

Analysis Of The Application Of Blowing Balloon Therapy To Improve Breath Patterns In Children With Pneumonia At Hospital X Bekasi

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Abstract

Pneumonia is usually marked by coughing and runny nose to shortness of breath which is a well-known disease in the community and easily attacks children, this disease mainly attacks the children's lung organs. One of the main nursing problems that arise due to pneumonia is an ineffective breathing pattern, where ventilation is not optimal. As a nurse, to provide non-pharmacological therapy in the form of innovative balloon-blowing therapy to improve oxygenation status in pediatric patients, especially those with breathing pattern problems. This innovation was carried out using the case study method for 3 patients. Balloon blowing therapy which is carried out by inhaling air from the nose and expelling it through the inflated mouth then the air coming out of the mouth is put into the balloon until the balloon is inflated, with the inclusion criteria applied to children aged 3-12 years, experiencing signs of respiratory distress, children with a diagnosis medical pneumonia and bronchopneumonia and cooperative. This balloon-blowing therapy was evaluated by looking at the respiratory frequency for 3 days with an observation sheet and an assessment of the clinical respiration score (CRS). The results for 3 days in the three patients showed a decrease in respiratory frequency with an average of before the action of 24 x/minute and after the procedure 21 x/minute, and the evaluation of the three patients included mild respiratory disorders. Based on evaluation results for 3 days with three patients, it was concluded that this balloon-blowing therapy improved the breathing pattern of pediatric patients by decreasing the respiratory rate to become slow and regular.

Keywords: *pneumonia, blowing balloon, breathing patterns, respiration frequency, clinical respiration score (CRS)*

Introduction

Pneumonia attacks children very easily, this disease is mainly attacked by children's respiratory tract, especially the lungs (UNICEF, 2019). Children with weak immune systems will easily experience respiratory tract infections which are characterized by fever, coughs, colds, rapid breathing and shortness of breath (Ministry of Health, 2019). The following manifestations are signs of pneumonia, which is caused by the bacteria *Streptococcus pneumoniae* (WHO, 2021). Pneumonia attacks the respiratory tract caused by the presence of Pneumococcus, Staphylococcus, Streptococcus bacteria and viruses that enter the child's body (Johns Hopkins Medicine, 2022).

In 2019, pneumonia contributed to the death rate in the world with an incidence reaching 740,180 (WHO, 2021). Pneumonia is estimated at around 19,000 in 2018 contributing to the mortality rate. Worldwide, it shows that 71 children in Indonesia are infected with pneumonia every hour (UNICEF, 2019). According to health profile data in 2019, around \pm 400,000 cases of pneumonia occurred in Indonesia (Ministry of Health, 2019). The findings of pneumonia cases in 2021 in Bekasi City reached 1,544 cases (Dinkes, 2021). Data on the incidence of children aged 3-12 years at Hospital X Bekasi with pneumonia and bronchopneumonia from January to April 2023 were 440 cases.

The process of pneumonia starts from inflammation which results in an increase in sputum production until signs of symptoms appear and problems arise and one of these problems is ineffective breathing patterns, so pneumonia can be treated with immunization and pharmacological treatment, in the form of antibiotics, oxygen therapy and therapy. mucolytic inhalation to dilute sputum (Suryono, 2020; UNICEF, 2020).

The non-pharmacological management that can reduce one of them is nursing intervention that can be given to those experiencing this problem based on research on the application of playing balloon blowing (balloon therapy) which can improve oxygenation status in children with respiratory problems and can be used as an approach to traumatic care for children due to the effects of hospitalization, according to research by Smita *et al.* (2018), giving balloon therapy to 60 children for 10 minutes every day in 1 session, evaluation of respiratory frequency and oxygen saturation showed significant differences between before and after with p value < 0.0001 (Smita *et al.*, 2018).

The impact of pneumonia that is not treated properly can result in infections that spread to all organs in the child's body, lung abscesses and pleural effusions or accumulation of fluid in the lining of the lungs (Suryono, 2020). This is an undesirable thing if pneumonia is not resolved and can even contribute to the mortality rate. in children in the world (Rich & Melgar, 2021).

At the East Bekasi Private Hospital Based on the reasons for writing above, the author draws the conclusion that he is interested in providing nursing care to children related to pneumonia accompanied by the application of additional implementation in the form of balloon blowing therapy.

Methods

The method used was a case study with 3 child respondents, the respondents were given a balloon blowing therapy intervention whose mechanism was like deep breathing exercises for adults but modified for children with balloon blowing games. The action is carried out by inhaling air from the nose and exhaling it through the protruding mouth, then the air that comes out of the mouth is put into a balloon until the balloon inflates, the air that enters the balloon expands the balloon to the end of the balloon (Lee *et al.*, 2019).

