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Nursing care for a neonate with respiratory distress syndrome and impaired spontaneous ventilation: A case study

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Abstract

Background: Asphyxia is one of the three main causes of death of newborn babies (neonates) in Indonesia, occurring due to the failure of the baby to start breathing spontaneously and regularly shortly after birth. Respiratory emergencies in newborn babies are also often encountered in the form of Respiratory Distress Syndrome (RDS). If asphyxia is more often triggered by intrapartum factors or oxygenation barriers during the birth process, Respiratory Distress Syndrome is closely related to lung organ immaturity problems, especially in babies born prematurely. It is this extreme fatigue in the respiratory muscles and depletion of energy reserves that clinically gives rise to the nursing diagnosis of impaired spontaneous ventilation.

Purpose: To describe pediatric nursing care for female baby patients with nursing problems of spontaneous ventilation disorders.

Method: This case study is nursing care for Respiratory Distress Syndrome patients with spontaneous ventilation disorders by implementing respiratory monitoring interventions (I.01014) and airway management (I.01011) with mechanical ventilation response outcomes (L.01005) with frequency monitoring measures; rhythm; depth and effort of breathing, monitoring breathing patterns, monitoring oxygen saturation, and sucking mucus for less than 15 seconds. The subjects of this section are infant patients diagnosed with Respiratory Distress Syndrome and receiving nursing care in accordance with applicable standard practice guidelines. This research was conducted from 6 to 9 December 2025.

Results: assessment of a premature baby with a low birth weight of 2,250 grams, preterm 34+2 weeks, born with the help of 2 cycles of VTP resuscitation with APGAR scores of 1'4 and 5'5, the baby did not immediately cry and was less active, conscious was sedated by midazolam, intubated with CPAP oxygenation FiO2 40% PEEP 8 mbar, installed ogt, installed D5% drip + ¼ Ns drip 9 ml/hour, the baby is in an infant warmer, the acral feels warm, PB: 45 cm, BB: 2,250 grams, LK: 33 cm, LILA: 8 cm, and LD: 28 cm. The results of nursing care on the third day showed that the patient's SpO2 was in the range of 96-97% and there was little secretion.

Conclusion: After carrying out actions for 3 times 8 hours on 7-9 December 2025 with frequency monitoring intervention; rhythm; depth and effort of breathing, monitoring breathing patterns, monitoring oxygen saturation, and sucking mucus for less than 15 seconds can have a significant effect on the nursing diagnosis of spontaneous ventilation disorders. This can be seen from the evaluation of the success of the intervention that has been provided.

Keywords: Asphyxia; Impaired Spontaneous Ventilation; Newborn Baby; Respiratory Distress Syndrome (RDS).

INTRODUCTION

Asphyxia is one of the three leading causes of neonatal mortality in Indonesia. This medical condition occurs due to the failure of a newborn to initiate spontaneous and regular breathing shortly after birth. Clinically, neonatal asphyxia is identified by three main signs: hypoxemia (insufficient oxygen in the blood), hypercapnia (excess carbon dioxide), and acidosis (accumulation of acid) (Lestari, 2024).

In addition to asphyxia, respiratory emergencies in newborns are also commonly encountered in the form of Respiratory Distress Syndrome (RDS). While asphyxia is more often triggered by intrapartum factors or impaired oxygenation during the delivery process, Respiratory Distress Syndrome is closely associated with lung immaturity, particularly in premature infants (Kadi et al., 2024). Respiratory Distress Syndrome is characterized by a deficiency or inadequate amount of surfactant, a substance that maintains alveolar stability and prevents alveolar collapse during exhalation (Putra, 2025). As a result of surfactant deficiency, infants must exert considerable effort to breathe, leading to clinical manifestations such as tachypnea (rapid breathing), chest wall retractions, grunting, and cyanosis (bluish discoloration) (Setiowati et al., 2023). Clinical data indicate that low birth weight (LBW) and younger gestational age increase the risk of developing this respiratory failure syndrome (Kadi et al., 2024).

The collapse of the alveoli due to surfactant deficiency forces infants to breathe much harder to reopen the airways in their lungs. This excessive work of breathing occurs continuously, while the chest wall of premature infants is still weak and their respiratory muscles are not yet fully mature. Consequently, the infant's persistent effort to expand the lungs and maintain gas exchange rapidly depletes the body's energy reserves, a critical process frequently observed in low-birth-weight infants with pulmonary immaturity (Fadillah et al., 2022).

