Magenda Bisma Yudha¹, Eko Wardoyo²

¹ Anesthesiology Nursing Undergraduate Program, Health Faculty, University of Harapan Bangsa
² Nursing Program, Health Faculty, University of Aisyah Pringsewu Lampung

LITERATURE REVIEW

ARTICLE HISTORY
Received: Mei 3, 2023
Revised: June 3, 2023
Accepted: July 27, 2023
DOI:10.1000.006/JNJ/2215

*Corresponding author:
(Write the full name, address and email of the corresponding author)
Magenda Bisma Yudha, S.Kep., Ns., M.Kep
Anesthesiology Nursing Undergraduate Program, Health Faculty, University of Harapan Bangsa, Indonesia Jl. Raden Patah, No. 100, Ledug, Kembaran, Banyumas, Indonesia.
Email: magendabismayudha@uhb.ac.id

Keywords: chest physiotherapy; respiratory rate; children; bronchopneumonia

Introduction:
Bronchopneumonia is an infection that affects the airways into the lungs. Mainly caused by bacterial infections, it can also be caused by viral and fungal infections. It is life-threatening in children, older adults, and other chronic immune compromised patients. Bronchopneumonia is more common in infants and young children. This is because their immune response is still not well developed. The most common bacteria in infants and children are Streptococcus Pneumoniae and Haemophilus Influenzae (Putri & Amalia, 2023).

The prevalence of bronchopneumonia is estimated to be nearly one-fifth of child deaths worldwide, with approximately 2 million children under five dying each year from pneumonia, mostly in Africa and Southeast Asia. The incidence of pneumonia in developing countries is 30-45% per 1000 children under 5 years of age, 16-22% per...
1000 children aged 5-9 years, and 7-16% per 1000 older children (Dicky & Wulan, 2017).

The coverage of pneumonia among children under five years old in Indonesia has fluctuated over the past 11 years. The highest was in 2016 at 65.3%. In 2015-2019, there was a change in the estimated number of cases from 10% to 3.55%, which led to high coverage in that year. In 2021, the national coverage of pneumonia in children under five was 31.4%, and the province has not yet reached the 65% discohidyaver target. The provinces with the highest under-five pneumonia coverage were East Java (50%), Banten (46.2%), and Lampung (40.6%) (Kemenkes RI, 2022).

The standard treatment that can be given to patients with pneumonia is chest physiotherapy. Chest physiotherapy can mobilize tracheobronchial secretions based on clinical parameters such as respiratory frequency and oxygen saturation (Oktaviani & Nugroho, 2022). Chest physiotherapy is divided into two, first by patting the chest wall or back with hands shaped like a bowl called percussion technique. Second, with manual compression and vibration techniques on the chest wall during the exhalation phase of breathing called vibration techniques (Musniati & Badrin, 2020).

Material and Methods:

This research uses the method literature study or literature review. The type in this study uses quasi-experimental type research and case studies whose data sources in this study are secondary data. International & National books, articles, and journals in the form of printed and non-printed data.

Literature search was conducted in 2018 - 2023. Literature search in this literature review using three databases with search engines namely Google Scholar, PubMed, and Garuda. Research journals that are found in accordance with the next words screen the titles and abstracts of the articles that have been obtained. Then, read the full text of the article and observe the articles to meet the inclusion and exclusion criteria. The inclusion criteria for this review were quasi-experimental research design or case study, sample age of children. The exclusion criteria for this review are articles that cannot be accessed, not full text, and articles with a literature review design.

Then, researchers created a special folder in Mendeley to store the articles obtained. Researchers filtered duplicate articles obtained from three databases. After the duplicate articles were removed, reviewers took steps to select the articles. The article search uses keywords and boolean operators (AND, OR, NOT) which are used to expand or limit the search. The keywords in this literature review are adjusted to the Medical Subject Heading (MeSH) consisting of:

<table>
<thead>
<tr>
<th>Databases</th>
<th>Search Statement</th>
<th>Total</th>
</tr>
</thead>
</table>
| Google Scholar | Bronchopneumonia AND Chest Physiotherapy  
Limit 5 years of publication (2018 - 2023)                                   | 465   |
| PubMed       | (((bronchopneumonia) OR (pneumonia)) AND (chest)) AND (physiotherapy)  
Limit 5 years of publication (2018 - 2023), free full text                   | 103   |
| Garuda       | Fisioterapi dada AND Bronkopneumonia  
Limit 3 years of publication (2020 – 2023)                                    | 5     |

