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Neonatal Outcome in Public and Private Sector in a Resource Poor Area

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ABSTRACT

BACKGROUND AND AIM: Assam's NMR stands at 19, one less than the national average. Disparities exist in neonatal outcomes across regions and across public and private setups, indicating need for retrospection and identifying bottlenecks at local levels. We compared 2 different neonatal units of Assam to study the morbidity and mortality profile with respect to available resources and identify factors affecting neonatal outcome which would allow for introspection and boost existing healthcare systems.

METHODOLOGY: Hospital based retrospective observational study was conducted from 1/2/2021-3/1/2022. Unit A, located in the Barak Plains of Southern Assam, a 60 bedded level3 NICU while Unit B located in the Brahmaputra Plains (Central Assam), 10 bedded private level3 NICU. The records of the neonates were analysed. IEC permission was taken.

RESULTS: Of 9200LB in UnitA, 5097(inborn:53.7%) were admitted,vs746LB in UnitB with 447(Inborn: 58%)admitted(RR=0.92,95%CI0.86-0.98).Amongst admitted, in UnitAvsUnitB, 3588 (69.8%) vs81(18%)were >37wks(p<0.0001),1062 (20.8%) vs170(38%)>34-36wks(p<0.0001) &477(9.35%) vs196 (43.8%)< 34 wks. of GA(p<0.001), while 3044(59.7%) vs 243 (54.3) had birthweight>2500 g (p=0.02), 1686 (33.07%) vs183 (40.7%)1500-2499gm (p,0.001),&316(6%)vs 19(4.2%) (p=0.04),1000-1499 gm &51(1%) vs 2(0.4%)<1000gm(p=0.1). Major morbidities were respiratory distress (RD), prematurity, sepsis and birthasphyxia (BA) in both units. UnitA, mortality was 8.9% while 3.3%in unitB. In UnitA, BA&RD were major contributors of mortality (40%each) compared to Unit B with BA(13.3%), RD6.6%(p<0.01). Human Resources at UnitA comprised of postgraduates, consultants and nurses (with transferable postings) while UnitB is manned by a junior resident, paediatrician, visiting neonatologist and well-trained nurses with non-transferable postings.

CONCLUSION: Birth asphyxia, respiratory distress being leading causes of neonatal mortality in both units. Though Unit A had higher number of mortalities, the reasons can be attributed for higher case load and late referral. We propose a public private partnership model to make quality neonatal services affordable to the predominantly rural population of Assam.

I. INTRODUCTION

Neonatal mortality is still a huge burden in our country despite recent gains. According to the SRS 2020, the current NMR is 20/1000 live births which is quite optimistic, this downward trend needs to be maintained to achieve the SDG 2030 target of single digit NMR. India being a very diverse country with different geographical and socio-economic settings, the challenges faced by different regions are in itself mixed and variable. In recent times the battle cry has been 'no one left behind'[1]. It is thus imperative to examine current issues at the local level to improve and adapt accordingly. However, very few studies have examined disparities in neonatal outcome at the local levels. The two institutions taken in our study, located in 2 different districts of Assam are from 2 distinct natural divisions under the SRS data.

The purposewas to study and compare the neonatal outcomes of two distinct institutions, 1 public and another private sector neonatal units in Assam. We aimed to identify the strengths & weaknesses of both units which will help understand and formulate better strategies at the local levels.

II. MATERIALS AND METHODS:

This study was done with the hospital records of infants born at the following institutions

1. UNIT A: Silchar Medical College (SMC), Silchar, Cachar district, Assam a government medical college with a postgraduate program

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with 60 bedded Level III NICU facilities and 20 formally trained nurses with transferable jobs catering to mothers having average education of primary school

2. UNIT B: Aditya Diagnostics & Hospital(ADH), a private owned, tertiary care Level III NICU in Dibrugarh, Assam with 10 bedshaving a neonatologist, 2pediatricians and 12 informally trained nurses with fixed posting,catering to mothers with average education ofXII+Standard

All neonates (0-28 days) admitted during the study period were included. Institutional ethical committee clearance was taken.

Records of newborns admitted from 1st February 2021 to 31 January 2022 were analyzed. Data entry was done on Microsoft Excel spreadsheets and analysis done using SPSS 28. A p value less than 0.05 considered statistically significant.

