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Clinical audit of newborn infants admitted in neonatal intensive care unit of a teaching hospital: A retrospective study

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Abstract. Understanding the causes of neonatal intensive care unit admission and their association with the neonatal outcome may help organising better patient care services. The objective was to investigate the causes and outcome of the newborn infants admitted in the neonatal intensive care unit. This was a retrospective study that analysed demographic and clinical data on newborns infants and their mothers obtained from medical records of all the neonatal intensive care unit admissions from 2018-2020. As a result, out of 400 neonatal admissions, majority (61.7%) of the newborn infants were aged <72 hours with male preponderance (63%) and presented with respiratory distress (59%) and jaundice (75%). Almost all outborn infants were found hypothermic on admission. Proportion of the patients presenting at the age of 4 days or more was significantly higher in the infants delivered inborn. Majority of mothers were aged 18-35 years (91.5%), multigravida (55.5%), and had >4 antenatal care visits (57.5%). Overall, a total of 252 (63%) infants recovered, 44 (11%) died and 104 (26%) left against the medical advice. The recovery rate was significantly higher (81.8%) in the inborn infants. Respiratory distress and jaundice in the newborn infants were the common clinical conditions on admission. High rate of left against the medical advice was a cause of concern and needed further studies to find out the actual reasons. The study highlighted the need for early risk identification, improved neonatal transport, targeted maternal care, strategies to reduce cases of leaving against medical advice, and enhanced in-hospital delivery services to improve neonatal outcomes and optimise neonatal intensive care unit

Keywords: neonatal mortality rate; respiratory distress syndrome; neonatal jaundice; maternal risk factors; neonates and mothers

Introduction

This retrospective clinical audit of neonates admitted to the Neonatal Intensive Care Unit (NICU) provides critical insights into the demographic, clinical, and perinatal factors influencing neonatal health outcomes in a teaching

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hospital setting. By analysing maternal and neonatal parameters, including delivery details, pregnancy complications, and neonatal interventions, the study highlights differences between inborn and outborn infants, shedding light on potential gaps in care for referred neonates. This research is particularly relevant in resource-limited settings, where understanding these factors is essential for reducing neonatal morbidity and mortality rates.

Neonatal admissions to the NICU form a crucial part of perinatal healthcare systems, reflecting the burden of neonatal morbidity and mortality. Neonatal mortality, defined as the death of a newborn within the first 28 days of life, is a critical indicator of community health. It provides insight into the accessibility and quality of maternal and neonatal healthcare services, and socio-economic disparities in different regions. Alarmingly, approximately 75% of neonatal deaths occur within the first week of life, with nearly 25% happening in the first 24 hours after birth. V.G. Chavan *et al.* [1] noted that these figures underscore the importance of timely and effective perinatal care to reduce neonatal mortality.

Globally, neonatal mortality remains a pressing public health concern, particularly in low- and middle-income countries. In 2023, an estimated 2.3 million newborns died within the first 28 days of life, translating to approximately 6,300 deaths per day and accounting for about 47% of all under-five deaths [2]. Although the global neonatal mortality rate declined from 37 deaths per 1,000 live births in 1990 to 17 per 1,000 in 2023, this reduction has lagged behind progress made in lowering post-neonatal under-five mortality rates. Since 2015, the pace of improvement has notably slowed, threatening the achievement of Sustainable Development Goal target 3.2, which aims to reduce neonatal mortality to at least 12 per 1,000 live births by 2030 [3]. Alarmingly, current trends indicate that 65 countries are not on track to meet this target without accelerated and targeted interventions.

In India, neonatal mortality has significantly declined between 2010 and 2021, reflecting the impact of sustained public health interventions. According to the Sample Registration System Statistical Report 2021, the national Neonatal Mortality Rate (NMR) dropped to 19 per 1,000 live births, down from 44 in 2010 – a 57% reduction. Rural areas saw a decline from 48 to 21, while urban areas improved from 29 to 12 per 1,000 live births. Additionally, six states and union territories, including Kerala, Delhi, Tamil Nadu, and Maharashtra, have already achieved the Sustainable Development Goal target of reducing NMR to 12 or below. These improvements are largely attributed to initiatives like Janani Suraksha Yojana (JSY), Janani Shishu Suraksha Karyakram (JSSK), and the National Health Mission (NHM), which have enhanced maternal and neonatal care services [4].

