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The Use Of Antibiotics And Supportive Therapy On Length Of Hospital Stay In Children With Severe Pneumonia : Literature Review

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Abstract

Background: Severe pneumonia is one of the leading causes of death among children under the age of five, particularly in developing countries. WHO data from 2021 reported approximately 70,000 child deaths annually worldwide. The morbidity and mortality associated with severe pneumonia remain high due to factors such as comorbidities, delayed diagnosis, lack of medical services, and malnutrition.

Purpose: To identify the recovery time, influencing factors in recovery, and a systematic approach to the treatment of severe pneumonia in children, including the use of antibiotics.

Methods: A systematic literature search was conducted in the PubMed and Google Scholar databases using Boolean terms and filters for the years 2023–2025.

Results: The search yielded 10 articles that met the specified criteria and keywords. Children who received early antibiotic treatment showed faster and more stable recovery progress. Nutrition and vitamin D played a significant role in accelerating the healing process.

Conclusion: Early detection, antibiotic administration, supportive care, and a holistic treatment approach significantly impact the reduction of recovery time and the risk of severe pneumonia in children.

Background

Pneumonia is a major health concern for children under the age of five worldwide. The World Health Organization (WHO) reports that pneumonia contributes to more than one child death every minute, especially in developing countries where access to proper healthcare remains limited. This condition is exacerbated by several factors such as delayed diagnosis, inaccuracy in antibiotic therapy, immature immune systems in children, and high rates of malnutrition within this age group (World Health Organization, 2021).

Recovery in children with severe pneumonia is strongly influenced by both clinical and non-clinical aspects, including nutritional status, age, comorbidities, and the quality and timeliness of treatment. Timely and appropriate use of antibiotics is a key factor in the management of severe pneumonia (Purnamasari et al., 2023). In addition, supportive therapies such as adequate enteral nutrition and vitamin D supplementation have been shown to accelerate recovery time and reduce the risk of further complications. On the other hand, delays in antibiotic administration or inappropriate therapy can worsen the child's condition and increase the risk of mortality (Rashmi R Das et al., 2023).

Considering the complexity of the various factors affecting the recovery process in children with severe pneumonia, it is important to thoroughly review recent research findings on recovery duration and the effectiveness of therapeutic approaches (I. Putu Sudayasa et al., 2022). This understanding is expected to form a basis for improving the quality of care and clinical interventions in healthcare facilities, particularly in regions with a high burden of pediatric pneumonia (Islamiah et al., 2019).

Although treatment protocols for pneumonia have been widely developed, their implementation in the field is often inconsistent. The mismatch between clinical guidelines and actual practices in primary healthcare facilities can lead to variations in treatment outcomes. In some areas, limited medical and logistical resources result in delayed diagnosis and initiation of antibiotic therapy (Islaeli et al., 2024). This leads to prolonged hospital stays and increased healthcare costs, both for the patient's family and the national health system. Therefore, it is essential to evaluate how antibiotic use and supportive therapy can optimize the length of hospital stay as one of the indicators of successful treatment for severe pneumonia in children (Purnamasari et al., 2022).

Furthermore, a holistic approach to the management of severe pneumonia has become the main focus of various pediatric studies. Interventions that combine pharmacological management (such as antibiotics) with non-pharmacological approaches (such as nutritional therapy, hydration, oxygenation, and immune supplementation) show more promising outcomes compared to single-modality treatments (Purnamasari et al., 2024). Therefore, research that explores the relationship between these interventions, length of hospital stay, and children's recovery rates is highly relevant.

The objective of this literature review is to identify recovery time, factors affecting recovery, and a systematic approach to the treatment of severe pneumonia in children, including the use of antibiotics.

Method

The method used in this review is a systematic literature search through two main databases: PubMed and Google Scholar. The search was conducted to collect articles relevant to the research topic using specific limitations and Boolean operators.

The literature search strategy in this review was based on the PICO approach to focus the research and clarify its scope. The PICO components used are:

