PERINATAL JOURNAL

Original Article

Perinatal Journal 2026; 34(1):968-972

https://doi.org/10.57239/prn.26.03410099

Respiratory disorders in newborns: A Five-Year retrospective study in a Secondary-Level hospital

Una Drača[1], Mladen Jašić[2], Željko Jovanović[3*]

[1]General Hospital Pula, Croatia
[2]Faculty of Medicine in Pula, Juraj Dobrila University of Pula, Croatia
[3]Faculty of Health Studies Rijeka, University of Rijeka, Croatia

Abstract

Respiratory disorders are among the leading causes of neonatal morbidity and hospitalization, particularly in the early neonatal period. The aim of this study was to determine the incidence, clinical characteristics, treatment modalities, and outcomes of newborns with respiratory disorders treated in a secondary-level hospital over a five-year period. A retrospective observational study was conducted including all newborns diagnosed with respiratory disorders and hospitalized at the Department of Pediatrics, General Hospital Pula. Demographic data, gestational age, birth weight, Apgar scores, diagnoses, diagnostic procedures, therapeutic interventions, and length of hospitalization were analyzed using descriptive statistics. Out of 1,853 hospitalized newborns, 140 (7.6%) were diagnosed with respiratory disorders. The majority were term newborns and male. Transient tachypnea of the newborn was the most common diagnosis, followed by respiratory distress syndrome and neonatal pneumonia. Most newborns were successfully treated with supplemental oxygen, while non-invasive ventilation was required in a smaller proportion and invasive mechanical ventilation in only a few cases. Respiratory disorders represent a significant burden in secondary-level neonatal care. Most cases can be effectively managed with timely diagnosis and appropriate respiratory support, reducing the need for transfer to tertiary centers.

Keywords: Newborn, Respiratory disorders, Neonatal morbidity, Secondary-Level hospital, Retrospective study

Introduction

Respiratory disorders are one of the leading causes of neonatal morbidity and hospitalization worldwide, particularly during the early neonatal period [1,2]. Adaptation of the respiratory system after birth is a complex physiological process requiring rapid lung aeration, clearance of fetal lung fluid, and establishment of effective gas exchange. Disturbances in these processes may result in a wide spectrum of clinical conditions, ranging from mild, self-limiting disorders to severe respiratory failure requiring intensive care [3-6]. Common neonatal respiratory disorders include transient Tachypnea of the Newborn (TTN), Respiratory Distress Syndrome (RDS), pneumonia, meconium aspiration syndrome, and other less frequent conditions associated with prematurity or perinatal asphyxia [2–6,13]. Their incidence and clinical presentation depend on gestational age, mode of delivery, perinatal risk factors, and the level of available neonatal care.

While numerous studies have addressed respiratory disorders in tertiary neonatal intensive care units, data from secondary-level hospitals remain limited [1,4,6]. Such hospitals play a crucial role in providing neonatal care, particularly for term and late preterm infants, who constitute the majority of the neonatal population and frequently present with mild to moderate respiratory morbidity. Understanding the burden and characteristics of respiratory disorders in this setting is essential for optimizing clinical practice, resource allocation, and referral strategies [6-12].

The aim of this study was to analyse the frequency, clinical characteristics, diagnostic findings, treatment modalities, and outcomes of new-borns with respiratory disorders treated in a secondary-level hospital over a five-year period.

Materials and Methods

Study design and setting

A retrospective observational study was conducted at the Department of Pediatrics, General Hospital Pula, a secondary-level hospital providing neonatal care.

Correspondence: Željko Jovanović, Faculty of Health Studies Rijeka, University of Rijeka, Croatia, **e-mail:** zeljko.jovanovic@uniri.hr|, **Received:** December 6, 2025 **Accepted:** January 15, 2026

Study population

The study included all new-borns hospitalized over a five-year period, who were diagnosed with one or more respiratory disorders during their hospital stay.

Data collection

Data were obtained from hospital medical records. Collected variables included sex, gestational age, birth weight, Apgar scores at 1 and 5 minutes, type of respiratory disorder, radiological and laboratory findings, applied therapeutic interventions (oxygen therapy, non-invasive ventilation, mechanical ventilation, pharmacological treatment), and length of hospitalization.

Ethical considerations

The study was approved by the Ethics Committee of General Hospital Pula. All data were anonymized prior to analysis.

Statistical analysis

Data were analysed using descriptive statistical methods. Categorical variables were presented as frequencies and percentages, while continuous variables were expressed as means and ranges.

Results

During the five-year study period, a total of 1,853 newborns were hospitalized at the Department of Pediatrics, General Hospital Pula. Among them, 140 newborns (7.6%) were diagnosed with one or more respiratory disorders and included in the analysis. Respiratory disorders therefore represented a relevant cause of neonatal morbidity requiring hospital care in this secondary-level institution.

The basic demographic and clinical characteristics of the study population are presented in Table 1.