Extreme fatigue of the respiratory muscles and depletion of energy reserves clinically manifest as the nursing diagnosis of impaired spontaneous ventilation. According to the Indonesian Nursing Diagnosis Standards (SDKI), impaired spontaneous ventilation is defined as a decrease in energy reserves that results in an individual's inability to breathe adequately. In the context of neonatal nursing care, this problem manifests as severe use of

accessory respiratory muscles, such as chest wall retractions and nasal flaring, decreased oxygen saturation, carbon dioxide retention, and apnea. This condition constitutes a major nursing diagnosis requiring continuous monitoring and intervention by nurses in intensive care settings (Azizi et al., 2025).

Although neonatal asphyxia and Respiratory Distress Syndrome (RDS) have different initial mechanisms, both ultimately lead to the same critical condition, namely inadequate gas exchange. Neonatal asphyxia occurs due to impaired uteroplacental circulation during labor, causing respiratory depression in the fetus or newborn (Lestari, 2024). When an infant fails to breathe spontaneously, tissue hypoxia occurs and triggers anaerobic metabolism. This process results in lactic acid accumulation, leading to metabolic and respiratory acidosis. If resuscitation is not performed promptly, hypercapnia and acidosis can depress cardiac function and reduce perfusion to vital organs (Sela, 2022).

In such critical situations, nurses in the Neonatal Intensive Care Unit (NICU) play a crucial role in continuously monitoring physiological parameters, particularly respiratory status, and in meeting the infant's ventilatory needs through mechanical or non-invasive ventilation, such as Continuous Positive Airway Pressure (CPAP). Delayed recognition of signs of impaired spontaneous ventilation can result in irreversible cerebral hypoxia. Therefore, the implementation of nursing care based on the Indonesian Nursing Intervention Standards (SIKI), such as ventilatory support and close respiratory monitoring, is essential for stabilizing the infant's hemodynamic status (Wulandari & Saputra, 2024).

Although medical and nursing interventions in intensive care units have advanced rapidly, the incidence of impaired spontaneous ventilation among neonates with asphyxia and Respiratory Distress Syndrome (RDS) in hospitals remains significant. Various studies have emphasized that the effectiveness of management largely depends on the nurse's ability to promptly formulate an accurate nursing diagnosis and evaluate the infant's clinical response in real time. Based on this phenomenon, this study is important to further analyze the implementation of nursing care for neonates experiencing impaired spontaneous ventilation in

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order to reduce neonatal mortality caused by respiratory failure (Hidayat et al., 2025).

RESEARCH METHOD

This study employed a case study design as the primary research approach. The subject was Mrs. A's infant, who was diagnosed with Respiratory Distress Syndrome (RDS) with a history of asphyxia and low birth weight (LBW), and received nursing care in accordance with applicable standard practice guidelines.

The case was conducted in the An Ni'mah Ward (Neonatal Intensive Care Unit) at RS PKU Muhammadiyah Yogyakarta from December 6–9, 2025. Data were collected using several techniques, including interviews, observation, and documentation review, to obtain comprehensive information regarding the infant's condition and the nursing interventions provided. Data analysis was performed progressively throughout the data collection process until all relevant information had been obtained. Subsequently, the researcher developed a nursing care plan based on the patient's condition, implemented the planned nursing interventions, and evaluated their effectiveness to assess the infant's clinical progress.

RESEARCH RESULTS

Assessment

The assessment was conducted from December 6 to 9, 2025, in the An Ni'mah Ward (Neonatal Intensive Care Unit) at PKU Muhammadiyah Yogyakarta Hospital. The assessment findings showed that Baby of Mrs. A was a 4-day-old male infant of Javanese ethnicity and Indonesian nationality. The infant was the first child from the mother's first pregnancy. The infant was born prematurely with a low birth weight (LBW) of 2,250 g at a gestational age of 34+2 weeks, appropriate for gestational age, and was delivered by cesarean section due to premature rupture of membranes.

Baby of Mrs. A was diagnosed with Respiratory Distress Syndrome (RDS) and required positive pressure ventilation (PPV) for two cycles immediately after birth. The APGAR scores were 4 at the first minute and 5 at the fifth minute. The infant did not cry immediately after birth and showed decreased spontaneous movement.