However, disparities in neonatal mortality persist across regions and states in India. P.S. Salve *et al.* [5] noted significant variations in NMR among Indian states. For instance, Jammu & Kashmir reported the highest NMR at 2,182 deaths per 100,000 live births, followed by Madhya Pradesh (1,743), Haryana (1,592), Rajasthan (1,564), Assam (1,507), Odisha (1,458), and Meghalaya (1,438). In contrast, Maharashtra had a significantly lower NMR of 711 deaths per 100,000 live births. P.S. Salve *et al.* emphasised that these disparities reflect differences in healthcare access, infrastructure, and quality between urban and rural areas, necessitating region-specific interventions.

A significant portion of neonatal deaths is preventable. M.J. Gondwe *et al.* [6] highlighted that preterm birth complications, infections, and intrapartum-related events like birth asphyxia are among the most common causes of neonatal mortality. They noted that addressing these causes requires identifying modifiable factors – those that, if addressed differently, could have prevented adverse outcomes. M.J. Gondwe *et al.* further emphasised the importance of strengthening antenatal care, ensuring skilled birth attendance, and implementing effective infection control measures to improve neonatal outcomes.

Clinical audits have emerged as a vital tool in identifying modifiable factors and improving neonatal care. R. Rashid *et al.* [7] highlighted the importance of analysing adverse events in NICUs to identify gaps in care and implement evidence-based interventions. Clinical audits not only promote accountability but also support continuous improvement in healthcare delivery. R. Rashid *et al.* noted that these audits are particularly valuable in resource-limited settings, where neonatal care often faces challenges such as inadequate infrastructure and workforce shortages. It is worth to mention studies by W. Khasawneh *et al.* [8], P.K. Panda & P.K. Panda [9] and A. Deka *et al.* [10]. W. Khasawneh *et al.* reported most of the inborn cases (92.2%), and only 7.8% were outborn. P.K. Panda & P.K. Panda had 58% of their cases as outborn. The burden of outborn babies in the study by A. Deka *et al.* was 39.5%. These findings underscore the critical role of clinical audits in enhancing neonatal outcomes, particularly by addressing systemic weaknesses and guiding targeted interventions based on the specific context and patient demographics of each healthcare setting.

Addressing neonatal mortality requires a multifaceted approach, including strengthening healthcare infrastructure, training healthcare workers, and ensuring equitable access to essential services. Hence, the purpose of the study was to investigate the causes and outcome of the neonates admitted in the NICU and suggest measures to improve the quality of new-born care with the help of a retrospective study at a tertiary care teaching hospital in North India.

Materials and Methods

The present retrospective study was conducted on 400 neonates admitted in the NICU, Department of Paediatrics, Era University, Lucknow. Demographic and clinical data of the newborn infants and their mothers were extracted from the medical records of all NICU admissions from 2018-2020. The Institutional Ethics Committee gave waiver from obtaining the informed consent [11]. Clinical information was collected from the written records (maternal age, gravida, type of delivery, presence of meconium,

induced or spontaneous labour, and pregnancy complications). NICU records provided additional information about newborn infants (APGAR score, gender, age at admission, birth weight, resuscitation required, intervention given). Complete clinical and delivery details of the mothers and resuscitation and treatment history of the newborn infants was not available in the out-born infants delivered in other health facilities and referred to NICU. The inborn and outborn infants were identified. The data collected was subjected to analysis using SPSS 21.0 software suite. Chi-square, Independent samples t-tests and paired t-tests were used to compare the data. The p-value of less than 0.05 indicated a statistically significant difference.

