



## INHALATION MEDICATION ADMINISTRATION IN CHILDREN WITH PNEUMONIA WITH INEFFECTIVE AIRWAY CLEARANCE: CASE STUDY

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### ABSTRACT

Pneumonia is responsible for the deaths of 740,180 infants and is the leading cause of mortality among this age group. In Indonesia, pneumonia accounts for 16% of all deaths and often leads to ineffective airway clearance, necessitating appropriate treatment such as inhalation medication to reduce sputum viscosity or widen the airways. To determine the effectiveness of inhalation medication administration in children with pneumonia experiencing ineffective airway clearance in the West Padmanaba Ward of Dr. Sardjito Yogyakarta General Hospital. The methodology employed in this case study aims to describe and explore the administration of inhalation medication to pediatric pneumonia patients with ineffective airway clearance for 3x24 hours at Dr. Sardjito Yogyakarta General Hospital. After administering inhalation medication for 3x8 hours to children with pneumonia experiencing ineffective airway clearance, partial resolution of the problem was observed. Inhalation medication administration was effective for pediatric pneumonia patients with ineffective airway clearance, exemplified in the case of An.M.

Keywords: ineffective airway clearance; inhalation medication administration; pneumonia

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## INTRODUCTION

Pneumonia is a disease characterized by inflammation or infection caused by bacteria, viruses, or fungi in the respiratory tract and lung tissues (Agustyana et al., 2019). According to the World Health Organization (2022), pneumonia claimed the lives of 740,180 infants in 2019. In Indonesia, pneumonia accounts for 16% of infant mortality, estimated at 920,136 deaths in 2015 (Indonesian Ministry of Health, 2020). The nursing diagnosis that arises in pneumonia patients is ineffective airway clearance, as indicated by Aldriana's research (2015), which showed a consistent increase in pneumonia cases each year, with ineffective airway clearance being the primary nursing concern. This is because the reaction to pneumonia infection often leads to airway obstruction. Therapy for pediatric pneumonia with ineffective airway clearance includes primary therapy and adjunct therapy. Primary therapy encompasses antibiotic treatment, while adjunct therapy consists of symptomatic treatment such as analgesics, antipyretics, bronchodilator inhalation, and mucolytics (Meriyani et al., 2016). Based on the aforementioned background, the authors are interested in writing a scientific paper titled "Inhalation Medication Administration in Children with Pneumonia with Ineffective Airway Clearance in the Padmanaba Ward of Dr. Sardjito General Hospital."

## **METHOD**

This study was a case study research that utilizes a nebulizer machine, nebulizer mask, observation sheet, and nursing care plan. The study was conducted in the Padmanaba Barat Ward of Dr. Sardjito General Hospital with one respondent, a pediatric pneumonia patient with the nursing problem of ineffective airway clearance. The study employed observation, interviews, physical examinations, and document analysis, referencing nursing reference books (SDKI, SLKI, SIKI)

## **RESULTS**

Based on the assessment, the patient, An.M, is a 6-month-old male with the nursing problem of ineffective airway clearance and a diagnosis of pneumonia in the Padmanaba Barat Ward of Dr. Sardjito General Hospital. The assessment of An.M began with inquiring about his complaints, and his mother reported that An.M still occasionally coughs but that when he does, it is severe and accompanied by rapid breathing. Vital sign examination yielded results of a temperature of 36.6°C, respiratory rate of 40 breaths per minute, and a pulse rate of 118 beats per minute, with An.M appearing to be conscious and alert. Physical examination findings indicated the presence of rales and wheezing sounds in the lungs, as well as a post-hernia repair wound in the abdominal area. An.M received therapy consisting of Ampicillin 250 mg every 6 hours intravenously, Gentamicin 40 mg every 24 hours intravenously, and Ventolin 2.5 mg every 8 hours via nebulizer.