Table 2. Search Statements in Each Database
Findings/Result

Figure 3 describes the process of selecting articles according to the Preferred Reporting Systematic Reviews and Meta-analysis (PRISMA) guidelines (Page et al., 2021). The initial search obtained articles with a total of 573 articles. After checking and removing duplicate articles, a total of 2 articles were obtained. Then, 571 articles were filtered. Furthermore, 551 articles were excluded because they did not match the title and abstract. After that, matching the title and abstract obtained 16 articles. Then checking again there were 8 articles that were excluded because they did not match the inclusion criteria of the researchers. Selected 8 articles that are eligible for inclusion in the review.

Figure 3. PRISMA 2020 Chart Diagram

Records identified from:
Databases:
PubMed (n = 103)
Google Scholar (n = 465)
Garuda (n = 5)
Total (n = 573)

Duplicate records removed (n = 2)

Records screened (n = 571)

Records excluded:
Not in accordance with the title and abstract (n = 551)

Reports assessed for eligibility (n = 16)

Studies included in review (n = 8)

Reports excluded:
Population not an children (n = 3)
Method is not appropriate (n = 5)

Reports sought for retrieval (n = 20)

Records not retrieved (n = 4)
<table>
<thead>
<tr>
<th>Author/Year</th>
<th>Title</th>
<th>Research Objectives</th>
<th>Research Design</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Subekti et al., 2023)</td>
<td>Application of Chest Physiotherapy to Improve Airway Clearance in Children with Pneumonia at RSUP Dr. Sardjito</td>
<td>Knowing the implementation of chest physiotherapy to improve airway clearance in pediatric patients with pneumonia</td>
<td>Observation, interviews, and case studies</td>
<td>Chest physiotherapy was given twice a day in the morning and evening for 6 days. Chest physiotherapy actions make many changes from (breathing patterns, breathing frequency, can remove phlegm, no shortness of breath)</td>
</tr>
<tr>
<td>(Lestari et al., 2018)</td>
<td>The combination of nebulization and chest physiotherapy improved respiratory status in children with pneumonia</td>
<td>Knowing the effectiveness of chest physiotherapy and nebulization on children’s respiratory status</td>
<td>Quasy experimental</td>
<td>There were significant differences in mean heart rate, respiratory rate, and oxygen saturation between the control and intervention groups (p = 0.000). Meanwhile, nebulization had No. effect on heart rate, respiratory rate, and oxygen saturation.</td>
</tr>
<tr>
<td>(Nurhayati et al., 2022)</td>
<td>Chest Physiotherapy to Overcome the Problem of Ineffective Airway Clearance in Patients with Bronchopneumonia</td>
<td>Provide nursing care to maintain a patent airway in patients with bronchopneumonia</td>
<td>Case study with nursing care approach</td>
<td>Evaluation of the implementation of nursing care plans using chest physiotherapy on the third day such as effective cough, sputum production, and breath sounds have improved.</td>
</tr>
<tr>
<td>(Azmy et al., 2022)</td>
<td>Analysis of Chest Physiotherapy Actions in Children at Bronchopneumonia and Airway Ineffectiveness: A Case Study</td>
<td>Describe nursing care for children experiencing bronchopneumonia with the nursing problem of ineffective airway clearance with chest physiotherapy.</td>
<td>Case study</td>
<td>The problem of airway clearance ineffectiveness is resolved with pulse, respiratory rate and oxygen saturation normalized.</td>
</tr>
<tr>
<td>(Astuti &amp; Dewi, 2020)</td>
<td>Application of Chest Physiotherapy to Respiratory Status in Children “A” With Bronchopneumonia</td>
<td>Knowing the respiration status and sputum discharge before and after the action</td>
<td>Case study</td>
<td>After chest physiotherapy treatment for 3 days, it was found that sputum discharge and respiration rate decreased.</td>
</tr>
<tr>
<td>(Pratiwi et al., 2023)</td>
<td>Application of Chest Physiotherapy in Overcoming Ineffective Airway Clearance in Children with Pneumonia</td>
<td>Knowing the results of chest physiotherapy to overcome ineffective airway clearance in children with pneumonia</td>
<td>Case study</td>
<td>Airway clearance before and after getting chest physiotherapy for 3 days obtained the results of the child can remove sputum, improved respiratory frequency,</td>
</tr>
</tbody>
</table>