The procedure is carried out for 3 days, in one day one treatment is given with one inflatable balloon, it can be done in the morning, afternoon or evening, the balloon is inflated until air is filled to the tip of the balloon (inflates) to a size of ± 10 cm, one session is carried out for 10 minutes interspersed breathing, if the child's response begins to become tired, the action is allowed to stop for 1 minute and then resume (Harsismanto *et al.*, 2021). The action begins 1 hour after the child eats and takes medicine (Nithya, 2019). The aim of this therapy is to improve oxygenation status by achieving an optimal ventilation process, reducing respiratory performance, breathing becomes slow and deep so that oxygen transport is better (Junaidin, 2021). This innovation is given to children with pneumonia to overcome the oxygenation problem of the patient's breathing pattern, the aim of which is to improve inspiration and expiration so that ventilation is adequate. Inclusion criteria for this case study include children aged 3-12 years, children experiencing signs of respiratory problems, children with medical diagnoses of pneumonia and bronchopneumonia, cooperative children and parents willing to be respondents. Meanwhile, the exclusion criteria used were children who had allergies to latex, children with mental retardation, congenital mouth and nose disorders, problems with the heart, kidneys and chest trauma, receiving other complementary therapy and children with post-oral surgery.

The results evaluation instrument looks at respiratory frequency and uses a clinical respiratory score (CRS) checklist sheet to see the results of pediatric patients' scores in the categories of mild (score <3), moderate (score 4-7) or severe (score 8-12) respiratory disorders. In the CRS instrument, respiratory rate, auscultation results, use of accessory muscles for breathing, consciousness, oxygen saturation and skin color are assessed by assessing a score of 0, 1 or 2 in the classification of each patient's condition. This sheet is used to assess the success of providing nursing care for three days to patients based on changes in the classification of respiratory disorders.

A process evaluation instrument to see improvements in the patient's breathing pattern, seen through the respiratory rate (RR) in the categories of normal, tachypnea and bradypnea which are grouped based on the age of children 3-6 years and children 6-12 years (Hafen & Sharma, 2022; Reenee, 2022). In the normal breathing category for children 3-6 years old it is 22-34 x/minute while in children 6-12 years it is 18-30 x/minute, the respiratory frequency in the tachypnea category in children 3-6 years old is >34 x/minute while in children 6-12 years >30 x/minute and respiratory frequency in the bradypnea category in children 3-6 years <22 x/minute while in children 6-12 years <18 x/minute.

Results and Discussions

The results of applying blowing balloon therapy to the 3 patients for 10-15 minutes over a period of 3 days were assessed in the morning, afternoon or evening, looking at the results of evaluating the respiratory frequency process and evaluating the results of assessing respiratory disorders. In patient An. A, aged 9 years 9 months and female, obtained the following results:

Table 1. Evaluation of Process and Results in An. A

Date	Process Evaluation (RR)		Evaluation of Results (Respiratory Disorders)	
	Before	After	Before	After
23/05/2023	RR: 23 x/minute (normal)	RR: 23 x/ minute (normal)	Mild respiratory distress (score 1)	Mild respiratory distress (score 1)
24/05/2023	RR: 22 x/ minute (normal)	RR: 22 x/ minute (normal)	Mild respiratory distress (score 1)	Mild respiratory distress (score 1)
25/05/2023	RR: 22 x/ minute (normal)	RR: 21 x/ minute (normal)	Mild respiratory distress (score 1)	Mild respiratory distress (score 1)

In the first case managed by An. A on the first day, May 23 2023, before being given the action and after being given the action, evaluate the child's RR process in the normal category and evaluate the results before the action is taken for the child in the category of mild respiratory disorders by showing a score of 1 in the RR category aged > 5 years. On the first day there was an increase in SaO₂ from previously 96% to 97%, crackles were still scattered on auscultation, chest and nostril retraction were absent, the child's consciousness was normal and the skin color was normal.

On the second day, May 24 2023, before the action was given and after the child was given an evaluation of the RR process in the normal category as well as an evaluation of the results before the action was taken the child was in the mild respiratory disorder category by showing a score of 1 in the RR category aged > 5 years. On the second day there was an increase in the previous SaO₂ from 95% to 95%, crackles were still scattered on auscultation, chest and nostril retraction were absent, the child's consciousness was normal and the skin color was normal. On the second day there were no significant changes.

