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Facility assessment of neonatal intensive care units of urban Allahabad

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Abstract

Background: During the last decade there has been a phenomenal growth of neonatal intensive care units in the country, especially in the corporatized health care sector and to a lesser extent in public sector health care facilities. Sick & premature newborn requiring specialized hospital care dies because facilities and skills required for Neonatal Intensive Care Unit (NICU) are usually unavailable. This study was conducted with an objective to assess the facility i.e. Neonatal Intensive Care Units, both public & private sector, in urban Allahabad.

Methods: The present study was conducted in the Newborn Intensive Care Units of Government and Private settings of urban Allahabad, Uttar Pradesh during the year 2015-2016. For the conduction of study, the factors were classified as Neonatal Factors and Health facility based i.e. NICU factors, which could influence the survival outcome of the neonates. The assessment of Facility was done on the basis of standards as suggested in the Ministry of Health and Family Welfare guidelines.

Results: Both the public & private sectors had the availability of 24 hour newborn services, which included 24 hour availability of pediatricians and nurses, facility for resuscitation, thermal care and breastfeeding support services. The present study reported sepsis score of 9 and 8 in Government and Private sectors respectively. The private sectors had better nurse bed ratio and low bed occupancy i.e. low patient load as compared to the government sector. The services, sepsis practices, equipments & drugs are comparable.

Conclusion: The study revealed poor human resources (doctor: bed ratio & nurse: bed ratio) as against the recommended standards for intensive care for neonates. So, the recruitment of human resources is recommended.

Keywords: Facility assessment, NICU, Allahabad

Introduction

Two third of the world's neonatal deaths occur mostly in Asian countries. Since the causes of neonatal deaths vary by country & with the availability and quality of healthcare, understanding the neonatal mortality in relation to these determinants is crucial^[1].

The newborn health challenge faced by India is bigger than any other country^[2]. There is no single solution to save lives of a newborn. The underlying factors such as illiteracy, socioeconomic deprivation, traditional beliefs and gender bias that profoundly affect maternal and neonatal deaths are complex and relatively resistant to change in the short-term^[3].

Sick & premature newborn requiring specialized hospital care dies because facilities and skills required for Neonatal Intensive Care Unit (NICU) are usually unavailable⁴. The presence of Neonatal Intensive Care Units at the hospital gives an opportunity for all at risk babies to be admitted and managed by a pediatrician. The decision for transfer is usually done by midwives or a pediatrician based on the condition of the newborn and resources available; low Apgar score, prematurity, Low Birth Weight, congenital malformation and suspected infection. In addition, some obstetric conditions may necessitate baby transfer because they could represent a risk to the newborn^[5].

During the last decade there has been a phenomenal growth of neonatal intensive care units in the country, especially in the corporatized health care sector and to a lesser extent in public sector health care facilities^[6].

Every year 70% of neonatal deaths take place because simple yet effective interventions do not reach those who need them the most. Coverage of interventions is low, progress in scaling up is slow, and inequity is high^[7].

This gap is due to poor coverage within the health system, shortage of health care providers, and issues related to access to referral services. While community-based research is receiving attention and investment, rigorous evaluation and research on facility-based interventions is lagging behind^[8].

Some hospitals tend to treat higher risk patients and as a result are more likely to have higher mortality rates. Therefore, devising a scorecard based solely on outcomes like neonatal mortality will not accurately reflect the quality of care delivered at hospitals or offer meaningful clues about how to improve care. Comparing the quality of care is tricky. Better understanding the differences of hospital care can help us improve care, limit deviation from evidence based practices and hopefully improve neonatal outcomes^[9]. This study was conducted with an objective to assess the facility i.e. Neonatal Intensive Care Units, both public & private sector, in urban Allahabad.

Material and Method

The present study was conducted in the Newborn Intensive Care Units of Government and Private settings of urban Allahabad, Uttar Pradesh during the year 2015-2016.

In Government setting, there is Sarojini Naidu Children Hospital (SNCH) Newborn Intensive Care Unit attached to the medical college and several private NICUs. The private NICU with comparable admission rates as that of the Government hospital (SNCH), was selected for the study.

In the beginning, the permission of NICU In-charge of the respective hospitals was obtained for conduction of the study maintaining the confidentiality. The ethical clearance was taken from institutional ethical committee.

For the conduction of study, the factors were classified as Neonatal Factors and Health facility based i.e. NICU factors, which could influence the survival outcome of the neonates. The neonatal factors have been discussed in a different paper.

The assessment of Facility was done on the basis of standards as suggested in the Ministry of Health and Family Welfare guidelines and advanced facilities of mechanical ventilation and surgeries.

