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Respiratory distress in preterm newborns: clinical featers and intensive care tactics

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ABSTRACT

Background. Respiratory disorders or respiratory distress are the most common cause of hospitalization of a newborn in the intensive care unit, and this is typical for both full-term and premature infants.

Aim — to determine the priorities of intensive care tactics for respiratory distress in premature newborns of different gestational age by studying the clinical and laboratory features of its course.

Materials and methods. A retrospective observational multicenter study was performed on 155 newborns, who were divided into two conditional groups depending on the gestational age. Group I included 120 premature newborns with a gestational age of up to 34 weeks, and group II included 35 late premature infants (gestational age — 34–36 (6/7) weeks).

Results. Group I showed lower Apgar scores both one minute and 5 minutes after birth. The median score on the Silverman–Andersen scale in the group I was 5 points, which was statistically significantly higher than in the group II (4 points). The severity of multiple organ dysfunction on the nSOFA (Neonatal Sequential Organ Failure Assessment) scale was higher in patients of the I group (3 vs 2; p=0.006). The median duration of mechanical ventilation in the I group of patients was significantly higher (263 vs 63 hours; p=0.006). Arterial hypotension was registered in the first 24 hours of life in 19 (12.2%) premature infants: 18 (15%) patients in the group I and 1 (2.8%) child — in the group II, the differences were statistically significant (p=0.04). Median volume of volumetric load in the first day of life in the group I was 89, and in the group II — 70 ml/kg in day, which was statistically significant. No statistically significant differences were obtained in terms of the level of hourly diuresis and hydrobalance. Diuresis was 3.6–3.1 ml/kg in hour and was within the permissible values. Inotropic-vasopressor support was provided to 45 (29%) premature infants: 40 (33.3%) patients in group I and 5 (14.3%) in group II. The differences were statistically significant (p=0.02). In group I, the median of the vasotropy-inotropic index was 11.2 [5; 12.5], in group II — 8.6 [5; 10], the differences are statistically significant (p=0.03).

Conclusion. Early premature infants are a more vulnerable group of newborns who have a severe course of respiratory distress, which requires longer respiratory and more intensive hemodynamic support.

Keywords: respiratory distress, newborns, premature infants, respiratory support

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Особенности течения и тактики интенсивной терапии респираторного дистресса у недоношенных новорожденных

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РЕЗЮМЕ

Актуальность. Дыхательные расстройства или респираторный дистресс являются наиболее частой причиной госпитализации новорожденного в отделение реанимации и интенсивной терапии, причем это характерно как для доношенных, так и недоношенных детей.

Цель исследования — определить приоритеты тактики интенсивной терапии респираторного дистресса у недоношенных новорожденных различного гестационного возраста путем изучения клинических и лабораторных особенностей его течения.

Материалы и методы. Выполнено ретроспективное обсервационное мультицентровое исследование 155 новорожденных детей, которые в зависимости от срока гестации были разделены на две условные группы. В I группу вошли 120 недоношенных новорожденных с гестационным возрастом до 34 недель, во II группу — 35 поздних недоношенных детей (срок гестации — 34–36 (6/7) недель).

Результаты. В группе I выявлены более низкие показатели по шкале Апгар как через одну минуту, так и через 5 минут после рождения. Медиана оценки по шкале Сильвермана–Андерсен в I группе составила 5 баллов, что оказалось статистически значимо выше, чем во II группе (4 балла). Оценка степени выраженности полиорганной дисфункции по шкале nSOFA (Neonatal Sequential Organ Failure Assessment) была выше у пациентов I группы (3 vs 2; p=0,006). Медиана длительности искусственной вентиляции легких в I группе пациентов была значимо выше (263 vs 63 часов; p=0,006). Артериальная гипотензия в первые сутки жизни зарегистрирована у 19 (12,2%) недоношенных детей: 18 (15%) пациентов в I группе и один (2,8%) ребенок — во II группе, различия были статистически значимыми (p=0,04). Медиана объема волемической нагрузки в первые сутки жизни в I группе составила 89, а во II — 70 мл/кг в сутки, что явилось статистически значимым. По уровню почасового диуреза и гидробаланса статистически значимых различий не получено. Диурез составил 3,6–3,1 мл/кг в час и находился в пределах допустимых значений.