Results and Discussion

Out of 400 admissions the majority of neonates were aged <72 hours (61.7%), were male (63%), and presented with respiratory distress (59%) and jaundice (75%). Proportion of those presenting at age 4 days or more was significantly higher (51%) in the inborn infants compared to outborn babies (34%) ($p = 0.017$). Among different other presenting signs and symptoms, inborns had significantly higher presentation with meconium aspiration (21.5%) and vomiting (4.5%) as compared to outborns (11.2 and 0.6% respectively) ($p = 0.012$ and $p = 0.008$). Majority of mothers were aged 18-35 years (91.5%), multigravida (55.5%), and had >4 antenatal care (ANC) visits (57.5%). The proportion of primigravida mothers was significantly higher in the outborn (63%) compared to the inborn infants (56.8%) ($p < 0.001$). Most common maternal blood group was B Rh+ (34.7%). A total of 50 (12.5%) women were Rh negative and 10% required Anti-D screening. There was a significant difference between inborn and outborn groups with respect to the maternal medical history of diabetes which was significantly higher in the outborns (8.9%) compared to that in inborn (2.2%) (Table 1).

Table 1. Maternal characteristics

Characteristics	Inborn n = 88 (%)	Outborns n = 312 (%)	Total n = 400 (%)	Statistical significance
Age				
<18 years	0	6 (2.5)	6 (1.5)	$X^2 = 1.046$; $p = 0.593$
18-35 years	84 (48.8)	282 (90.3)	366 (91.5)	
>35 years	4 (4.5)	24 (7.6)	28 (7)	
Gravida				
Primi	50 (56.8)	197 (63.1)	222 (55.5)	$X^2 = 28.22$; $p < 0.001$
Multi	38 (43.2)	115 (36.9)	178 (44.5)	
ANC visits				
≤3	30 (34)	140 (35)	170 (42.5)	$X^2 = 3.265$; $p = 0.071$
≥4	58 (65)	172 (43)	230 (57.5)	
Maternal blood group				
A	18 (20.4)	71 (22.7)	89 (22.2)	$X^2 = 1.748$; $p = 0.0626$
B	35 (39.7)	104 (33.3)	139 (34.7)	
AB	10 (11)	48 (15.3)	58 (14.5)	
O	25 (28.4)	89 (28.5)	114 (28.5)	
Maternal Rh status				
Positive	78 (88)	272 (87.1)	350 (87.5)	$X^2 = 0.133$; $p = 0.715$
Negative	10 (11.3)	40 (12.8)	50 (12.5)	
Anti – D				
Required	10 (11.3)	30 (9.6)	40 (10)	$X^2 = 3.047$; $p = 0.218$
Not required	78 (88)	272 (87.1)	350 (87.5)	
Not known	0	10 (3.2)	10 (2.5)	
Maternal medical history				
Hypertension	4 (4.5)	7 (2.2)	11 (2.7)	$X^2 = 1.360$; $p = 0.244$
Diabetes mellitus	2 (2.2)	28 (8.9)	30 (7.5)	$X^2 = 4.444$; $p = 0.035$
Bronchial asthma	0	1 (0.3)	1 (0.2)	$X^2 = 0.283$; $p = 0.595$
Tuberculosis	0	1 (0.3)	1 (0.2)	$X^2 = 0.283$; $p = 0.595$
Hypothyroidism	1 (1.2)	4 (1.2)	5 (1.2)	$X^2 = 0.018$; $p = 0.9135$
UTI	1(1.2)	4 (1.2)	5 (1.2)	$X^2 = 0.018$; $p = 0.9135$
Fever	3 (3.4)	6 (1.9)	9 (2.2)	$X^2 = 0.6892$; $p = 0.4064$

Source: compiled by the authors

Majority of cases were outborn (78%), did not require induction (83.8%), had vertex presentation (90%), had spontaneous delivery (52%), clear or unknown meconium status (82%). A significant difference between the two groups was observed for liquour characteristics and infection only. Stained/unknown meconium colour and infection rates were significantly higher in outborn compared to inborn ($p < 0.05$) (Fig. 1).