1. The assessment of health facilities was done under the following headings:
2. Resources & Services provided
3. Infection prevention practices
4. Availability and functionality of essential equipments

5. Drugs and consumables

1. Resources and services provided

- 24 hour newborn care services include 24 hour availability of pediatricians and nurses, facility for resuscitation, thermal care and breastfeeding support services.
- Triaging of sick newborns means sorting of neonates to rapidly screen sick neonates for prioritizing management into Emergency cases, Priority cases and Non-urgent cases.
- The availability of the criteria for admission & discharge from Newborn Care Units and criteria for transfer to step down unit and discharge was checked.
- Staffing pattern (Doctors & nurse bed ratio)
- The availability of transport services for referral was checked.

2. Infection prevention practices

The infection prevention practices were assessed and asepsis score was given.

- a. Asepsis score^[10]: It is a composite score of 11.
- b. 24 hour running water (2)
- c. Presence of an elbow operated washbasin (1)
- d. Soap availability (1)
- e. Practice of hand-washing before entering NICU (2)
- f. Practice of hand-washing after checking every baby (2)
- g. Practice of wearing gowns in NICU (1)
- h. Practice of wearing slippers in NICU (1)
- i. Practice of wearing masks and caps in NICU (1)

3. Equipment's

The equipment's under assessment included monitoring equipment, equipment for management, resuscitation equipment, oxygenation facility, equipment for investigation and general equipment's. The availability and functionality of the equipment's were checked.

4. Availability of commonly used lifesaving drugs

The availability of ampicillin, gentamycin, amikacin, cefotaxime, chloramphenicol, aminophylline, vitamin K, phenobarbitone, phenytoin, dopamine/dobutamine, intravenous fluids was assessed.

Results

The findings have been tabulated as follows:

Table 1: Assessment of Resources & Services provided

Organization of staff and system of care	Government	Private
24 hour New born services	Yes	Yes
Total number of Beds	15	13
Nurse Bed ratio	1:5	1:2
Doctor Bed ratio	1:5	1:6
Bed occupancy	100%	85%
Average Duration of stay in NICU	5 days	3 days
Charts with criteria for admission and discharge	Yes	No
Availability of management guidelines for common conditions	Yes	No
Training facility	Yes	No
Referral services	Yes	Yes

In Government NICU, the display charts with criteria for admission and discharge were found at the time of study. The management guidelines for common conditions were

displayed. The training facility & referral facility was also available in Government NICU while in private, only referral services were available.

Table 2: Assessment of Infection Prevention practices

Infection Prevention practices (Asepsis score)	Government	Private
24 hour running water (2)	2	2
Presence of an elbow operated wash basin (1)	1	0
Soap availability (1)	1	1
Practice of hand-washing before entering NICU(2)	0	0
Practice of hand-washing after touching every baby (2)	2	2
Practice of wearing gowns in NICU (1)	1	1
Practice of wearing slippers in NICU (1)	1	1
Practice of wearing masks and caps in NICU (1)	1	1
Total Score	9	8

Table 3: Assessment of Equipment's

Equipment's	Government		Private	
Availability and functionality of Equipment's				
Monitoring equipment's	Available		Available	
Stethoscope with neonatal chest piece	Available		Available	
Non-invasive BP monitors	Available		Available	
Pulse-ox meter, Thermometer	Available		Available	
Baby weighing scales (Electronic and Mechanical)	Available		Available	
	Available	Functional	Available	Functional
Equipment for management:	13	13	10	10
Radiant warmer, Phototherapy unit	2	2	6	6
Resuscitation equipment's (Self inflating bag and suction pump)	Available	Available	Available	Available
oxygenation facility	Available	Available	Available	Available
General Equipment's:	Available and Functional	Available and Functional	Available and Functional	Available and Functional
Generator Inverter, Washing machine, Refrigerator, Computer Wall clock with seconds hand, Surgical instruments Spot lamps Air-conditioner Autoclave equipment	Available and Functional	Available and Functional	Available and Functional	Available and Functional

Table 4: Assessment of Drugs and consumables

Drugs and consumables	Government	Private
Availability of commonly used lifesaving drugs and consumables	Available	Available
Dose and time recorded for medications and intravenous fluids	Yes	Yes
Dose guidelines for commonly used drugs	Available	No
Routine administration of vitamin K to new Borns	Yes	Yes
Routine administration of prophylactic eye drops/ointment to new Borns	No	No

It can be noted that the nurse bed ratio is better and lower bed occupancy in private settings as compared to government settings. The asepsis practices, essential equipments and commonly used life-saving drugs are comparable in both the sectors with few differences mentioned in the above tables.

Table 5: Survival outcome of neonates at the time of discharge from NICUs

Outcome	Government	Private
Survived & improved	534 (70.91%)	569 (86.73%)
Died	96 (12.74%)	24 (3.65%)
LAMA	96 (12.74%)	53 (8.07%)
Referred	27 (3.58%)	10 (1.52%)
Total	753	656

Discussion

The present study was carried out in the Neonatal Intensive Care Units (NICUs) of urban Allahabad. The Government and Private NICUs with comparable admission rates were chosen for conducting the research to probe in the factors (facility related) that may influence the survival outcome of neonates at tertiary health care systems.