Инотропно-вазопрессорную поддержку проводили 45 (29%) недоношенным детям: 40 (33,3%) пациентам I группы и 5 (14,3%) — II, выявленные различия статистически значимы (p=0,02). В I группе медиана вазотропно-инотропного индекса составила 11,2 [5; 12,5], во II — 8,6 [5; 10], различия статистически значимы (p=0,03).

Вывод. Ранние недоношенные дети являются более уязвимой группой новорожденных, у которых отмечается тяжелое течение респираторного дистресса, что требует более длительной респираторной и более интенсивной гемодинамической поддержки.

Ключевые слова: респираторный дистресс, новорожденные, недоношенные, респираторная поддержка

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INTRODUCTION

A key aspect of the newborn's transition to extrauterine life is the adaptation of the respiratory system. A broad range of pathological conditions involving the respiratory, circulatory, and central nervous systems, as well as metabolic disturbances and other factors, can lead to the development and progression of respiratory disorders. Respiratory disorders, or respiratory distress, are the most common reason for neonatal admission to the intensive care unit, a finding that applies to both term and preterm infants [9]. Approximately 15% of term newborns and 29% of preterm newborns are admitted to intensive care units due to various conditions associated with respiratory distress [7, 13].

Among all newborns, late preterm infants at 34–37 weeks' gestation account for approximately 70–75%, and their numbers have been steadily increasing in recent years [4].

The clinical signs of respiratory distress include tachypnea, nasal flaring, retractions, grunting, and cyanosis [3].

The most common causes of respiratory distress in newborns are respiratory distress syndrome (RDS), sepsis, intra-amniotic infection, meconium aspiration syndrome (MAS), transient tachypnea of the newborn (TTN), neonatal pneumonia, and asphyxia [3, 15].

Although neonatal respiratory failure is treatable in most cases, severe cases require a rational diagnostic and therapeutic approach to optimize outcomes and minimize morbidity.

Newborns with respiratory distress often require prolonged intensive respiratory support, leading to longer stays in both the intensive care unit and the hospital overall. This is associated with adverse short- and long-term consequences that necessitate long-term pediatric follow-up [5, 11].

To date, the clinical and laboratory characteristics of preterm infants with respiratory failure across different gestational ages remain insufficiently studied. Furthermore, no comprehensive intensive care management protocol has been established, hindering the development of personalized treatment approaches for these patients.

AIM

The aim of this study was to establish priorities for intensive care strategies in managing respiratory distress in preterm infants across different gestational ages by analyzing the clinical and laboratory features of its course.

MATERIALS AND METHODS

This retrospective observational multicenter study was conducted at the neonatal intensive care units of the Perinatal Centers of Leningrad Regional Clinical Hospital and Voronezh Regional Clinical Hospital No. 1.

A total of 155 newborns were enrolled and stratified into two groups based on gestational age. Group I consisted of 120 preterm infants with a gestational age of less than 34 weeks, while Group II included 35 late preterm infants with a gestational age of 34 to 36 weeks and 6 days. The characteristics of the study population are summarized in Table 1.