Table 1. Demographic and clinical characteristics of newborns with respiratory disorders (N = 140)

Characteristic	Value
Total hospitalized newborns (2015–2019)	1,853
Newborns with respiratory disorders	140 (7.6%)
Male sex	86 (61%)
Female sex	54 (39%)
Gestational age (weeks)	37 ± 3 (median 38; range 24–41)
Birth weight (g)	3088.5 ± 749.2 (median 3210; range 1010–4350)
Apgar score at 1 min	8.1 ± 2.5
Apgar score at 5 min	8.9 ± 1.6

Values are presented as mean ± SD, median (range), or number (%)

Male new-borns predominated, accounting for 61% of cases. The majority of affected infants were born at term, with a mean gestational age of 37 ± 3 weeks. Birth weight was generally appropriate for gestational age, with a mean birth weight of 3088.5 ± 749.2 g. Apgar scores at 1 and 5 minutes were overall satisfactory, indicating adequate initial postnatal adaptation in most new-borns, although lower scores were observed in cases with more severe respiratory compromise.

The distribution of respiratory disorders is shown in Table 2. Respiratory distress syndrome was the most frequently diagnosed condition, accounting for 40% of cases, followed by transient tachypnea of the new-born (21%). Other causes of respiratory distress included prematurity-related respiratory disorders, perinatal asphyxia, and perinatal infection. Less frequent diagnoses comprised meconium aspiration syndrome, pneumothorax, neonatal abstinence syndrome, and congenital pneumonia. Diagnostic evaluation included chest radiography in the majority of new-borns and was used to support clinical assessment and confirm the underlying cause of respiratory distress. Laboratory investigations were performed as part of routine clinical care, primarily to assess inflammatory markers and exclude infectious etiologies, and were consistent with the established diagnoses.

Table 2. Distribution of respiratory disorders

Diagnosis	Number (%)
Respiratory distress syndrome	56 (40%)
Transient tachypnea of the newborn (TTN)	30 (21%)
Prematurity-related respiratory disorder	23 (16%)
Perinatal asphyxia	15 (11%)
Perinatal infection	10 (7%)
Meconium aspiration syndrome	3 (2%)
Pneumothorax	1 (1%)
Neonatal abstinence syndrome	1 (1%)
Congenital pneumonia	1 (1%)

TTN – transient tachypnea of the newborn

Treatment modalities and outcomes are summarized in Table 3. Most newborns required supplemental oxygen therapy (92%) as the primary form of respiratory support. A more severe clinical course was observed predominantly among preterm infants. Non-invasive respiratory support was used in a subset of patients, while invasive mechanical ventilation and transfer to a tertiary center were required in only a limited proportion of cases (9%). The mean duration of oxygen therapy was 2.1 ± 0.9 days. Length of hospitalization varied according to the severity and etiology of respiratory disorder, with a mean hospital stay of 8.5 ± 7.1 days (median 7 days; range 1–34 days).

Table 3. Treatment modalities and outcomes

Treatment modality / outcome	Number (%)
Oxygen therapy	129 (92%)
Incubator / babytherm care	137 (98%)
Intubation	46 (33%)
Exogenous surfactant therapy	39 (28%)
Mechanical ventilation with transfer to tertiary center	13 (9%)
Mean duration of oxygen therapy (days)	2.1 ± 0.9
Length of hospitalization (days)	8.5 ± 7.1 (median 7; range 1–34)

Values are presented as mean ± SD, median (range), or number (%)

Discussion

The present study demonstrates that respiratory disorders account for a substantial proportion of neonatal hospitalizations in a secondary-level hospital setting, affecting 7.6% of all hospitalized new-borns during the five-year study period. This finding is consistent with previously published data reporting neonatal respiratory morbidity rates between 5% and 10% in comparable healthcare settings [1, 3,5,6, 11, 12].

Respiratory distress syndrome was the most frequently diagnosed condition in this cohort, reflecting the inclusion of preterm and late preterm infants requiring respiratory support, as reported in other neonatal epidemiological studies [1,5,7]. Transient tachypnea of the newborn was also common, particularly among term infants, which is in line with previous studies identifying TTN as a leading cause of early neonatal respiratory distress [2,4,7].

New-borns with respiratory distress syndrome and neonatal pneumonia required more intensive respiratory support and longer hospitalization, emphasizing the clinical relevance of early diagnosis and timely intervention [1,3,6]. Advances in non-invasive respiratory support have significantly improved outcomes and reduced the need for invasive ventilation in this population [8,9].

Most new-borns in this cohort were successfully managed with conservative treatment and non-invasive respiratory support. Only a small proportion required invasive mechanical ventilation and transfer to a tertiary center, indicating that secondary-level hospitals with adequately trained staff and appropriate equipment are capable of managing the majority of neonatal respiratory disorders safely and effectively [6-12].

The main limitations of this study include its retrospective design, single-centre setting, and lack of long-term follow-up data. In addition, potentially relevant perinatal risk factors such as mode of delivery or maternal comorbidities were not analysed. Despite these limitations, the study provides valuable insight into the epidemiology and management of neonatal respiratory disorders in a secondary-level hospital.