III. RESULTS:

Table 1: Comparison of live births and admissions in both units

UNITS	TOTAL LIVE BIRTHS	NUMBER OF ADMISSIONS		
		INBORN (%)	OUTBORN (%)	
UNIT A	9200	2355(53.7)	2742 (46.3)	RR= 0.92, 95% CI 0.86-0.98
UNIT B	746	260 (58)	187 (42)	

(UNIT A= SMCH, UNIT B= ADH)

Table 2: Comparison of admissions according to gestational age

ADMISSIONS	UNIT A, N (%)	UNIT B, N (%)	P VALUE
>37 WEEKS	3588(69.8)	80 (18)	<0.0001
34- 36 WEEKS	1062(20.3)	169 (38)	<0.0001
<34 WEEKS	477(9.35)	198 (43.8)	<0.001

(UNIT A= SMCH, UNIT B= ADH)

Table 3: Comparison of admissions according to birth weight.

ADMISSIONS (in grams)	UNIT A, n (%)	UNIT B, n (%)	P VALUE
>2500	3044 (59.7)	242 (54.3)	0.02
1500-2499	1686 (33.07)	182(40.7)	0.001
1000-1499	316 (6.1)	19 (4.2)	0.04
<1000	51 (1)	4 (0.4)	0.1

(UNIT A= SMCH, UNIT B=ADH)
A significant number of babies with birth weight>2500 grams were admitted in unit A compared to unit B.

Comparison of morbidity in both units:

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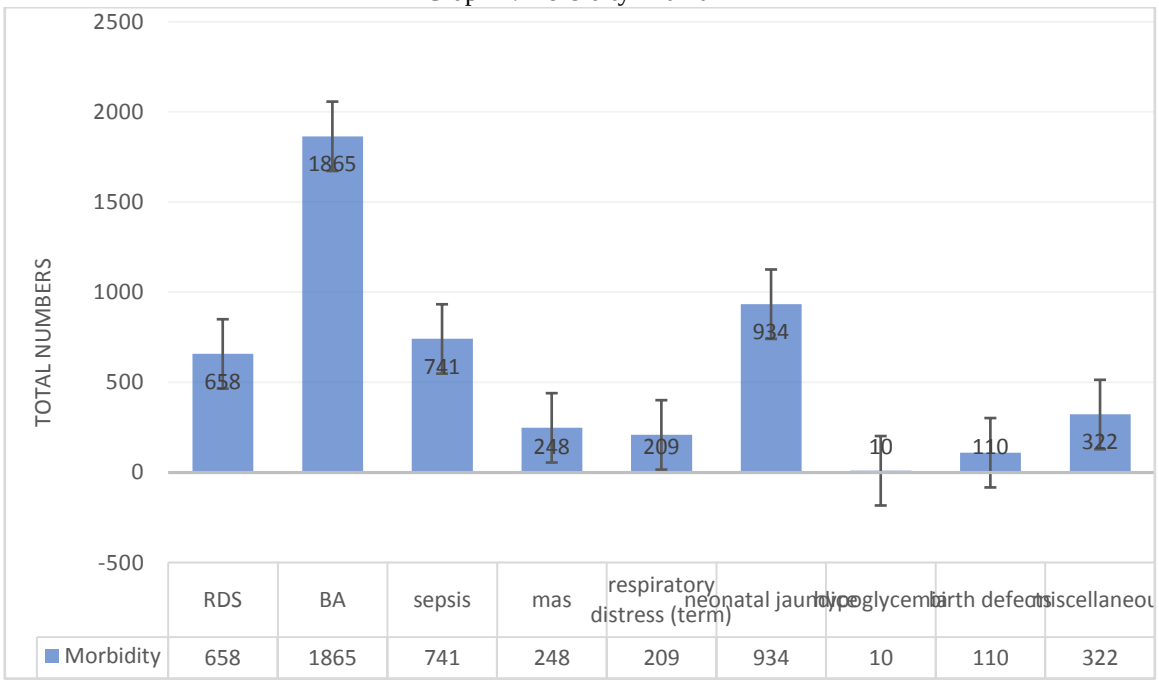
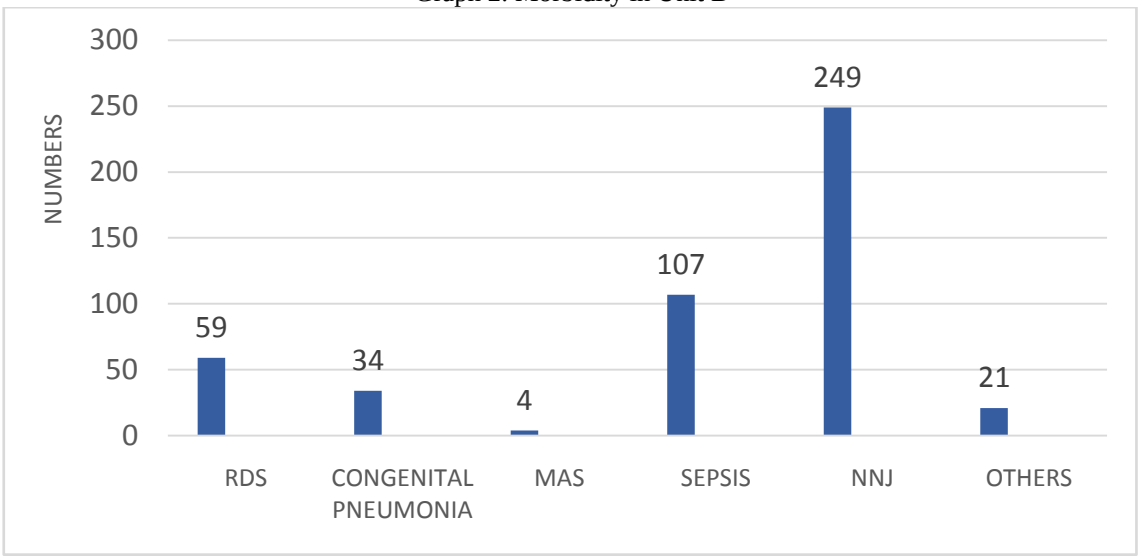
Graph 1: morbidity in unit A