The primary nursing diagnosis that emerged for An.M was ineffective airway clearance related to retained secretions. Additionally, there were other nursing diagnoses such as the risk of falls (indicated by age  $\leq 2$  years) and the risk of infection (indicated by invasive procedure effects). Based on the priority of the nursing diagnosis of ineffective airway clearance, the plan for An.M was that after 3x8 hours of nursing care, airway clearance was expected to improve with the following outcome criteria: reduced sputum production (3 moderate  $\rightarrow$  5 reduced), reduced rales (2 moderate  $\rightarrow$  5 reduced), reduced wheezing (2 moderate  $\rightarrow$  5 reduced), and improved breathing pattern (3 moderate  $\rightarrow$  5 improved). Accordingly, the following action plan was developed: airway management, which includes monitoring breathing patterns, monitoring breath sounds, semi-Fowler's positioning, and collaboration in administering bronchodilator medications; and inhalation medication administration, which includes checking medication expiration dates, adhering to the six rights of medication administration, educating the family about medication administration, explaining the types of medication, reasons for administration, expected actions, and potential side effects of the medication, as well as explaining factors that can affect medication effectiveness. Implementation began on May 15, 2023, and continued until May 17, 2023, in accordance with the established plan. Here are the results of the inhalation medication administration observed over 3x8 hours.

Table 1.  
Implementation of Inhalation Drug Administration along with observations and results

| Date                   | Airway Clearance                                                                                                                                                                           |                                                                                                                                                                                                                       | Duration of Inhalation Drug Administration                                                                                                                                                                                        | Results                                                                                                                       |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
|                        | Before                                                                                                                                                                                     | After                                                                                                                                                                                                                 |                                                                                                                                                                                                                                   |                                                                                                                               |
| Monday, 15 May 2023    | 20.55 WIB<br>1. Breath sounds: rales and wheezing heard<br>2. Respiratory rate: 34 breaths per minute<br>3. Child's condition: the child is not restless<br>4. Breathing pattern: (eupnea) | 21.45 WIB<br>1. Breath sounds: rales and wheezing heard<br>2. Respiratory rate: 32 breaths per minute<br>3. Child's condition: the child is not restless<br>4. Breathing pattern: (eupnea)                            | The administration was carried out for approximately 30 minutes. During the procedure, the child cried and was fussy; the procedure was briefly paused until the child became calmer, and the child was in a semi-fowler position | The result showed a decrease in respiratory frequency, but rales and wheezing were still audible.                             |
| Tuesday, 16 May 2023   | 12.50 WIB<br>1. Breath sounds: rales and wheezing heard<br>2. Respiratory rate: 39 breaths per minute<br>3. Child's condition: the child is not restless<br>4. Breathing pattern: (eupnea) | 13.40 WIB<br>1. Breath sounds: rales slightly reduced, wheezing moderately reduced<br>2. Respiratory rate: 35 breaths per minute<br>3. Child's condition: the child is not restless<br>4. Breathing pattern: (eupnea) | The administration was carried out for approximately 20 minutes. During the procedure, the child remained calm and did not cry as the child was sleeping, and the child was in a semi-fowler position.                            | After the procedure, it was observed that the breath sounds of rales and wheezing had decreased significantly.                |
| Wednesday, 17 May 2023 | 13.10 IB<br>1. Breath sounds: rales and wheezing heard<br>2. Respiratory rate: 40 breaths per minute<br>3. Child's condition: the child is not restless<br>4. Breathing pattern: (eupnea)  | 14.30 WIB<br>1. Breath sounds: ales reduced, wheezing moderately reduced<br>2. Respiratory rate: 36 breaths per minute<br>3. Child's condition: the child is not restless<br>4. Breathing pattern: (eupnea)           | The administration was carried out for approximately 20 minutes. During the procedure, the child remained calm and did not cry as the child was sleeping, and the child was in a semi-fowler position.                            | After the procedure, it was observed that the breath sounds of rales had decreased, and wheezing had decreased significantly. |

## **DISCUSSION**

The maternal assessment data indicated that An.M had occasional coughing, but when the coughing occurred, it was productive and accompanied by rapid breathing. Physical examination revealed rales and wheezing sounds in the lungs. This corresponds to Mandan's theory (2019) regarding the signs and symptoms of Pneumonia, which include chills, nausea, loss of appetite, productive cough, shortness of breath, rales, and wheezing. Wheezing in children with pneumonia occurs due to the narrowing of the airways caused by retained secretions, as described by Djojodibroto's theory (2016). Wheezing is characterized by continuous, high-pitched musical sounds during breathing, and it can occur during both inspiration and expiration. Airway narrowing can result from excessive secretions, mucosal edema, smooth muscle constriction, tumors, or the presence of foreign bodies. The implementation began on May 15, 2023, at 11:00 AM WIB, involving monitoring of the breathing pattern and breath sounds, as outlined in An.M's care plan based on PPNI (2018) regarding airway management action plans. This plan includes monitoring the patient's breathing pattern and breath sounds to assess the breathing pattern and identify any abnormal breath sounds during inspiration and expiration, such as rales, wheezing, or stridor).