The resources & services at Government and Private Neonatal Intensive Care Units were assessed. Both the public & private sectors had the availability of 24 hour newborn services, which included 24 hour availability of pediatricians and nurses, facility for resuscitation, thermal

care and breastfeeding support services.

The total number of beds was 15 in Government and 13 in Private NICUs. The total number of nurses during one shift in a Government hospital was 3 and 7 in Private NICUs. The nurse: bed ratio was 1: 5 in Government and 1:2 in Private NICUs. The pediatricians were available round the clock in both the hospitals. The doctor: bed ratio was 1: 5 and 1: 6 in Government and Private set-ups respectively. The bed occupancy at the time of study in Government was 15 out of 15 (100%) and 11 out of 13 (84.61%) in Private NICU. The average duration of stay was 5 days in Government and 3 days in Private hospital.

Sutapa Bandyopadhyay Neogi *et al.* [11] studied the functioning of Sick Newborn Care Units (SNCUs) of eight rural districts of India and found that the median bed occupancy was 103% and the average duration of stay was 5 days. The units had a varying nurse: bed ratio (1:0.5-1:1.3). Rajendra Mahore, Sanjay Dixit, SB Bansal *et al.* (2014) [12] conducted a study to assess the functioning of SNCUs in six centres of India. The units had a varying nurse: bed ratio (1:1-1:2.14). The bed occupancy rate ranged from 83% to 121% (median 115%), and the average duration of stay ranged from three days to 8 days (median 5 days).

In Government NICU, the charts mentioning the criteria for admission and discharge were found. The management guidelines for common conditions were available. The training facility for nurses and paramedical staff were also available.

In Private NICU, the charts mentioning the criteria for admission and discharge were not available. The management guidelines for common conditions were not available. The training facility was not available.

Similarly, Charles Opondo, Stephen Ntoburi, John Wagai *et al.* [13] assessed the availability of resources that support the provision of basic neonatal care in eight first referral level (district) hospitals in Kenya and reported that patient management guidelines were missing in all sites.

However, the referral facilities were available at both the hospitals.

The infection prevention practices were assessed by an asepsis score. The Government NICU had an asepsis score of 9 while it was 8 in Private NICU.

The practice of hand washing before entering the NICUs was not performed in both the hospitals. Hand washing is a very important component of hygiene and infection prevention. And more often, it is a widely overlooked practice. The private sector did not have an elbow operated tap in a wash basin.

Rajendra Mahore, Sanjay Dixit, SB Bansal *et al.* [12] conducted a study to assess the functioning of SNCUs in six centers of India. In asepsis scoring, of a maximum score of 11, the score of the units ranged from 7 to 11 (median 6.8). The present study reported asepsis score of 9 and 8 in Government and Private sectors respectively.

The monitoring equipments, general equipments and the equipments for management were available in both the units. There were 13 radiant warmers and 2 phototherapy units in Government NICU while 10 warmers and 6 phototherapy units in private. All were functional at the time of assessment.

All the commonly used lifesaving drugs was available. The dose and time were recorded for administering medications and intravenous fluids. The dose guidelines for commonly used drugs were available at both the centers. The routine administration of vitamin K was practiced in both the sectors.

If we compare the outcome in both the sectors in terms of survival & death, it is surprisingly alarming in the Government sector. This could be attributed to the fact that the private hospitals refer the serious patients without admitting them which could mask the true picture unlike government set up where all the patients are admitted irrespective of the disease severity. The private sectors had better nurse bed ratio and low bed occupancy i.e. low patient load as compared to the government sector. The other resources & services, asepsis practices, equipments & drugs are quite comparable.

Also, the difference of outcome in neonatal mortality at the centers included in the study could be due to conditions like heavy patient load, low human resources at NICUs as compared to recommendations, severity of the health condition of the neonates or delay in transportation to the health care system or due to inappropriate services at the lower levels of health system or inappropriate referral.

Conclusion

The assessment of public and private facilities providing neonatal care in urban areas of Allahabad revealed quite comparable results in terms of admission rates, services provided, infection prevention practices, availability of equipments & drugs but low human resources as against the recommendations. The survival outcomes show a stark

difference across the two sectors. The private sector had a better survival outcome (86.73%) of sick neonates than Government (70.91%). There were more (12.74%) deaths in Government hospital than Private (3.65%) settings.

Recommendations

The study revealed poor human resources (doctor: bed ratio & nurse: bed ratio) as against the recommended standards for intensive care for neonates. So, the recruitment of human resources is recommended.

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