Table 1. General characteristics of early and late preterm infants

Таблица 1. Общая характеристика ранних и поздних недоношенных

Показатели / Parameters	I группа / I group (n=120)	II группа / II group (n=35)	p (U-тест Манна–Уитни) / (Mann–Whitney U test)
Масса тела при рождении, г / Body mass at birth, g	1322 [900; 1680]	2155 [1870; 2390]	0,00001
Рост, см / Height, cm	39 [35; 42]	46 [44; 47]	0,00001
Оценка по шкале Апгар на 1-й минуте, баллы / Apgar score at 1 minute, points	5 [4; 6]	6 [5; 7]	0,0003
Оценка по шкале Апгар на 5-й минуте, баллы / Apgar score at 5th minutes, points	6 [6; 7]	7 [6; 8]	0,0004
Срок гестации, недели / Gestation period, weeks	30 [27; 32]	35 [34; 35]	0,00001
Оценка по Сильверману-Андерсен, баллы / Silverman-Andersen score, points	5 [3; 7]	4 [3; 5]	0,001
Оценка по nSOFA, баллы / nSOFA score, points	3 [0; 5]	2 [0; 4]	0,006
Длительность искусственной вентиляции легких, часы / Duration of mechanical ventilation, hours	263 [14; 338]	63 [2; 66]	0,006
Длительность лечения в отделении реанимации и интенсивной терапии новорожденных, дни / Duration of treatment in the neonatal intensive care unit, days	20 [6; 32]	8 [4; 9]	0,00001

Inclusion criteria:
1) gestational age under 37 weeks;
2) presence of respiratory distress within the first 24 hours of life;
3) need for supplemental oxygen or mechanical ventilation.

Exclusion criteria:
1) congenital central nervous system malformations;
2) confirmed genetic disorders;
3) diabetic fetopathy;
4) congenital anomalies requiring emergency surgical intervention.

The study was approved by the local ethics committee of St. Petersburg State Pediatric Medical University, Ministry of Health of the Russian Federation (Protocol No. 1/3, January 21, 2019).

Initial stabilization in the delivery room was provided to all newborns with respiratory disturbances presenting as ineffective spontaneous breathing [2], in accordance with the methodological letter of the Ministry of Health of the Russian Federation No. 15-4/10/2-3204 (April 21, 2010)[1].

Noninvasive respiratory support was initiated when the Silverman–Andersen score exceeded 4 points. If pronounced oxygen dependence (FiO_2 >0.4) and signs of respiratory failure persisted for 30 minutes after birth, exogenous surfactant (Curosurf, Chiesi, Italy) was administered endotracheally at a dose of 200 mg/kg.

While continuing noninvasive respiratory support with the Stephan Reanimator F120 Mobile device (Stephan, Germany), the newborn was transported from the delivery room to the neonatal intensive care unit in a transport incubator (ITN-01, Ural Optical and Mechanical Plant named after E.S. Yalamov Production Association, Russia).

In the neonatal intensive care unit, noninvasive respiratory support was continued. If oxygen dependence (FiO_2 >0.4) was required to achieve target transcutaneous oxygen saturation (SpO_2=90–94%), or if refractory respiratory acidosis (pH ≤7.20) developed, the infant was transitioned to mechanical ventilation. Syndromic therapy was also provided.

Organ dysfunction severity was assessed using the nSOFA (Neonatal Sequential Organ Failure Assessment) score [19], with the worst values recorded during the study period used for analysis.

To evaluate the invasiveness of fluid therapy and hemodynamic support aimed at maintaining optimal cardiac output, the total volume of fluid administered, fluid balance, and the vasoactive-inotropic score were analyzed [8].

Based on data from the newborn's developmental history and inpatient medical records, 143 parameters were analyzed, encompassing medical history, clinical, laboratory, and instrumental findings, intensive care interventions, and disease outcomes.

Statistical analysis. Normality of the data was assessed using the Kolmogorov–Smirnov and Shapiro–Wilk tests. As the distribution of the primary data deviated from normal, quantitative variables are reported as medians (Me) with interquartile ranges (LQ–HQ). Differences in ordinal and scaled values were evaluated using the Wilcoxon test, with the Z-value reported. Spearman's rank correlation coefficient was used. The level of statistical significance was set at p <0.05.

RESULTS

ПComparison of Apgar scores revealed statistically significant differences in median values between groups both at 1 and 5 minutes, with higher scores observed in Group II (late preterm infants). An Apgar score of ≤3 at 5 minutes, indicative of severe intrapartum asphyxia, was recorded in 3 (2.5%) infants in the early preterm group. No such cases occurred in Group II, though this difference was not statistically significant.