The administration of inhalation medication took place at 9:00 PM WIB. During the procedure, the researchers monitored the child's condition, ensuring that the child was in a semi-fowler position. This aligns with the research conducted by Yuliana and S.I Agustina (2016), indicating that the semi-fowler position can reduce intra-abdominal pressure, abdominal muscle tension, and pressure on the respiratory organs, thus facilitating breathing and respiratory movement. In addition, the administration of inhalation medication followed the Standard Operating Procedure (SOP) (PPNI, 2021), including pre-interaction, orientation, working, and termination phases. The pre-interaction phase involved reviewing medical records and preparing the necessary equipment, such as a simple mask, gloves, tissues, a nebulizer machine, and tubing. The orientation phase included greeting, self-introduction, verifying the patient's identity, explaining the purpose and timing, and providing an opportunity for family members to ask questions. This was followed by the working phase and concluded with the termination phase, which involved evaluating the administration of inhalation medication to the family, discussing further care plans, offering an opportunity for family members to ask questions, and completing documentation.

During the administration of inhalation medication in accordance with the Standard Operating Procedure (SOP), the writer also observed the child's condition during the procedure, such as when the child cried and became restless. When the child cried and became restless, the procedure was momentarily paused until the child calmed down. Inhalation medication could proceed when An.M was calmer and not crying because crying can hinder the optimal inhalation of inhalation medication. This aligns with the theory of Supriyatno and Heda (2016), which states that when a child cries, mouth breathing occurs, reducing the amount of medication inhaled into the lungs due to poor mask adherence. Additionally, the child's breaths become shorter and quicker. The administration of inhalation medication in children was conducted for approximately 20 minutes, in line with the theory of Roza et al. (2019), which suggests that effective inhalation medication should be administered for 10 minutes or until the vapor has dissipated to achieve optimal results. During the implementation of inhalation medication, the researcher performed respiratory monitoring observations before and after the procedure, consistent with Roza et al.'s theory (2019), which emphasizes the importance of monitoring respiratory status before and after the procedure to obtain optimal outcomes.

After the implementation on May 17, 2023, Nursing Evaluation emerged with results showing a significant decrease in sputum production (4), reduced rales (5), substantially reduced wheezing (4), and improved breathing patterns (5). Consequently, the problem of ineffective airway clearance was partially resolved. The nursing evaluation was considered partially resolved because the criteria for success were only partially achieved, in line with Nunung's findings (2019), which suggest that the problem is only partially resolved when the client demonstrates partial changes from the established criteria for success.

## **CONCLUSION**

Based on the case study conducted in the Padmanaba Ward of Dr. Sardjito Hospital regarding the administration of inhalation medication in children with ineffective airway clearance due to pneumonia, it can be concluded that inhalation medication is administered to address the retention of secretions caused by mucus buildup in the lungs, thereby maintaining a patent airway. The implementation of inhalation medication was carried out while adhering to the Standard Operating Procedure (SOP), starting from the pre-interaction phase, orientation phase, working phase, and termination phase. Additionally, the administration of Ventolin 2.5 mg followed the "6 Rights" principles (right patient, right drug, right dose, right time, right route, and right documentation). Furthermore, the condition of An.M was considered during the administration of inhalation medication, which lasted for approximately 20 minutes, with the patient in a semi-fowler position. The evaluation of the inhalation medication implementation was conducted in line with the goals of the nursing care plan. The evaluation indicated an improvement in respiratory patterns, a decrease in rales, and a significant reduction in wheezing, thereby partially resolving the problem of ineffective airway clearance.

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