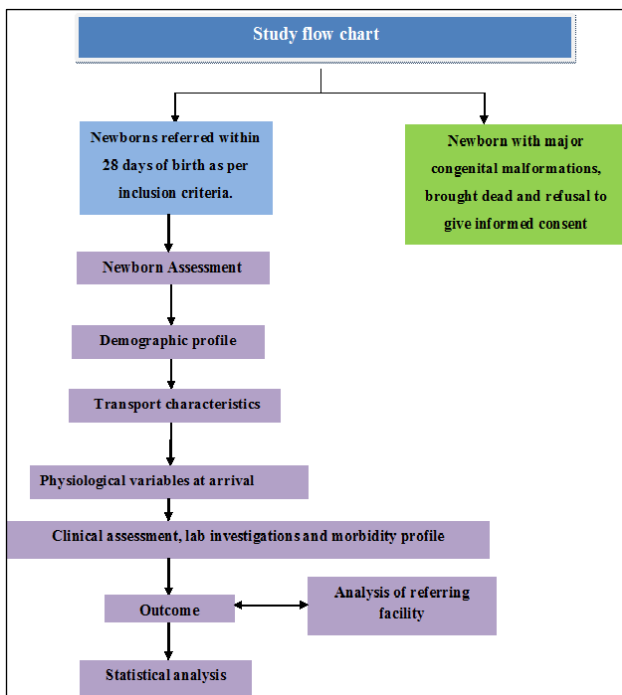


Figure 2: Study flow chart.

The study was carried out at the Special Care Newborn Unit (SCNU), Department of Pediatrics, Gajra Raja Medical College, Gwalior (MP) for one year duration. Study was conducted after approval of institutional ethical committee of Medical College. The subjects was assessed in terms of maternal antenatal visits, place of delivery (home, Primary Health Centre, Community Health Centre, District Hospital, Private Hospital), person conducting delivery (Doctor, Nurse, Female Health Worker, Trained Birth Assistant, or Other) and if any reason for referral (written), pre-referral treatment, indication for referral, mode of transport (ambulance or self-arranged), advise given during transport (like feeding, temperature, airway). Clinical condition of baby at arrival in SCNU will be assessed and need for immediate resuscitation on admission. After initial stabilization newborns will be assessed for maturity, clinical condition, risk factors, individual morbidity and their outcome will be assessed in term of successfully

discharged, left against medical advice, referred to higher centre or expired with duration of stay in Special Newborn Care Unit (SNCU) at Kamala Raja Hospital, Gwalior (M.P.). Data was collected compiled in MS excel. Data was analysed using appropriate statistical tools (Figure 2). Study period was 1 year (September 2015 to September 2016). Study design was prospective study.

Inclusion criteria

All newborns (0-28 days) referred to the SCNU during the study period (2000 referred newborns were enrolled in the study).

Exclusion criteria

Newborns brought dead, with major congenital malformations, and whose parents didn't consent for study were excluded from study.

Data collection and analysis

Data was collected, compiled in MS excel. Data was analysed using appropriate statistical tools.

RESULTS

The total referred newborns in the study were 2000 which fulfil the inclusion and exclusion criteria. They were enrolled and followed up. In these 2000 newborns, 1398 newborns survived that constitute 69.90% of total sample size and 602 newborns expired that makes 30.10% of total sample size. In the present study, it was observed statistically significant difference among referred newborns from district hospitals/SNCUs, UHCs (urban health centre), CHCs (community health centre), PHCs (primary health centre) and self-referrals in expired group duration of stay less than 1 day found very significant and for survived newborns duration of stay more than 7 days found very significant, this could be due to majority of referred newborns was referred in grave situations generally expired within 1 day in referral facility.

While results found statistically not significant in terms of duration of stay of survivor and expired group for referred newborns from private hospital with p value 0.20 which could be due to private hospitals stabilize the baby before referral and follow referral guidelines to more extent than Government hospitals and for Civil hospitals also results was statistically not significant, which could be due to lesser sample size obtained in our study. In the present study, it was observed that there was no statistically significant difference found between outcome of referred newborns from district hospitals/SNCUs or from any other hospitals or even self-referral, with p value 0.07. Also We observed at the end of this study, in terms of bed occupancy of referral and referring facilities, there is congestion at the medical college SCNU, G.R.M.C., Gwalior as the bed occupancy of this facility

is more than 2 times of cumulative bed occupancies of all SNCUs of state, also around 4 times of those SNCUs from where it receives maximum referrals annually. This huge gap makes the congestion/ over utilization of the resources at this medical college SNCU on the other hand underutilization of resources at these referring SNCU, which makes a significant difference in terms of newborn care at receiving SNCU, because resources are allocated by Government as per the sanctioned beds. Referring

SNCU contributing in irrational referrals making underutilization of their beds and resources, although these all referring SNCU are very well equipped for the irrational referrals they are referring with the manpower and other resources like medical equipment's and medicine disposables (Figure 3). Table 1 shows that the SNCU with maximum proportion of irrational referrals have less case fatality at the medical college SNCU, itself justifying their irrational referrals made.