The median Silverman–Andersen score was significantly higher in Group I than in Group II (5 vs. 4 points). Similar findings were observed for multiorgan dysfunction severity assessed by the nSOFA score (3 vs. 2; p=0.006), reflecting more severe clinical status in Group I patients.

The median duration of mechanical ventilation was 263 hours in Group I compared with 63 hours in Group II (p <0.05). Mechanical ventilation lasting ≥168 hours occurred in 48 cases, accounting for 31% of all preterm newborns with respiratory distress.

Prolonged mechanical ventilation was observed in 45 (37.5%) cases in Group I versus 3 (8.6%) in Group II (p=0.0005) (Table 2). Length of stay in the neonatal intensive care unit was also significantly longer in Group I (20 vs. 8 days). Clinical and laboratory characteristics of newborns during the first 24 hours of NICU treatment are presented in Table 2.

SpO_2 and heart rate did not differ significantly between groups. Analysis of blood pressure showed that systolic, diastolic, and mean arterial pressures were significantly lower in Group I than in Group II.

Arterial hypotension during the first 24 hours of life occurred in 19 (12.2%) preterm infants: 18 (15%) in Group I versus 1 (2.8%) in Group II (p=0.04). No significant differences were observed between groups in blood gas parameters, acid–base status, hemoglobin, leukocyte or platelet counts, C reactive protein, or procalcitonin.

Correlation analysis revealed no significant associations between lactate levels and nSOFA score, blood

[1] Letter of the Ministry of Health and Social Development of the Russian Federation No. 15 4/10/2 3204 dated April 21, 2010, "Primary and Resuscitation Care for Newborn Infants." Available at: https://docs.cntd.ru/document/902232603 (accessed May 30, 2025). (In Russian.)

pressure, or urine output. However, a negative correlation was found between lactate levels and pH (R=–0.24; p=0.007), as well as between lactate concentration and umbilical cord blood bicarbonate (R=–0.35; p <0.001).

On the first day of NICU treatment, protein levels were significantly lower in Group I than in Group II.

Alanine aminotransferase (ALT) levels were significantly lower in Group I. ALT above the reference range (>31 U/L) occurred in 20 (16.6%) cases in Group I versus 7 (20%) in Group II, a non significant difference.

Positive correlations were found between ALT levels and nSOFA score (R=0.25; p=0.002), as well as between ALT concentration and lactate (R=0.3; p=0.001). Negative correlations were identified between lactate and bicarbonate (R=–0.3; p=0.007), and between the degree of hyperlactatemia and urine output during the first 24 hours (R=–0.17; p=0.02), confirming lactate's role as a marker of hypoperfusion.

No significant differences in aspartate aminotransferase levels were observed between groups; however, values exceeding the upper reference limit (>75 U/L) were noted in 6 (5%) patients in Group I and 3 (8.6%) in Group II (p=0.3).

The main intensive care interventions are summarized in Table 3. Median fluid loading volume during the first 24 hours of life was significantly higher in Group I than in Group II (89 vs. 70 mL/kg/day). No significant differences were found in hourly urine output or fluid balance. Urine output ranged from 3.6 to 3.1 mL/kg/h, remaining within acceptable limits.

Table 2. Clinical and laboratory characteristics of newborns on the first day of intensive care unit treatment

Таблица 2. Клинико-лабораторные характеристики новорожденных в первые сутки лечения в отделении реанимации и интенсивной терапии