The leading cause of morbidity in unit Awas birth asphyxia, sepsis, Neonatal jaundice and respiratory distress.

Graph 2: Morbidity in Unit B



- Birth asphyxia was seen in only three out born newborn in unit B (35.5%unit A vs 0.6%unit B)
- Respiratory distress syndrome & Congenital pneumonia were the most common respiratory problems (20% of all admission compared to 12.9% in Unit A, p<0.05)
- Sepsis was observed in high percentage of neonates (23% of all admission in unit B compared to 14.5% in Unit A)

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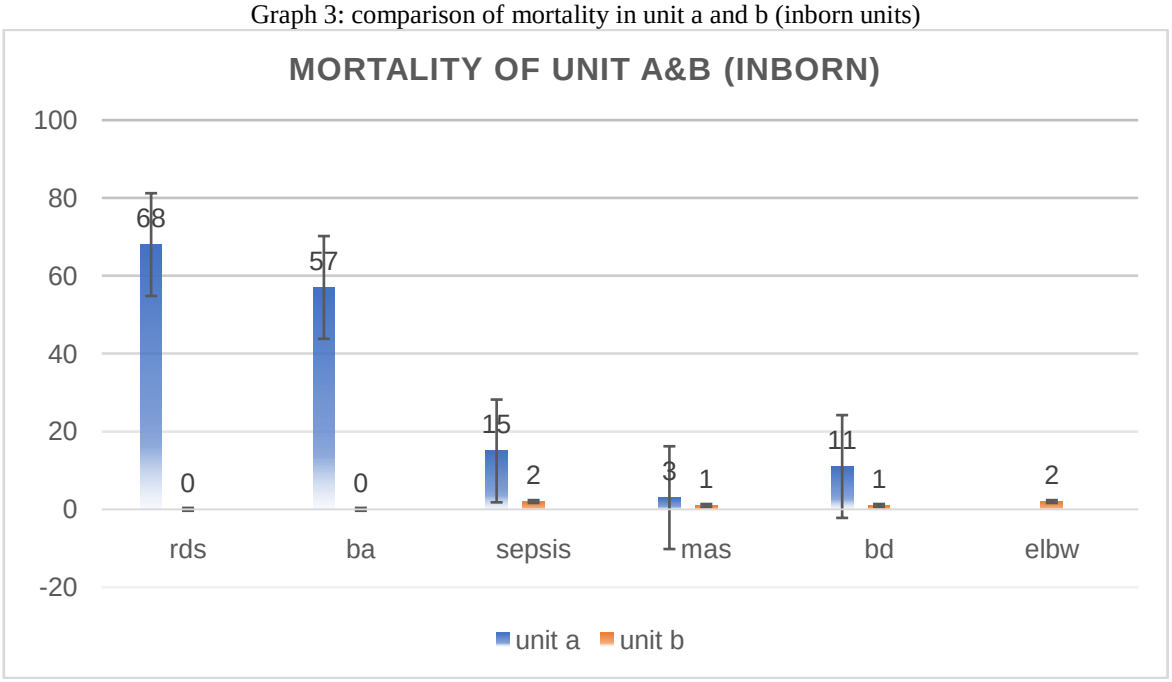
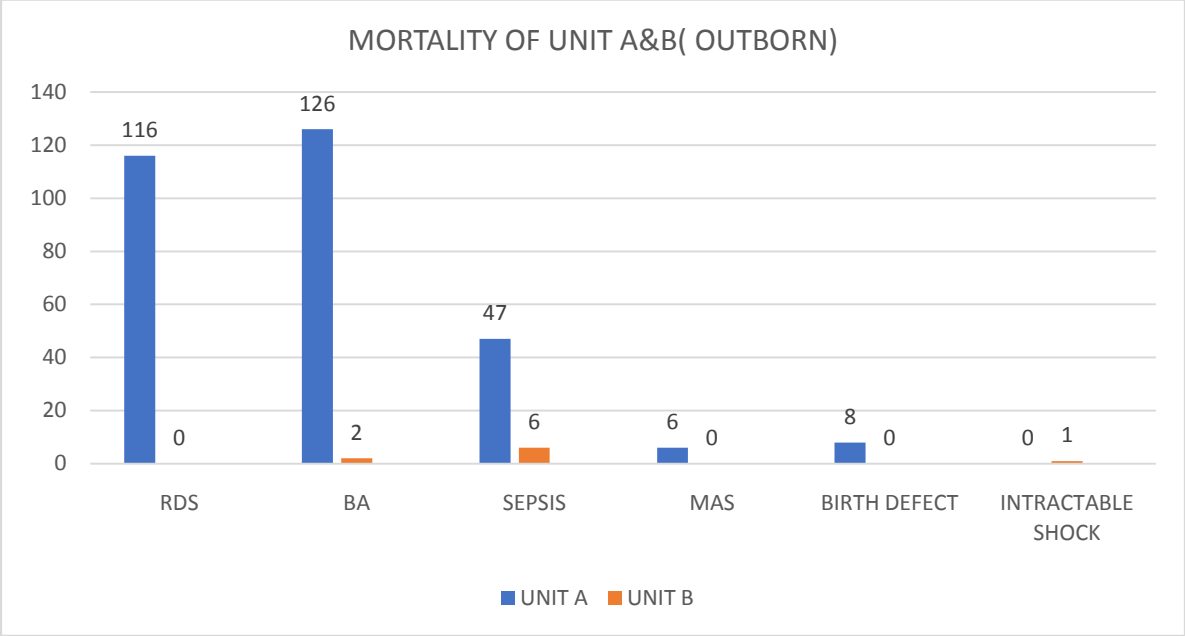
Comparison Of Mortality in Unit A And B (Inborn Units)

Graph 3: comparison of mortality in unit a and b (inborn units)



- Inunit A (inborn), the leading causes of mortality was respiratory distress (68), followed by birth asphyxia (57).
- In unit B(inborn), out of 6 deaths, 2 each were due to sepsis, extremely low birth weight babies and 1 each due to meconium aspiration syndrome and birth defects.

Graph 4: Comparison of Mortality in Unit A and B (Out Born)



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- Birth asphyxia and respiratory distress were the major causes of mortality in unit A (out born units).
- There were 2 deaths due to birth asphyxia in unit B, while sepsis was the most common cause of mortality.