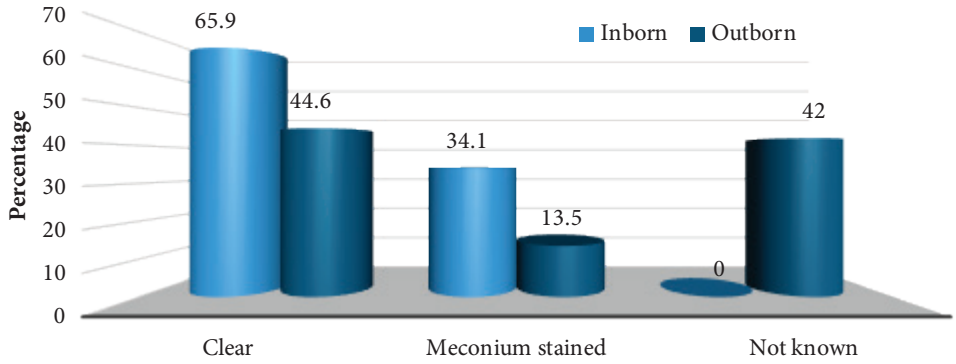

Figure 1. Comparison of liquor status during delivery/labour of inborn & outborn neonates
Source: compiled by the authors

Majority of neonates were born at term (58%), did not have any congenital defect (95.8%), had birth weight <2,500 g (53%), APGAR score in 7-10 or unknown range (75.3%). Proportion of those with birth weight <2,500 g was significantly higher in inborn (61.3%) as compared to that in outborn (42.9%) ($p = 0.023$). APGAR Score was not known in 40.7% outborn infants. Proportion of those on top feed only was also significantly higher in outborn (23.3%) as compared to inborn (2.2%) neonates ($p < 0.001$) In the study, Kangaroo mother care (KMC) was provided to 18 inborn neonates (20.4%) and 94 outborn neonates (23.5%), totalling 112 cases (28%) across the cohort of 400 neonates. The difference in KMC implementation between inborn and outborn groups was not statistically significant (Chi-square = 3.186; $p = 0.074$), indicating comparable rates of KMC practice between both groups. (Table 2; Fig. 2).

Table 2. Neonatal characteristics

Characteristics	Inborn n = 88 (%)	Outborns n = 312 (%)	Total n = 400 (%)	Statistical significance
Gestational age				
Term (37-41 wks)	61 (69.3)	171 (54.8)	232 (58)	$X^2 = 7.201$; $p = 0.066$
Preterm (<37 wks)	20 (22.7)	118 (37.8)	138 (34.5)	
Ext. preterm (28 wks)	5 (5.6)	18 (5.7)	23 (5.7)	
Post-term (≥42 wks)	2 (2.2)	5 (1.6)	7 (1.7)	
Birth weight				
<1,000 g	1 (1.1)	8 (2.5)	9 (2.25)	$X^2 = 9.554$; $p = 0.023$
1,000-1,499 g	9 (10.2)	42 (13.4)	51 (12.7)	
1,500-2,499 g	24 (27.2)	128 (41)	152 (38)	
>2,499 g	54 (61.3)	134 (42.9)	188 (47)	
APGAR				
<7	23 (26.1)	76 (24.3)	99 (24.7)	$X^2 = 59.819$; $p < 0.001$
7-10	65 (73.9)	109 (34.9)	174 (43.5)	
Not known	0	127 (40.7)	127 (31.7)	
Baby ABO group				
A	30 (34)	82 (26.2)	112 (28)	$X^2 = 5.774$; $p = 0.213$
B	33 (37.5)	127 (40.7)	160 (40)	
AB	4 (4.5)	38 (12.1)	42 (10.5)	
O	21 (23.8)	65 (20.8)	86 (21.5)	
Rh incompatibility	5 (5.6)	17 (5.4)	22 (5.5)	$X^2 = 0.007$; $p = 0.123$
Temperature				
Normothermic	58 (65.9)	230 (73.7)	288 (72)	$X^2 = 3.064$; $p = 0.215$
Hypothermic	27 (30.6)	75 (24)	102 (25.5)	
Hyperthermic	3 (3.4)	7 (2.2)	10 (2.5)	
Resuscitation				
Required	24 (27.2)	93 (29.8)	117 (29.2)	$X^2 = 6.572$; $p = 0.010$
Not required	64 (72.7)	219 (70.1)	283 (70.7)	
Infant morbidity profile				
Juandice	68 (77.2)	243 (77.8)	311 (77.7)	$X^2 = 0.015$; $p = 0.903$
Respiratory distress	30 (34)	206 (66)	236 (59)	$X^2 = 7.563$; $p = 0.001$
Seizures	39 (44.3)	117 (37.5)	156 (39)	$X^2 = 1.134$; $p = 0.247$