Параметры / Parameters	I группа / I group (n=120)	II группа / II group (n=35)	p
SpO_2 в 1-й день жизни, % / SpO_2 on the 1st day of life, %	94 [92; 96]	95 [93; 98]	0,1
Частота сердечных сокращений в 1-й день жизни, уд./мин / Heart rate on the 1st day of life, beats/min	148 [137; 158]	142 [130; 152]	0,07
Систолическое артериальное давление в 1-й день жизни, мм рт. ст. / Systolic blood pressure on the 1st day of life, mmHg	54 [48; 58]	59 [54; 64]	0,0003
Диастолическое артериальное давление в 1-й день жизни, мм рт. ст. / Diastolic blood pressure on the 1st day of life, mmHg	29 [24; 33]	33 [28; 36]	0,006
Среднее артериальное давление в 1-й день жизни, мм рт. ст. / Mean arterial pressure on the 1st day of life, mmHg	37 [32; 42]	41 [37; 45]	0,005
pH венозной крови в 1-й день жизни / Venous blood pH on the 1st day of life	7,34 [7,31; 7,39]	7,35[7,3; 7,4]	0,8
pO_2 венозной крови в 1-й день жизни, мм рт. ст. / Venous blood pO_2 on the 1st day of life, mmHg	56 [42; 59]	62 [43; 70]	0,2
pCO_2 венозной крови в 1-й день жизни, мм рт. ст. / Venous blood pCO_2 on the 1st day of life, mmHg	32,2 [27,8; 36,4]	31 [26; 37]	0,3
HCO_3 венозной крови в 1-й день жизни, ммоль/л / Venous blood HCO_3 on the 1st day of life, mmol/l	19 [17; 20]	18 [17; 20]	0,9
BE венозной крови в 1-й день жизни, ммоль/л / Venous blood base excess on the 1st day of life, mmol/l	7,5 [5,2; 9,6]	6,9 [5,8; 8.6]	0,6
Лактат венозной крови в 1-й день жизни, ммоль/л / Venous blood lactate on the 1st day of life, mmol/l	3,4 [2,2; 3,9]	3,7 [2,4; 5,2]	0,2
Гемоглобин в 1-й день, г/л / Hemoglobin on the 1st day of life, g/l	169 [146; 190]	173 [159; 201]	0,4
Лейкоциты в 1-й день жизни, $\times 10^9$/л / Leukocytes on the 1st day of life, $\times 10^9$/l	13,6 [8,6; 15,4]	13,5 [11; 16]	0,1
Тромбоциты в 1-й день жизни, $\times 10^9$/л / Platelets on the 1st day of life, $\times 10^9$/l	244 [179; 289]	299 [201; 389]	0,02
С-реактивный белок в 1-й день жизни, мг/л / C-reactive protein on the 1st day of life, mg/l	2,65 [0,15; 3]	2,1 [0,1; 2,73]	0,6
Прокальцитониновый тест в 1-й день жизни, нг/мл / Procalcitonin test on the 1st day of life, ng/ml	2,8 [0,12; 1,5]	16,8 [0,56; 33]	0,2
Общий белок в 1-й день жизни, г/л / Total protein on the 1st day of life, g/l	44,5 [38; 50]	52,6 [46; 58]	0,00003
Аланинаминотрансфераза в 1-й день жизни, ЕД/л / Alanine aminotransferase on the 1st day of life, U/l	16,2 [5; 17,5]	25 [8; 28]	0,01
Аспартатаминотрансфераза в 1-й день жизни, ЕД/л / Aspartate aminotransferase on the 1st day of life, U/l	60 [33; 69]	67 [32; 87]	0,2

Inotropic-vasopressor support was administered to 45 (29%) preterm infants: 40 (33.3%) in Group I versus 5 (14.3%) in Group II (p=0.02). The median vasoactive-inotropic score was 11.2 [5; 12.5] in Group I compared with 8.6 [5; 10] in Group II (p=0.03). Positive correlations were found between VIS and peak inspiratory pressure (R=0.2; p=0.02), and between VIS and nSOFA score (R=0.53; p <0.001).

Median peak inspiratory pressure was 19 and 17 cm H_2O in Group I and Group II, respectively, and positive end expiratory pressure was 6.2 and 5.8 cm H_2O, with no significant differences between groups. The fraction of inspired oxygen during the first 24 hours of therapy was maintained at safe levels: a median of 0.3 in Group I versus 0.28 in Group II (p <0.05; Table 3).