The assessment conducted on December 6, 2025, showed that the infant was sedated with midazolam, intubated, and receiving respiratory support with CPAP at an FiO₂ of 40% and PEEP of 8

mbar. An orogastric tube (OGT) was also in place. The infant received D5% + ¼ NS intravenous fluid at a rate of 9 mL/hour and was placed under an infant warmer. The extremities were warm to the touch. Anthropometric measurements showed a body length of 45 cm, body weight of 2,250 g, head circumference of 33 cm, mid-upper arm circumference of 8 cm, and chest circumference of 28 cm.

Nursing Diagnosis

The nursing diagnosis identified was impaired spontaneous ventilation (D.0004) related to respiratory muscle fatigue. Supporting objective data included chest wall retractions when respiratory support was removed, chest X-ray (babygram AP view) findings indicating reduced and collapsed lung fields with an enlarged cardiac silhouette, intubation with CPAP support at an FiO₂ of 40% and PEEP of 8 mbar, a respiratory rate of 63 breaths/minute, and an SpO₂ of 96%.

Nursing Interventions

The nursing interventions provided to Baby of Mrs. A for impaired spontaneous ventilation included respiratory monitoring (I.01014) and airway management (I.01011). The interventions included monitoring respiratory rate, rhythm, depth, and effort; monitoring respiratory patterns; monitoring oxygen saturation; and performing suctioning for less than 15 seconds when airway secretions were present.

Nursing Implementation

The implementation consisted of monitoring respiratory rate, rhythm, depth, and effort; monitoring respiratory patterns; monitoring oxygen saturation; and performing suctioning for less than 15 seconds when secretions were present. Monitoring was conducted regularly while the infant received respiratory support with CPAP at an FiO₂ of 40% and PEEP of 8 mbar.

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Nursing Evaluation

On the first day of evaluation following implementation, the respiratory rate was 40 breaths/minute and SpO₂ was 97%. Only a small amount of airway secretion was observed. Based on the outcome criteria, the fulfillment of FiO₂ requirements increased from a score of 4 to 5, oxygen saturation increased from a score of 3 to 5, and airway secretion decreased from a score of 3 to 4.

On the second day of evaluation, SpO₂ was maintained within the range of 95–97%, the respiratory rate was 41 breaths/minute, and only a small amount of secretion was observed. The infant remained under an infant warmer, was intubated and receiving CPAP with an FiO₂ of 40% and PEEP of 8 mbar, and had an OGT in place. The infant received 39 mL of formula milk. On the third day of evaluation, SpO₂ remained within the range of 96–97%, the respiratory rate was 40 breaths/minute, and only a small amount of secretion was observed.

Overall, during the three-day nursing care period, improvements in respiratory parameters were observed, as indicated by a decrease in respiratory rate from 63 breaths/minute to approximately 40–41 breaths/minute, oxygen saturation maintained within the range of 95–97%, and decreased airway secretions.

DISCUSSION

Assessment

The assessment findings showed that Baby of Mrs. A was a premature infant at a gestational age of 34+2 weeks with LBW of 2,250 g and RDS. Prematurity and LBW are important risk factors for respiratory disorders in neonates. Another reported that infants with a history of prematurity and LBW have a higher risk of developing respiratory distress compared with full-term infants with normal birth weight (Setiowati et al., 2023).

RDS in premature infants is associated with respiratory system immaturity, particularly due to inadequate production and function of pulmonary surfactant. This condition may result in alveolar collapse and reduced gas exchange efficiency. The finding of reduced and collapsed lung fields on chest X-ray supports the presence of respiratory impairment in the patient.

The history of asphyxia, indicated by APGAR scores of 4 at the first minute and 5 at the fifth minute,

as well as the need for two cycles of PPV, also indicates impaired respiratory adaptation immediately after birth. This condition requires rapid and appropriate resuscitation. During the Golden Minute, neonatal resuscitation measures, including maintaining warmth, ensuring airway patency, providing tactile stimulation, and administering positive pressure ventilation, are essential to prevent complications associated with hypoxia (Sela, 2022).

Nursing Diagnosis

Based on the assessment findings, impaired spontaneous ventilation (D.0004) related to respiratory muscle fatigue was established as one of the primary nursing problems. This diagnosis was supported by chest wall retractions when respiratory support was removed, a respiratory rate of 63 breaths/minute, the need for CPAP support with an FiO₂ of 40% and PEEP of 8 mbar, and radiological findings indicating reduced and collapsed lung fields.