Continued Table 2

Characteristics	Inborn n = 88 (%)	Outborns n = 312 (%)	Total n = 400 (%)	Statistical significance
Neonatal sepsis	53 (60.2)	214 (68.5)	267 (66.7)	$X^2 = 2.163$; p = 0.141
Congenital defect	3 (3.4)	14 (4.4)	17 (4.2)	$X^2 = 0.196$; p = 0.066
Culture report				
Blood culture	48 (54.4)	202 (64.5)	250 (62)	$X^2 = 3.046$; p = 0.081
CSF culture	28 (31.8)	97 (31)	125 (31.2)	$X^2 = 0.017$; p = 0.896
Feed				
Exclusive breast feeding	66 (75)	150 (48)	216 (53)	$X^2 = 3.176$; p = 0.075
Topfeed only	2 (2.2)	73 (23.3)	75 (18.7)	$X^2 = 20.11$; p < 0.001
Mixed feed	9 (9)	29 (9.2)	38 (9.5)	$X^2 = 0.003$; p = 0.953

Source: compiled by the authors

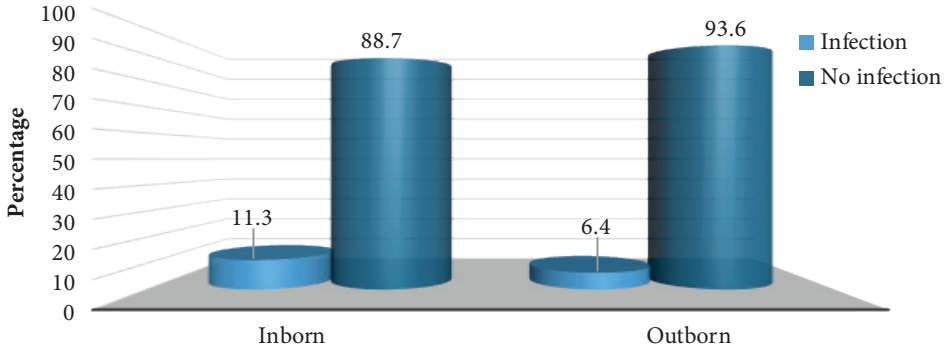

Figure 2. Comparison of infection during delivery/labour (neonatal sepsis and intrapartum maternal infections) of inborn & outborn neonates

Source: compiled by the authors

Phototherapy was required in 76% of cases and exchange transfusion was done in 18 (4.5%) cases. Oxygen therapy in the form of hood, nasal cannula, Continuous Positive Airway Pressure (CPAP) and mechanical ventilator was done in 21.7, 27.7% and 29% neonates respectively. Oxygen requirement by hood or ventilator, antibiotic need, blood product transfusion, Fresh Frozen Plasma (FFP), Packed Red Blood Cells (PRBC) and platelet need were significantly higher in outborn compared to inborn babies. Compared to inborns, outborn neonates had a significantly higher proportion of those diagnosed with Respiratory Distress Syndrome (RDS – 38.2%) and Hypoxic-Ischemic Encephalopathy (HIE – 19%) and a significantly lower proportion of those diagnosed with meconium aspiration syndrome. Overall, a total of 252 (63%) recovered, 44 (11%) died and 104 (26%) left against medical advice. Proportion of those recovering was significantly higher in inborn (81.8%) as compared to outborn (57.7%) cases (p < 0.001).