The oxygenation index on the first day of life was significantly lower in Group I than in Group II (318 vs. 358), suggesting more severe respiratory distress; however, no correlation was observed between the oxygenation index and Silverman–Andersen score.

Table 4 presents the characteristics of respiratory support in the delivery room. Noninvasive respiratory support (NIPPV and CPAP) was used significantly more frequently in Group I than in Group II, as was invasive respiratory support (p=0.03).

An analysis of respiratory support in the neonatal intensive care unit is presented in Table 5.

No significant differences were found between the groups in the use of various respiratory support modalities.

DISCUSSION

The results of this study demonstrate a relationship between gestational age and the frequency and severity of respiratory distress in newborns. The most severe course of respiratory distress was observed in

Table 3. Intensive care measures in newborns on the first day of intensive care unit treatment

Таблица 3. Мероприятия интенсивной терапии у новорожденных в первые сутки лечения в отделении реанимации и интенсивной терапии

Параметры / Parameters	I группа I group Me [LQ; UQ] (n=120)	II группа II group Me [LQ; UQ] (n=35)	p
Интенсивная терапия в 1-й день, мл/кг / Total fluid intake on day 1, ml/kg	89 [80; 98]	70 [60; 80]	0,0001
Диурез в 1-й день, мл/кг / Urine output on day 1, ml/kg	3,6 [2,3; 4,5]	3,1 [2; 4,1]	0,11
Гидробаланс в 1-й день % / Fluid balance on day 1, %	61 [13; 100]	65,7 [29; 100]	0,5
Катехоламиновый индекс, баллы / Catecholamine index, points	11,2 [5; 12,5]	8,6 [5; 10]	0,05
FiO_2 в 1-й день жизни, % / FiO_2 on the 1st day of life, %	0,3 [0,25; 0,4]	0,28 [0,21; 0,3]	0,037
PIP в 1-й день жизни, мм рт. ст. / PIP on the 1st day of life, mmHg	19 [18; 22]	17[12; 21]	0,11
PEEP в 1-й день жизни, мм рт. ст. / PEEP on the 1st day of life, mmHg	6,2 [5,5; 6]	5,8 [6; 6]	0,6
Дотация энергетических субстратов, кКал / Energy substrate supplementation, kcal/kg/day	38 [28; 49]	42,4 [28; 51]	0,7
Индекс оксигенации в 1-й день жизни / Oxygenation index on the 1st day of life	318 [260; 368]	358 [300; 447]	0,02

Note: FiO_2 — fraction of inspired oxygen; PIP — positive inspiration pressure; PEEP — positive end-expiratory pressure.

Table 4. Respiratory support in the delivery room

Таблица 4. Респираторная поддержка в родильном зале

Вид респираторной поддержки / Type of respiratory support	I группа / I group (n=120)	II группа / II group (n=35)	P-значение (точный тест Фишера) / p-value (Fisher's exact test)
nCPAP / nCPAP	33 (27,5%)	14 (40%)	0,1
NIPPV / NIPPV	18 (15%)	1 (2,8%)	0,04
CPAP/ CPAP	6 (5%)	7 (20%)	0,01
Неинвазивная респираторная поддержка, всего / Non-invasive respiratory support, total	57 (47,5%)	22 (62,9%)	0,08
Assist Control	18 (15%)	4 (11,4%)	0,4
SIMV / SIMW	40 (33,3%)	6 (17,1%)	0,04
Инвазивная респираторная поддержка, всего / Invasive respiratory support, total	58 (48,3%)	10 (28,6%)	0,03

Note: nCPAP — nasal Continuous Positive Airway Pressure; nIPPV — Noninvasive Positive Pressure Ventilation; CPAP — Continuous Positive Airway Pressure.