Conclusion

Respiratory disorders represent a common and clinically significant cause of neonatal hospitalization

in secondary-level hospitals. The results of this study show that the majority of newborns with respiratory disorders can be successfully managed with early recognition, appropriate diagnostic evaluation, and timely respiratory support within a secondary-level care setting, thereby reducing the need for transfer to tertiary centers.

An important implication of these findings is the critical role of continuous education and training of healthcare professionals involved in neonatal care. In addition to physicians, the education of nursing staff plays a key role in the early identification of respiratory compromise, appropriate monitoring, and implementation of respiratory support measures. Well-trained neonatal nurses contribute substantially to patient safety, quality of care, and favorable clinical outcomes.

Strengthening structured education programs and interdisciplinary collaboration between physicians and nursing staff is essential for maintaining high standards of neonatal respiratory care. Such an approach may further improve clinical outcomes, optimize resource utilization, and enhance the overall quality of care for newborns with respiratory disorders in secondary-level hospitals.

Author contributions

UD contributed to the study design, data collection, data analysis, and drafting of the manuscript. MJ contributed to data interpretation, clinical oversight, and critical revision of the manuscript for important intellectual content. ŽJ methodological supervision, interpretation of results, and final approval of the manuscript. All authors read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

Acknowledgements

The authors thank the medical and nursing staff of the Department of Pediatrics, General Hospital Pula, for their contribution to patient care and data availability.

Conflict of Interest

The authors declare no conflict of interest.

References

1.Sweet DG, Carnielli VP, Greisen G, et al. European Consensus Guidelines on the Management of Respiratory Distress Syndrome: 2022 Update. *Neonatology.* 2023;120(1):3-23. doi:10.1159/000528914

2.Jain L, Dudell GG. Respiratory transition in infants delivered by cesarean section. *Semin Perinatol.* 2006;30(5):296-304. doi: 10.1053/j.semperi.2006.07.011

3.Hermansen CL, Lorah KN. Respiratory distress in the newborn. *Am Fam Physician.* 2007;76(7):987-994.

4.Dani C, Reali MF, Bertini G, et al. Risk factors for the development of respiratory distress syndrome and transient tachypnoea in newborn infants. Italian Group of Neonatal Pneumology. *Eur Respir J*. 1999;14(1):155-159. doi:10.1034/j.1399-3003.1999. 14a26.x

5.Kumar A, Bhat BV. Epidemiology of respiratory distress of newborns. *Indian J Pediatr. 1996;* 63:93–98.doi:10.1007/BF02823875

6.Lakshminrusimha S, Manja V, Mathew B, Suresh GK. Oxygen targeting in preterm infants: a physiological interpretation. *J Perinatol.* 2015; 35(1): 8–15. doi:10.1038/jp.2014.199

7.Marchesini V, Corlette S, Sheppard S, Davidson A, Tingay D. Evaluation of lung homogeneity in neonates and small infants during general anaesthesia using electrical impedance tomography: a prospective observational study. *BJA Open*. 2024; 12:100344. Published 2024 Sep 21. doi: 10.1016/j.bjao.2024.100344

8.Gautam G, Gupta N, Sasidharan R, et al. Systematic rotation versus continuous application of 'nasal prongs' or 'nasal mask' in preterm infants on nCPAP: a randomized controlled trial. *Eur J Pediatr*. 2023;182(6):2645-2654. doi:10.1007/s00431-023-04933-1

9.Anne RP, Murki S. Noninvasive Respiratory Support in Neonates: A Review of Current Evidence and Practices. *Indian J Pediatr*. 2021;88(7):670-678. doi:10.1007/s12098-021-03755-z

10.Klingenberg C, Wheeler KI, McCallion N, Morley CJ, Davis PG. Volume-targeted versus pressure-limited ventilation in neonates. *Cochrane Database Syst Rev*. 2017;10(10):CD003666. Published 2017 Oct 17. doi:

10.1002/14651858.CD003666.pub4
11.Woldeyes D, Negesse A, Alamneh AA, Jemberie SS, Anteneh AA, Birhanu MY. Incidence and predictors of respiratory distress among neonates admitted to neonatal intensive care unit, Northwest Ethiopia. *Sci Rep.* 2025;15(1):30444. Published 2025 Aug 19. doi:10.1038/s41598-025-05957-3
12.Hascoet JM, Mitanchez D, Saliba E, Athea Y. Respiratory distress in late-preterm neonates: from controversy to consensus - a survey of regional advisory boards and neonatologists in France. *BMJ Paediatr Open.* 2025;9(1):e003557. Published 2025 Jun 12. doi:10.1136/bmjpo-2025-003557
13. Abbas, M., Khan, T. I., & Jam, F. A. (2025). Avoid Excessive Usage: Examining the Motivations and Outcomes of Generative Artificial Intelligence Usage among Students. Journal of Academic Ethics, 1-20.