Table 1: SNCU wise referral and indication for referral to receiving facility in year 2016.

Morbidity	SNCU			
	Morar	Morena	Bhind	Shivpuri
ELBW	04	05	02	02
NNHB	73	18	08	04
HIE I	22	61	09	02
HIE II	67	19	14	15
HIE III	24	35	14	08
RDS	57	106	16	21
NNS	92	68	22	27
MAS	30	36	13	03
PT	30	31	12	05
B/O HBs (+)mother	09	08	02	-
Others	10	01	02	01
No of referrals	412/2000	388/2000	114/2000	88/2000
	20.60%	19.40%	5.7%	4.4%
Bed occupancy (%)	64.15%	72.33%	71.63%	154%
Case fatality rate	91/412	131/388	44/114	31/88
	22.08%	33.76%	38.59%	35.22%

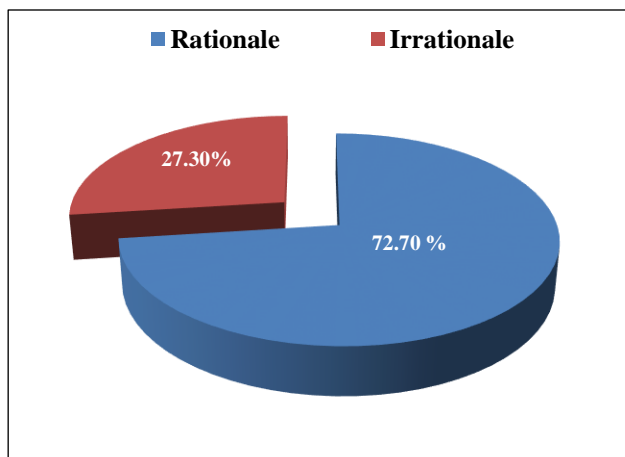


Figure 3: Proportion of referrals from various source to receiving facility.

In Figure 3, apart from SNCUs annually 1/3rd referrals were made by other hospitals and both these type of referring facilities contributes to near about 30% of irrational referrals.

Table 2: Scenario of Bed Occupancy of Referral facility and Receiving facility in 2016.

SNCU	Bed Occupancy (%) (annual/average)
Receiving facility	253.14
Madhya Pradesh	119.69
Morar	64.55
Morena	72.33
Bhind	71.63
Shivpuri	154
Datia	62.11
Guna	189.16
Sheopur	69.32

When this 30% annual data were analysed in terms of figure it will be in thousands, means these thousands of newborn who did not require level 3 newborn care at level 3 SNCU, are referred to the place who seems to be engaged in providing level 3 newborn care, affecting care of the newborns who actually needs level 3 newborn care annually.

As SNCU, of institute caters not only nearby places, but also to distant districts of Madhya Pradesh, Rajasthan and Uttar Pradesh. SNCU wise referral was in order of SNCU Morar (20.60%), Morena (19.40%), Bhind (5.70%), Dholpur (5.35%), Shivpuri (4.40%), Chattarpur (3.10%), Datia (1.20%), Sheopur (0.40%) and Jhansi (0.30%). SNCU wise bed occupancy was in order of SNCU Guna (189.16%), Shivpuri (154%), Morena (72.33%), Bhind (71.63%), Sheopur (69.32%), Morar (64.15%) and Datia (62.11%). SNCU wise case fatality was in order of Jhansi (100%), Sheopur (100%), Chattarpur (56.45%), Bhind (38.59%), Shivpuri (35.22%), Morena (33.76%), Dholpur (27.10%), Datia (25%), Morar (22.08%) (Table 2 and Figure 4).