In premature infants with RDS, respiratory system immaturity may increase the work of breathing and contribute to respiratory muscle fatigue. This condition may result in an inability to maintain adequate spontaneous ventilation, requiring respiratory support. Therefore, impaired spontaneous ventilation is an important problem that requires close attention in the provision of nursing care.

Nursing Interventions and Implementation

Respiratory monitoring and airway management were prioritized because respiratory stability is essential for maintaining the overall condition of neonates. Monitoring respiratory rate, rhythm, depth, and effort, as well as oxygen saturation, enables nurses to detect early changes in respiratory status.

In this case, monitoring was performed while the infant received CPAP support with an FiO₂ of 40% and PEEP of 8 mbar. SpO₂ monitoring served as one of the indicators for assessing oxygenation adequacy and the infant's response to respiratory therapy. Another studies stated that structured respiratory monitoring in neonates plays an important role in detecting changes in clinical condition and supporting cardiorespiratory stabilization (Wahyuni et al., 2026). Airway management through selective suctioning was also performed when secretions were present. This intervention aimed to maintain airway

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patency so that ventilation and oxygenation could occur optimally. Suctioning was performed for less than 15 seconds to minimize the risk of oxygenation disturbances and stress in the neonate.

Nursing Evaluation

The evaluation results demonstrated positive progress following three days of respiratory monitoring and airway management. The respiratory rate decreased from 63 breaths/minute at the initial assessment to 40-41 breaths/minute during evaluation. Oxygen saturation was maintained within the range of 95-97%, indicating relatively stable oxygenation while the infant continued to receive respiratory support.

Improvement was also observed in airway secretions. On the first day of evaluation, only a small amount of secretion was observed, with the airway secretion outcome score improving from 3 to 4. This finding indicates improved airway patency following selective suctioning.

According to the Indonesian Nursing Outcome Standards, the effectiveness of interventions for impaired spontaneous ventilation can be evaluated through improved mechanical ventilation response, improved fulfillment of FiO_2 requirements, increased oxygen saturation, and decreased airway secretions. In the case of Baby of Mrs. A, most of these indicators demonstrated positive progress.

Therefore, regular respiratory monitoring and appropriate airway management resulted in favorable respiratory outcomes in Baby of Mrs. A. The improvement was indicated by a decreased respiratory rate, stable oxygen saturation, and reduced airway secretions. These findings suggest that the interventions provided were appropriate to the patient's needs and supported respiratory stabilization in this neonate with RDS and a history of asphyxia.

CONCLUSION

Based on the findings and discussion of the case of Baby of Mrs. A with Respiratory Distress Syndrome and impaired spontaneous ventilation in the An Ni'mah Ward (Neonatal Intensive Care Unit), it can be concluded that the assessment showed that Baby of Mrs. A was born prematurely with a low birth weight of 2,250 g at a gestational age of 34+2 weeks, appropriate for gestational age. The infant was

delivered by cesarean section due to premature rupture of membranes and required positive pressure ventilation (PPV) for two cycles, with APGAR scores of 4 at the first minute and 5 at the fifth minute. The infant did not cry immediately after birth and had decreased spontaneous movement. The infant was sedated with midazolam, intubated, and receiving CPAP respiratory support with an FiO_2 of 40% and PEEP of 8 mbar. An OGT and intravenous infusion of $\text{D5\%} + \frac{1}{4} \text{ NS}$ at 9 mL/hour were also in place. The infant was placed under an infant warmer, with warm extremities. Anthropometric measurements were a body length of 45 cm, body weight of 2,250 g, head circumference of 33 cm, mid-upper arm circumference of 8 cm, and chest circumference of 28 cm.

The primary nursing diagnosis identified in this case was impaired spontaneous ventilation, with the expected outcome of improved mechanical ventilation response. The nursing interventions provided were respiratory monitoring and airway management.

After nursing implementation was carried out over three 8-hour periods from December 7 to 9, 2025, the interventions provided to Baby of Mrs. A included monitoring respiratory rate, rhythm, depth, and effort; monitoring respiratory patterns; monitoring oxygen saturation; and performing suctioning for less than 15 seconds. The final evaluation showed an SpO_2 ranging from 96–97%, minimal airway secretions, and a respiratory rate of 40 breaths/minute, with improved fulfillment of FiO_2 requirements, increased oxygen saturation, and decreased airway secretions.

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