In the present study, the majority of admitted neonates were males (63%). A dominance of males in NICU is a general feature reported in almost all the studies. In their study, D. Kumar & S. Gupta [12] had 60.4% males, which is close to that in the present study. In the study of R.S. Sinha *et al.* [13], 64% of neonates admitted to the NICU were males. P.K. Panda & P.K. Panda [9] in their study had a marginally higher proportion of males (52%) as compared to that of females (48%). In the study by V. Anurekha *et al.* [14], 55.5% were males. However, K. Maheswari & N. Sharma [15] found that the majority (53.1%) of neonates are females.

The present study found significantly higher proportion of inborn neonates presented after 72 hours of birth (52%) as compared to outborn neonates (35%). As far as other studies are concerned, they usually attribute delays in admission to NICU to be associated with poor NICU outcomes and often state in special context with outborn NICU admissions [16]. S.M. Abdel-Aziz *et al.* [17] reported all the inborn NICU admissions to take place within 24 hours of birth compared to 93.1% of outborn admissions to take place after 24 hours of birth and found this difference to be statistically significant too. This is contrary to the findings of the present study, where the most common cause of NICU admission was neonatal jaundice (75%) followed by respiratory distress (59%), seizures (39%), etc. Compared to the present study, A. Deka *et al.* [10] reported sepsis to be the most important cause of NICU admission (21.6%) followed by jaundice (19.0%), respiratory distress (16.8%), birth asphyxia (11.7%), and meconium aspiration syndrome (7.9%). G.S. Shah *et al.* [18] also reported sepsis as major cause.

The present study found the proportion of male sex, refusal to feed, and respiratory distress to be significantly higher in outborn than in the inborn group. Simultaneously, meconium aspiration and vomiting were substantially higher in inborn as compared to outborn admissions. Similar to the present study, V. Anurekha *et al.* [14] also had

higher proportion of males in outborn (57%) as compared to inborn (54%). Similar to the present study, P.K. Panda & P.K. Panda [9] did not find a substantial difference between inborn and outborn groups for various indications for admission. S.M. Abdel-Aziz *et al.* [17] reported the same findings. W. Khasawneh *et al.* [8], reported as many as 23.5% NICU babies were born to mothers with age >35 years. Primipara mothers contributed to only 24% of total NICU admissions in their study. C.R. Iyer *et al.* [19] in their study, found majority of mothers to be aged 21-30 years (73%). However, in their study primigravida (49.5%) women were close to the present study. A dominance of those paying 4 or more ANC visits (70.5%) was also reported by R.S. Sinha *et al.* [13]. Compared to the present study, K. Maheswari & N. Sharma [15] reported the prevalence of cumulative maternal complications in 60.4% of infants admitted to NICU. Their study also found these complications to be related to NICU mortality. However, S.M. Abdel-Aziz *et al.* [17] reported maternal complications like diabetes to be higher in inborn compared to outborn preterm and full-term neonates admitted to NICU.

In the present study, majority of pregnancies did not require induction for labour (83.8%), had vertex presentation (90%), were spontaneous deliveries (52%), and had clear or unknown liquor status (82%). Compared to the present study, S.M. Abdel-Aziz *et al.* [17] dominated those born through caesarean section (81.9% in preterm and 82.6% in full-term group) but did not describe much about the other labour characteristics. In the present study, most neonates were born at term (58%) and did not have congenital defects (95.8%). Significantly higher proportion of outborn as compared to inborn neonates had birth weight <2.5 kg, unknown APGAR, resuscitation need, and lack of exclusive breastfeeding.