Java Nursing Journal, Vol. 1, No. 1, 2023, ISSN: 2988-4152
Pneumonia at RSUD Dr. Moewardi Surakarta

<table>
<thead>
<tr>
<th>Author/Year</th>
<th>Title</th>
<th>Research Objectives</th>
<th>Research Design</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bauw &amp; Palupi, 2023</td>
<td>Chest Physiotherapy in Pneumonia Children on Airway Clearance</td>
<td>Helps improve ineffective airway clearance in children</td>
<td>Case study</td>
<td>Observation for 3 days obtained the effectiveness of the provision of chest physiotherapy</td>
</tr>
<tr>
<td>Sudirman, 2023</td>
<td>Analysis of Nursing Care in Bronchopneumonia Children with Nursing Problems of Ineffective Airway Clearance with Chest Physiotherapy Actions</td>
<td>Knowing nursing care for children with bronchopneumonia with ineffective airway clearance nursing problems</td>
<td>Case study</td>
<td>After taking nursing care measures for ineffective airway clearance, his cough began to decrease and he could cough up phlegm</td>
</tr>
</tbody>
</table>

**Literature Review Results**

Analysis of the results obtained in 8 articles states that the use and application of chest physiotherapy in overcoming respiratory rate and airway clearance problems in children has proven effective for removing sputum, diluting sputum, increasing breath sounds, pulse frequency and oxygen saturation increases within normal limits. In the study of Subekti et al (2023) entitled "Application of Chest Physiotherapy to Improve Airway Clearance in Children with Pneumonia at RSUP Dr. Sardjito". Chest physiotherapy was given twice a day in the morning and evening for 6 days. Chest physiotherapy actions make many changes from (breathing patterns, breathing frequency, can remove phlegm, no shortness of breath). Efforts to improve airway clearance with chest physiotherapy in pneumonia patients show that chest physiotherapy is effective in assisting pharmacological therapy in improving airway clearance.

Research Lestari et al (2018) entitled "The combination of nebulization and chest physiotherapy improved respiratory status in children with pneumonia" with the results of the analysis there were significant differences in mean heart rate, respiratory rate, and oxygen saturation between the control and intervention groups (p = 0.000). Meanwhile, nebulization had no effect on heart rate, respiratory rate, and oxygen saturation. This study can be considered for inclusion in hospital guidelines to encourage nurses to perform nebulization followed by chest physiotherapy.

Research Nurhayati et al (2022) entitled "Chest Physiotherapy to Overcome the Problem of Ineffective Airway Clearance in Patients with Bronchopneumonia". The results showed that the evaluation of the implementation of nursing care plans using chest physiotherapy on the third day such as effective cough, sputum production, and breath sounds had improved. Research Azmy et al (2022) entitled "Analysis of Chest Physiotherapy Actions in Children with Bronchopneumonia and Airway Ineffectiveness Problems: A Case Study". The results of his research stated that the problem of airway clearance
ineffectiveness was resolved with the criteria of pulse frequency, respiratory frequency, and oxygen saturation being normal. The client's response to chest physiotherapy (clapping) and inhalation showed that the problem of ineffective airway clearance was resolved, which was characterized by the child's breathing becoming easy, regular breathing rhythm, stable hemodynamics, and hospitalization time became faster.

Research Astuti & Dewi (2020) with the title "Application of Chest Physiotherapy to Respiratory Status in children “A” with Bronchopneumonia". The results showed that after chest physiotherapy treatment for 3 days, sputum discharge was obtained, and the respiration rate decreased. Research Pratiwi et al (2023) with the title "Application of Chest Physiotherapy in Overcoming Ineffective Airway Clearance in Children with Pneumonia at DR Moewardi Surakarta Hospital". The results showed that airway clearance before and after getting chest physiotherapy for 3 days obtained results in both patients, namely the child could remove sputum, breathing frequency improved, pulse frequency remained at normal limits, and oxygen saturation increased.