Table 5. Respiratory support in the neonatal intensive care unit

Таблица 5. Респираторная поддержка в отделении реанимации и интенсивной терапии новорожденных

Вид респираторной поддержки / Type of respiratory support	I группа / I group (n=120)	II группа / II group (n=35)	p-значение (точный тест Фишера) / p-value (Fisher's exact test)
NCPAP / NCPAP	7	1	0,4
NIPPV / NIPPV	25	10	0,3
CPAP / CPAP	10	6	0,1
Неинвазивная респираторная поддержка, всего / Non-invasive respiratory support, total	42	17	0,1
Assist Control	20	5	0,5
SIMV / SIMV	46	10	0,2
Инвазивная респираторная поддержка, всего / Invasive respiratory support, total	66	15	0,14

Note: nCPAP — nasal Continuous Positive Airway Pressure; nIPPV — Noninvasive Positive Pressure Ventilation; CPAP — Continuous Positive Airway Pressure.

early preterm infants, as reflected by higher nSOFA organ dysfunction scores; these infants also required longer mechanical ventilation and NICU stays. These findings support stratifying early preterm newborns into the high risk group for severe disease. In contrast to some researchers [14], we believe that focusing exclusively on late preterm infants is insufficient.

Apgar scores were significantly lower in the early preterm group than in late preterm infants. This aligns with reports that low birth weight and low Apgar scores at 1 and 5 minutes are most often associated with the development of severe respiratory disorders [6].

Several clinical scales are used to assess the severity of respiratory distress in newborns. The most widely cited is the Silverman–Andersen score [18]. We found that a high score (>4 points) is associated with increased venous carbon dioxide tension, complications, and prolonged invasive respiratory support. Other authors, like us, consider a score of ≥5 points a reliable predictor of the need for respiratory support [10].

It has been shown that predictors of bronchopulmonary dysplasia in newborns with respiratory distress syndrome include not only low birth weight and gestational age <32 weeks, but also a total duration of oxygen therapy exceeding 10 days [17].

The need for respiratory support in term newborns is also highly variable, depending on the frequency of respiratory distress across different gestational ages. The highest incidence was observed at 37 weeks' gestation (1.7%), gradually decreasing to a minimum at 39 weeks (0.6%), followed by a slight increase at 40 weeks (0.7%) and 41 weeks (0.8%) [12].

Venous carbon dioxide levels were extremely low in all newborns, indicating excessive respiratory support in most cases, occurring alongside compensatory tachypnea driven by base deficit and the unique metabolic profile of preterm infants.

Low birth weight and low gestational age are the main risk factors for adverse neonatal outcomes, particularly in hospitals in low income countries with limited staff training and resources. Preterm infants with extremely low birth weight represent a particularly high risk group, especially when complicated by severe infections or sepsis. Respiratory distress was most severe in the early preterm group, accompanied by arterial hypotension requiring pharmacological hemodynamic support. These infants also required longer mechanical ventilation, which in turn prolonged NICU stays [16]. In most cases, particularly in term newborns, the disease had a favorable course and, in the majority (47%), resulted in complete recovery [1].

CONCLUSIONS

1. Early preterm newborns have a more severe course of respiratory distress, reflected by higher nSOFA scores, longer mechanical ventilation requirements, and higher NICU admission rates.

2. Despite comparable respiratory and nutritional support strategies between the groups, early preterm newborns are more prone to arterial hypotension requiring pharmacological hemodynamic support.

ADDITIONAL INFORMATION

Author contribution. All authors made a substantial contribution to the conception of the study, acquisition, analysis, interpretation of data for the work, drafting and revising the article, final approval of the version to be published and agree to be accountable for all aspects of the study.

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ДОПОЛНИТЕЛЬНАЯ ИНФОРМАЦИЯ

Вклад авторов. Все авторы внесли существенный вклад в разработку концепции, проведение исследования и подготовку статьи, прочли и одобрили финальную версию перед публикацией.

Конфликт интересов. Авторы декларируют отсутствие явных и потенциальных конфликтов интересов, связанных с публикацией настоящей статьи.

Источник финансирования. Авторы заявляют об отсутствии внешнего финансирования при проведении исследования.

Информированное согласие на публикацию. Авторы получили письменное согласие законных представителей пациентов на публикацию медицинских данных.

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