Table 4: Overall comparison of mortality in both units

Causes	Unit A				Unit B				P value
	Inborn	Outborn	Total	Percentage	Inborn	Outborn	Total	Percentage (%)	
RDS	68	116	184	40.26	0	0	0	0	<0.01
Birth asphyxia	57	126	183	40.04	0	2	2	13.3	<0.01
Sepsis	15	47	62	13.56	2	6	8	53.3	<0.01
MAS	3	6	9	1.96	1	0	1	6.66	<0.01
Birth defects	11	8	19	4.15	1	0	1	6.66	0.15
ELBW	0	0	0	0	2	0	2	13.3	0.01
Intractable shock	0	0	0	0	0	1	1	6.66	0.01
Total	154	303	457	8.9	6	9	15	3.3	0.01

- The mortality percentage in unit A was 8.9% while that of unit B was 3.3%
- In UnitA, Birth asphyxia and respiratory distress were major contributors of mortality (40%each)compared to UnitB with Birth asphyxia 13.3%and Respiratory distress 6.6% which was statistically significant (p<0.01)

IV. DISCUSSION:

Even though great strides have been made in reducing the NMR in India, huge challenges still remain to improvethe state of new-born health especially in rural and semi-urban areas of the country. Our study was done with aim to study the pattern of neonatal morbidity and mortality in 2 semi-urban areas of Assam, identify the lags and strengths which will allow for introspection.

- NMR in Unit A was 16.7/1000 LB compared to 8/1000 in unit B. However, the burden of care was much higher in unit A.
- Both of these units were located at geographically distant places and catering to diverse set of populations. However, unit B caters to a population with better socio-economic prospects and higher education status.
- Probable Reasons for disparities in both units were:

❖ Higher maternal education & social status, with better outcome in unit B. Better education acts as a catalyst for better awareness in the community level and improved antenatal and postnatal care to the mother and baby.
❖ Improved nurse patient ratio in unit B and availability of neonatologist in unit B
❖ Fixed posting of nurses in Unit B compared to transferable job in Unit A
❖ With high load in public sector, overcrowding, understaffing & housekeeping become issues influencing neonatal outcome
❖ In private sector units, the mothers have easier access to quality care and as such are better equipped to deal with unforeseen clinical condition. This may result in better outcomes
❖ In unit B, the outcome of preterm babies was better compared to unit A which can be attributed to better handling and improved in house care.
❖ In addition to these, unfortunately the mothers in unit A have more social barriers to overcome. Social taboos and practices often play a role in accessing quality care. Prior studieshave found that rural women are more

readily influenced by traditional practices that are contrary to modern health care.

We found that there is disproportionate load in unit A as unit A was responsible for the bulk of all neonatal care in Barak valley.The sicker and higher risk woman in the community with poor amenities are often cared for which is one of the reasons for higher disparityin neonatal outcome.

In a study by Dwivedi et al in UP, India found that Government NICU had a survival outcome of 70.91% while Private NICU had 86.73% which was statistically significant. However, the profile of sick neonates according to age at the time of admission, mode of admission and community in Government and Private NICUs differed significantly ($p<0.05$).[5]This was comparable to our study where the mortality was better in private sector.

In the study conducted by Lee et althat assessed maternal and new-born health system quality in India found that Institutionaldelivery was not protective against new-born mortality in the districts with poorest health systemquality, but was associated with decreased mortality in districts with higher quality.[7]Thus, this was relative to our study where quality care can lead to improved mortality rates.

In a multi-centre study conducted by Japneet Kaur et al in Bihar,District hospitals were found to be inadequately prepared to provide neonatal care. While no association was revealed between structural capacity and patient-reported quality of care, adequacy of staffing was positively associated with the quality of care in district hospitals.[8] This was relative to our study where improved nurse patient ratio in unit B was one of the reasons for low mortality.

One of the main barriers to realising the goal of single digit NMR is often the poor execution at the peripheral levels. As such, focusing on skill training and strengthening the peripheral setups will decrease the burden of care at tertiary centres leading to better distribution of resources and improved outcomes.

Limitations of Study:

1. A Retrospective study was conducted, a prospective study would have been more appropriate
2. The data was from 2 different population with different geographical setting. The results cannot be extrapolated to the general population

V. CONCLUSION:

Birth asphyxia and respiratory distress were still the leading cause of mortality in both units. The higher mortality in unit A can be attributed to the high case load and late referrals from peripheral centres. Hence, we propose strengthening of peripheral set ups and public private partnership model to make quality neonatal services affordable in predominantly rural population of Assam. Minimising the existing disparities in private and public sectors is the challenge of the health care system.,

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