Research Bauw & Palupi (2023) entitled "Chest Physiotherapy in Pneumonia Children on Airway Clearance". The results of his research stated that the intervention and observation of chest physiotherapy in children with pneumonia for 3 days obtained the effectiveness of chest physiotherapy. Research Sudirman (2023) entitled "Analysis of Nursing Care in Bronchopneumonia Children with Nursing Problems of Ineffective Airway Cleansing with Chest Physiotherapy Action". The results of the study explained that after taking nursing care actions in bronchopneumonia children with a focus on ineffective airway clearance, both children began to cough less and easily spit out their sputum.

**Discussions**

A review of 8 articles showed that the application of chest physiotherapy to children with pneumonia and bronchopneumonia with ineffective airway clearance was shown to reduce the incidence of coughing, relieve sputum discharge, make respiratory frequency, pulse frequency, and oxygen saturation increase within normal limits.

Chest physiotherapy is the action of postural drainage, percussion and vibration on the chest which is a way to enlarge client efforts and improve lung function (Astuti & Dewi, 2020). The purpose of this therapy is to clean the airway, mechanically release secretions attached to the bronchial wall and maintain the function of the respiratory muscles (Marini, 2020). Chest physiotherapy is very useful for children with lung disease both acute and chronic, very effective in removing secretions and improving ventilation in clients with impaired lung function (Nurhayati et al., 2022).

According to research Tehupeiory & Sitorus (2022) Chest physiotherapy was given to the three patients and given for 3 x 24 hours and each action was carried out for approximately 10 - 15 minutes. Patients 1 and 3 experienced significant changes after being given chest physiotherapy, namely secretions easily came out so that there was no more sputum production and accumulation of secretions. In patient 2 there were no significant changes, because the intensity of chest physiotherapy was not continuous, and the patient was not cooperative. This is in line with research
Hidayatin (2019) that the longer the intervention is carried out, the more visible the changes in airway clearance will be.

According to the results of literature review research Salsabila (2022) chest physiotherapy is proven to help clear the airway, reduce mucus or sputum, improve gas exchange, and reduce the work of breathing. Research from Polapa et al (2022) also concluded that there was a significant effect of the application of chest physiotherapy on hemodynamic status and oxygen saturation in children with pneumonia. In line with research Maisyaroh et al (2020) Chest physiotherapy has a significant effect on the respiration status of toddlers with ineffective airway clearance problems. The measurements were taken pre and posttest after a minimum of two hours of intervention. In line with research Chaves et al (2019) a systematic review study conducted on chest physiotherapy in children performed for 10-30 minutes with administration once a day for two days can reduce clinical symptoms of pneumonia.

According to research results Wardiyah et al (2022) there was an improvement in the value of respiration before and after the chest physiotherapy intervention with airway clearance obtained an average value of 4x/minute difference, indicating that chest physiotherapy has the effect of removing sputum. Research Azahra (2022) the results of his research showed the results of both subjects, namely the difference in response before and after the chest physiotherapy intervention. This means that the application of chest physiotherapy in children can provide improvements in the status of temperature, pulse, respiration, SaO2, ronkhi, secretions, cough within normal limits. In line with research Turochman & Nuhan (2022) chest physiotherapy is effective and beneficial in improving airway clearance in pre-school children with pneumonia cases.

Limitations and Future Research
In this review, there is no mention of effective chest physiotherapy and there is not much discussion on bronchopneumonia. In the future, it is hoped that future researchers can conduct research related to chest physiotherapy in bronchopneumonia cases and the amount of time needed to achieve effective chest physiotherapy so that airway clearance is resolved, and respiratory status improves.

Conclusion
Based on the review of several articles that have been reviewed, it can be concluded that the application of chest physiotherapy in children with bronchopneumonia or pneumonia is proven to stabilize hemodynamic status such as pulse frequency, respiratory rate frequency, oxygen saturation within normal limits, and can remove secretions, sputum, and reduce cough frequency.

Acknowledgments
Eko Wardoyo, Nursing Program, Faculty of Health, University of Aisyah Pringsewu Lampung as the second reviewer and University of Harapan Bangsa.

References


updated guideline for reporting systematic reviews. *The BMJ*, 372. https://doi.org/10.1136/bmj.n71