On the third day, May 25 2023, before the action was given and after the action was given, evaluate the child's RR process in the normal category and evaluate the results before the action was taken for the child in the mild respiratory disorder category by

showing a score of 1 in the RR category aged > 5 years. However, on the third day there was a decrease in RR before 22 x/minute while after 21 x/minute and an increase in SaO₂ before 94% after 96%, crackles were still scattered on auscultation, chest and nostril retraction were absent, the child's consciousness was normal and the skin color was normal. Conclusions obtained from giving balloons for 3 days to An. A, there was a decrease in RR from 23 x/minute to 21 x/minute and the category for 3 days was mild respiratory problems. In patient An. AL, 4 years old, female, obtained the following results:

Table 2. Evaluation of Process and Results in An. AL

Date	Process Evaluation (RR)		Evaluation of Results (Respiratory Disorders)	
	Before	After	Before	After
27/05/2023	RR: 25 x /minute (normal)	RR: 25 x/ minute (normal)	Mild respiratory distress (score 0)	Mild respiratory distress (score 0)
28/05/2023	RR: 23 x/ minute (normal)	RR: 22 x/ minute (normal)	Mild respiratory distress (score 0)	Mild respiratory distress (score 0)
29/05/2023	RR: 22 x/ minute (normal)	RR: 21 x/ minute (normal)	Mild respiratory distress (score 0)	Mild respiratory distress (score 0)

In the case of the first management of An. AL on May 27 2023, the first day before the action was given and after the action was given, the child's RR process evaluation was in the normal category and the evaluation of the results before the child's action was carried out in the mild respiratory disorder category showed a score of 0. On the first day there was an increase in SaO₂ before 96% to 99% , on auscultation the rhonchi are still scattered, there is no retraction of the chest and nostrils, the child's consciousness is normal and the skin color is normal.

On the second day, May 28 2023, before the action was given and after the action was given, the child's RR process evaluation was in the normal category and the evaluation of the results before the child's action was carried out in the mild respiratory disorder category showed a score of 0. However, there was a decrease in the RR from 23 x/minute to 22 x / minute, and SaO₂ increased from 98% to 99%, crackles were still scattered on auscultation, chest and nostril retraction were absent, the child's consciousness was normal and the skin color was normal.

On the third day, May 29 2023, before being given action, the child's RR process evaluation was in the normal category after being given action into the bradypnea category. Meanwhile, evaluation of the results before and after the child's treatment in the category of mild respiratory problems showed a score of 0. There was a decrease in RR from 22 x/minute to 21 x/minute, and SaO₂ increased from 97% to 99%, crackles were still scattered on auscultation, chest and nostril retractions are absent, the child's consciousness is normal and the skin color is normal. Conclusions obtained from giving balloons for 3 days to An. AL, decreased RR from 25 x/minute to 21 x/minute and category for 3 days of mild respiratory disorders. In patient An. H, aged 5 years 8 months and male, obtained the following results:

Table 3. Evaluation of Process and Results in An. H

Date	Process Evaluation (RR)		Evaluation of Results (Respiratory Disorders)	
	Before	After	Before	After
30/05/2023	RR: 24 x /minute (normal)	RR: 23 x/ minute (normal)	Mild respiratory distress (score 1)	Mild respiratory distress (score 1)
31/05/2023	RR: 24 x/ minute (normal)	RR: 22 x/ minute (normal)	Mild respiratory distress (score 1)	Mild respiratory distress (score 1)
01/06/2023	RR: 21 x/ minute (normal)	RR: 20 x/ minute (normal)	Mild respiratory distress (score 1)	Mild respiratory distress (score 1)

In the case of the first management of An. H on May 30 2023, the first day before the action was given and after the action was given, evaluate the child's RR process in the normal category and evaluate the results before the child was taken in the mild respiratory disorder category by showing a score of 1. On the first day there was a decrease in the RR of 24 x/minute to 23 x/minute and SaO₂ increases before 96% to 99%, crackles are still scattered on auscultation, chest and nostril retraction are absent, the child's consciousness is normal and the skin color is normal.

On the second day, May 31 2023, before the action was given and after the action was given, the child's RR process evaluation was in the normal category and the evaluation of the results before the child's action was carried out in the mild respiratory disorder category showed a score of 1. However, there was a decrease in the RR from 24 x/minute to 22 x/minute, the SaO₂ increased from 96% to 99%, crackles were still scattered on auscultation, chest and nostril retraction were absent, the child's consciousness was normal and the skin color was normal.

On the third day, June 1 2023, before the action was given and after the action was given, evaluate the child's RR process in the bradypnea category and evaluate the results before the child was given action in the mild respiratory disorder category by showing a score of 1. There was a decrease in the RR from 21 x/minute to 20 x/ minutes, SaO₂ increased from 97% to 99%, crackles were still scattered on auscultation, chest and nostril retraction were absent, the child's consciousness was normal and the skin color was normal. Conclusions obtained from giving balloons for 3 days to An. H, decrease in RR from 24 x/minute to 20 x/minute and category for 3 days of mild respiratory disorders.

The results of the case study on the three managed patients who were observed and assessed for 3 days with nursing problems with ineffective breathing patterns carried out the application of innovative independent nursing actions using the balloon blowing technique. It was found that the patient's breathing pattern could be improved to become more regular by taking deep breaths and visible exhalations. from a decrease in respiratory frequency. And the responses from the three patients were very happy and enthusiastic when playing with balloons, always looking for time to play with balloons again, overcoming atraumatic care in pediatric patients.