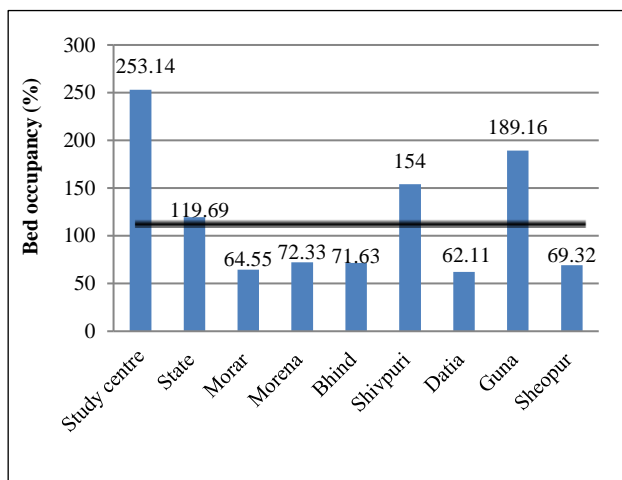


Figure 4: Scenario of bed occupancy of referring facility and receiving facility in 2016.

DISCUSSION

Though the newborn care and survival has improved with the establishment of SNCUs, but on the one hand the referral system is not structured and organised, on the other hand receiving facility is being congested with referred newborns compromising the newborn care at receiving facility, comparison of bed occupancy of referring SNCUs and receiving SNCU is surprising. Referring facility need to understand that it is indeed necessary to refer sick newborn to a higher centre for appropriate management but stabilization them before transport is of prime importance to get maximal benefit out of the referral. This study reflects poor status of newborn referral as we discussed outcome of referred newborn is poor as compared to intramurals because of the lack of the prioritization, triage and logistic factors involved, disproportionate bed occupancy at various facilities. This disproportion in bed occupancy as we already discussed leads to underutilization of those facility which are very well equipped with manpower and medical equipment's on the other hand over utilization of facilities at the receiving facilities. Irrational referrals, irrational referrals leading to compromised care of those newborn who actually needs level 3 newborn care at the medical college SNCU. The higher the bed occupancy at

receiving facility the higher was mortality. This was due to congestion at the receiving facility which affected monitoring and care of individual newborns in resource limited settings. Many newborns referred to tertiary care hospital/level III care SNCU only for phototherapy, prematurity (without complications), HIE-I, hepatitis -B immunoglobulin administration, that led to congestion at the receiving facility (Table 2).

Improper referral on the one hand leading to underutilization of district SNCUs (level II) and on the other hand it causes congestion in referral SNCUs (level III SNCUs of Medical Colleges, leading to compromise of monitoring and care of sick newborns requiring level III SNCU care. Because in hospital all the resources allocated as per the sanctioned beds whether it is the human resources, e.g. doctors, nursing staffs and supportive staffs or medicines disposables and medical equipment's. Many referred newborns as shown in table no.2 referred for management of NNHB, prematurity (uncomplicated), HIE-I and for hepatitis-B immunoglobulin administration should be managed at district SNCUs only. It was found by Shah PS et al, in a study done in NICUs of Canada in 2010-2012, that larger the NICUs more intense was resource utilization, which were found to be associated with higher odds of a composite adverse outcome in very preterm infants, i.e. the total of 2889 (29%) infants developed the composite outcome, the odds of which were higher for 16-29, 30-36 and >36-bed NICUs compared with <16-bed NICUs (AOR (95% CI): 1.47 (1.25-1.73); 1.49 (1.25-1.78); 1.55 (1.29-1.87), respectively) and for NICUs with higher resource utilization at admission (AOR: 1.30 (1.08-1.56)).¹¹

A significant number of neonatal deaths among referred newborns can be prevented. The development of an effective neonatal transport system is needed for proper implementation of regionalization of perinatal care and better neonatal outcome, as observed by Buch Pankaj M et al, in their study.¹² Triage system in referral of newborns is an alternative for resources limited settings like India or other developing countries. There must be proper communication to referral facility or time to time feedback system to referring facility about their case fatality. Referring facility should not refer newborn without indication of referral, or those who can be managed at referring facility should be discouraged. Though there are referral guidelines available, but there is a need to strengthen the existing referral system. Rationalization of referral system and optimum utilization of beds at referring facility.

CONCLUSION

There should be provision of down referral of those newborns who referred for the condition which sought and managed at the referral facilities then after stabilization, these referred newborns should be referred back to the same referring facilities. There should be a

close loop system with level 1, level 2 and level 3 newborn care facilities proper coordination. To decongest the facility from the irrational referrals there should be prioritization and triage with referring facilities before referral. Only those sick newborn who are not manageable at referring facility should be referred. Although newborn care in existing system had improved neonatal outcome, institutional deliveries, transport facilities, but newborn transport is still a challenging so there is a need to strengthen the existing referral system and logistic factors like communication, stabilization before transport. The referral system should be like a closed loop circle and there should be provision for the referral facility that once stabilization and taken care of condition for which referral was sought had been managed, to be referred back to referring facility for the further management. This down referral concept should be integral part of referral system to decongest the receiving facility.

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