In the study by V. Anurekha *et al.* [14], substantial difference between inborn and outborn groups was observed with respect to neonatal jaundice, which was reported in 2.22 times higher number of inborn as compared to outborn neonates. Differences in neonatal morbidity profiles between inborn and outborn groups were also observed by A. Deka *et al.* [10], who reported the major cause of admission in inborn neonates to be jaundice (22%) followed by RDS (18.8%) and sepsis (18.6%), whereas in outborn neonates sepsis (30.09%) was the predominant cause. Compared to the present study, V. Anurekha *et al.* [14] reported the majority of newborns to be >2.5 kg (51.1%) and preterm (54.63%). S.M. Abdel-Aziz *et al.* [17] also reported the predominance of preterm births (56.78%). A. Deka *et al.* [10] in their study, not only had majority of neonates with birth weight >2.5 kg (52.27%), but also did not find any substantial difference between inborn and outborn groups with respect to birth weight.

Antibiotic overuse were observed in present study, as neonatal sepsis was suspected in only 60.2% of cases, whereas antibiotic use was reported in as high as 89% of cases. This is an alarming issue. It seems that antibiotics were used as prophylaxis in the present study, which cannot be termed as a good clinical practice and indicates a need for methodological improvement. However, S. Mandal [20] reported a much higher use of antibiotics (38.8%) compared to the proportion of neonatal sepsis (16.6%) cases. In the present study, mortality rate was 2.84 times higher in outborn (12.8%) compared to inborn (4.5%) neonates. Compared to the present study, A. Deka *et al.* [10] reported recovery, referral, leave against medical advice (LAMA), and death in 82.3, 1.14, 4.17, and 12.37% cases, respectively. They also found the mortality rate to be more than twice in outborn (18.0%) compared to inborn (8.7%) neonates.

D. Kumar & S. Gupta [12] reported mortality and LAMA in 3.26 and 3.26% of patients only. However, in the present study, it was reflected in terms of a high LAMA rate. In the study by R.S. Sinha *et al.* [13] LAMA rate was only 9.5%, still they considered it to be higher. Mortality rate in their study was only 0.9%. Though, P.K. Panda & P.K. Panda [9] reported mortality rate of 11% which is close to that in the present study yet in their study LAMA rate was only 9% and discharge after recovery was achieved in 75%. A slightly higher mortality rate (12.7%) was reported by C.R. Iyer *et al.* [19], who also had a high LAMA rate (17.5%). However, they did not find a significant difference in mortality rate between inborn (13.2%) and outborn (12.2%) groups. In their study referral/LAMA rate was only 9.51%. The mortality rate was also unaffected by place of birth. V. Anurekha *et al.* [14] in their study, did not report any LAMA as they had already excluded them from the study. However, after excluding LAMA, the mortality rate in their study (11.28%) was similar to present study.

The present study provided valuable insights and highlighted several differences in the clinical profile of inborn and outborn neonates admitted to NICU. It was shown that outborn neonates often reach in a more severe condition than the inborn neonates and have higher interventional needs. Moreover, outborn neonates' mortality rate (2.84 times) is more than twice that of inborn neonates. Apart from highlighting these differences, the study also introspected some gaps in service, primarily highlighted in terms of high antibiotic use and a high LAMA rate.

Conclusions

The present retrospective study on 400 neonates admitted to the NICU at Era University, Lucknow, provides critical insights into neonatal outcomes and their association with maternal and perinatal factors. Among the neonates, 61.7% were aged less than 72 hours, 63% were male, and the primary presentations included respiratory distress (59%) and jaundice (75%). Outborn neonates constituted the majority (78%), with significantly higher rates of infection, top feeding (23.3 vs 2.2%, $p < 0.001$), and hypothermia (30.6 vs 24%, $p = 0.215$) compared to inborn neonates. Inborn infants showed a higher proportion of low birth weight (<2,500 g) cases (61.3 vs 42.9%, $p = 0.023$) and better recovery rates (81.8 vs 57.7%, $p < 0.001$). Maternal factors also played a significant role in neonatal outcomes. The