According to WHO, the incidence of pneumonia can cause mortality in children. In 2019, 740,180 children aged < 5 years died due to pneumonia (WHO, 2014, 2022). Children aged 2-5 years are most commonly infected with the respiratory virus streptococcus pneumoniae, especially children aged 5-13 years are most often infected with mycoplasma pneumoniae (Ebeledike & Ahmad, 2023). The estimated number of pneumonia cases each year reaches 120 million (WHO, 2022). According to WHO (2022), pneumonia occurs in pre-school children because their immune system is not yet mature (WHO, 2020), while according to Ningrum (2019) in school-aged children, pneumonia can occur because there are several other factors besides immune system and recurrent pneumonia, it can also be caused by environmental factors and house conditions, according to research on ventilation area, wall type, humidity temperature and residential density (Ningrum, 2019).

The priority problem found in the three patients was ineffective breathing patterns caused by airway obstruction. Ineffective breathing patterns are ineffective ventilation exchange between oxygen and carbon dioxide (Mashudi, 2021; PPNI, 2016). The nursing problem of ineffective breathing patterns in cases of patients with pneumonia is a problem characterized by, this nursing problem is a priority because it has problems with the vital system, namely oxygenation, which has a very important role in regulating ventilation, the release of carbon dioxide and the entry of oxygen into the body, oxygen It is very necessary for metabolism, if oxygen is not met within 4 seconds then the tissue and cells in the brain can be damaged (Mashudi, 2021).

There was an increase in oxygen saturation in the case study results, this is in line with research by Nugroho *et al.* (2018) the balloon blowing activity carried out on 22 children aged 3-5 years had a significant effect on increasing oxygen saturation with a p value of 0.000 and according to Nugroho, balloon blowing play can be used to treat children with an atraumatic care approach, which is in line with the study In the third case of giving balloon blowing therapy, the patient looked enthusiastic and happy and always looked for the nurse who gave the balloon (Nugroho *et al.*, 2018).

Based on the results of the case study, in line with research by Kharvi *et al.* (2021) this balloon therapy affects oxygen saturation and respiratory frequency, because by inhaling and then exhaling you can clear the airways, expand the lung parenchyma, increase respiratory muscles, increase expiratory volume because the exhaled air lengthens, when the volume of the balloon is completely filled with when air is exhaled, the respiratory muscles also increase (diaphragm), so that as the ventilation cycle lengthens the contraction of the intercostal muscles increases.

There was a decrease in respiratory frequency in the results of the case study in line with the research of Raja & Arunachalam (2022). There was a significant difference in the change in respiratory frequency in 20 children aged 3-6 years with balloon therapy with a significant p value < 0.05 seen from the respiratory frequency before and after providing therapy (Raja & Arunachalam, 2022).

The results of the case study are in line with research by Yunica (2021), balloon blowing therapy is similar to breathing relaxation, which can increase the muscles in the intercostals and increase the elevation of the diaphragm and ribs. By blowing balloons, the lungs absorb oxygen and release more carbon dioxide from the lungs, becoming a training effort. breathing for the lungs by taking in and releasing air (Dwi *et al.*, 2020; Yunica, 2021).

Based on previous research, Tunik (2017) is in line with the results of the case study, because during this balloon blowing exercise it will release carbon dioxide trapped in the lungs during exhalation and enter oxygen into the blood during the inhalation phase, this balloon exercise also has an effect on oxygen saturation because it can increase ventilation. alveoli, maintain good gas exchange by removing air trapped in the alveoli so that oxygen saturation can increase (Dwi *et al.*, 2020; Oktaviani *et al.*, 2021; Tunik & Khoiriyati, 2017).

According to the author's assumption, this balloon blowing therapy affects the child's oxygenation status, especially on the oxygenation pattern because of the ventilation process where the inspiratory and expiratory phases are optimal, the release of CO₂ that is retained when inflating the balloon, the expiratory phase is prolonged so that CO₂ expenditure is optimal and during the inspiration phase, O₂ is absorbed. becomes better, intercostal muscle contraction increases causing ventilation in the alveoli to increase, breathing performance decreases so that the breathing pattern becomes regular.

Conclusions

For 3 days, the three patients showed a decrease in respiratory frequency with an average RR before the procedure of 24 x/minute and after the procedure of 21 x/minute, and the evaluation of the three patients included mild respiratory disorders. The results for 3 days saw an increase in oxygen saturation with an average of 96% for the three patients before the procedure and 98% after the procedure. The application of blowing balloon therapy is effective in improving breathing patterns, there are no obstacles to the implementation and this therapy can be continued in the pediatric inpatient room at the X Private Hospital, East Bekasi.

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