majority of mothers (91.5%) were aged 18-35 years, and multigravida mothers constituted 55.5% of the cohort. Primigravida mothers were more prevalent among outborn neonates (63 vs 56.8%, $p < 0.001$). The prevalence of diabetes mellitus among mothers was significantly higher in the outborn group (8.9 vs 2.2%, $p = 0.035$). Most mothers had adequate antenatal care (≥4 visits in 57.5%), and maternal blood group B Rh+ was the most common (34.7%). Clinical interventions and outcomes also showed notable differences between inborn and outborn neonates. Oxygen therapy, including CPAP and mechanical ventilation, was required in 7.5 and 29% of neonates, respectively, with outborn neonates showing a significantly higher requirement. Phototherapy was administered to 76% of neonates, and exchange transfusion was needed in 4.5% of cases. The incidence of RDS and HIE was significantly higher in outborns, whereas meconium aspiration syndrome was more frequent in inborns. Despite the higher morbidity in outborn neonates, 63% of all neonates recovered, with the inborn group showing a significantly higher recovery rate. In conclusion, inborn neonates demonstrated better clinical outcomes compared to outborn neonates, underscoring the importance of institutional deliveries and comprehensive antenatal care to improve neonatal outcomes. Enhanced infrastructure and care protocols in referral centers are critical to addressing the disparities observed in outborn neonates, particularly concerning morbidity and recovery rates. Future research should be supported by systematic improvements of infrastructure, staff training, and enhancing inter-personal communication alongside the establishment of evidence-based antibiotic use guidelines.

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Conflict of Interest
None.

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Клінічний аудит новонароджених, госпіталізованих у відділення інтенсивної терапії новонароджених навчальної лікарні: ретроспективне дослідження

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Анотація. Розуміння причин госпіталізації новонароджених до відділення інтенсивної терапії новонароджених і їхнього зв'язку з неонатальними результатами може допомогти в організації кращих послуг для пацієнтів. Метою було дослідити причини та результати лікування новонароджених, госпіталізованих до відділення інтенсивної терапії новонароджених. Було проведене ретроспективне дослідження, у якому проаналізовано демографічні та клінічні дані новонароджених і їхніх матерів, що отримані з медичних записів усіх випадків госпіталізації до відділення інтенсивної терапії новонароджених за період 2018-2020 років. У результаті, із 400 госпіталізованих новонароджених більшість (61,7 %) були віком менше 72 годин, із переважанням хлопчиків (63 %), і мали респіраторний дистрес (59 %) та жовтяницю (75 %). Майже всі діти, народжені поза лікарнею, мали гіпотермію під час надходження. Частка пацієнтів, які надходили у віці 4 днів і більше, була значно вищою серед дітей, народжених у лікарні. Більшість матерів були у віці 18-35 років (91,5 %), були вагітними раніше (55,5 %) і мали понад чотири антенатальні огляди (57,5 %). Загалом 252 (63 %) немовлята одужали, 44 (11 %) померли, а 104 (26 %) залишили лікарню всупереч медичним рекомендаціям. Рівень одужання був значно вищим (81,8 %) серед дітей, народжених у лікарні. Респіраторний дистрес і жовтяниця були найпоширенішими клінічними станами при надходженні. Високий рівень випадків, коли пацієнт залишав лікарню всупереч медичним рекомендаціям, викликав занепокоєння і потребує подальших досліджень для з'ясування реальних причин. Дослідження підкреслило необхідність раннього виявлення ризиків, поліпшення транспортування новонароджених, цілеспрямованої допомоги матерям, стратегій щодо зменшення випадків виписки проти медичних рекомендацій та покращення послуг з пологів у лікарнях для поліпшення показників новонароджених та оптимізації роботи відділень інтенсивної терапії новонароджених

Ключові слова: рівень смертності новонароджених; респіраторний дистрес-синдром; жовтяниця новонароджених; фактори ризику для матерів; новонароджені та матері