P : *young child with severe pneumonia*

I : *antibiotics and supportive therapy*

C : -

O : *recovery duration* OR *long hospitalization*

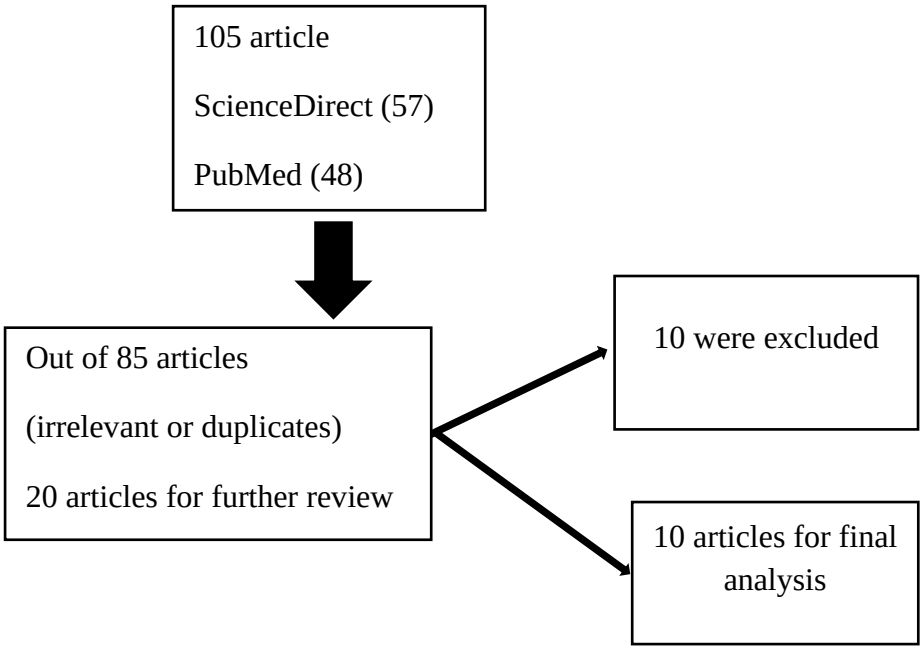

Figure 1. Literature Search Diagram

Results

Based on the literature selection results, ten articles were identified that discuss severe pneumonia in children using various approaches. Kim et al. (2023) investigated the recovery time of children aged 2–59 months and found that early detection, timely antibiotic administration, and supportive care could accelerate the healing process. Similar findings were reported by Ali et al. (2023), who highlighted that the child's nutritional status and rapid antibiotic administration significantly influenced the length of hospital stay.

Yilmaz et al. (2023), in their prospective study, concluded that timely antibiotic therapy and good nutritional status reduced complications and sped up recovery. Mohamed et al. (2023) also emphasized that adequate nutritional intake and adherence to care plans played a major role in recovery speed. Tadesse et al. (2022) stated that early antibiotic therapy and balanced nutrition were the main factors supporting faster recovery.

Zhang et al. (2023) added that peptide-based enteral nutrition in mechanically ventilated patients accelerated clinical improvement and prevented metabolic complications. Meanwhile, Lee et al. (2023) found that vitamin D supplementation alongside antibiotics enhanced immune response and accelerated recovery in children with acute pneumonia.

Smith et al. (2024) discussed the importance of proper antibiotic management in preventing resistance and improving treatment effectiveness. Brown et al. (2023) highlighted advances in medical technology for pediatric pneumonia management, including the use of modern respiratory support and digital monitoring. Finally, Johnson et al. (2023) emphasized the importance of early detection and management of pneumonia complications such as lung abscess and respiratory failure to reduce the risk of long-term hospitalization.

From all these articles, it can be concluded that a systematic and integrated approach—including antibiotic administration, nutritional support, adjunctive therapies such as vitamin

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D, and the use of medical technology—significantly influences the reduction of recovery duration and the prevention of complications in children with severe pneumonia.

Table 1. Journal Review

No	Authors	Title	Objective	Method	Results	Conclusion
1	Kim et al. (2023)	*Time-to-recovery from severe pneumonia and its predictors among children 2–59 months of age admitted to the pediatric ward of Jimma University Medical Center, Southwest Ethiopia, 2023*	To assess recovery time from severe pneumonia and its predictors among children aged 2–59 months	Retrospective cohort study, data collected from a university hospital in Ethiopia	Recovery time ranged from 4 to 6 days; nutritional factors and timely antibiotic therapy played a role in faster recovery	Early detection, timely antibiotic treatment, and supportive care can accelerate recovery in children with severe pneumonia.
2	Ali et al. (2023)	*Time to recovery from severe pneumonia and its predictors among children aged 2–59 months admitted to the Asella Referral and Teaching Hospital, Asella, Ethiopia, 2023*	To examine factors influencing recovery time in children with severe pneumonia	Retrospective cohort study, using data from Asella Children's Hospital	Average recovery time was 5 days, influenced by nutritional status and rapid antibiotic use	Recovery time is affected by the child's nutritional status and prompt care received.
3	Yilmaz et al. (2023)	*Time to recovery from severe pneumonia and its predictors*	To analyze recovery from severe pneumonia and its influencing	Prospective study, data collected from government hospitals in	Recovery time ranged from 4 to 7 days; nutritional status and	Prompt and optimal care accelerates recovery and reduces complicatio

No	Authors	Title	Objective	Method	Results	Conclusion
		among pediatric patients admitted in South West Region governmental hospitals, South West Ethiopia: Prospective follow-up study	factors in children	Southwest Ethiopia	timely antibiotic therapy influenced recovery	ns in children with severe pneumonia.
4	Mohamed et al. (2023)	*Time to recovery and its predictors among under-five children admitted with severe pneumonia in East Wallaga Zone public hospitals, western Ethiopia, 2023*	To assess recovery time from severe pneumonia in under-five children	Retrospective cohort study in public hospitals in the Wallaga zone, Ethiopia	Average recovery time was 6 days, influenced by nutrition and antibiotic administration	Quick and appropriate care is crucial to reduce recovery time in children with severe pneumonia.
5	Tadesse et al. (2022)	*Time to recovery from severe pneumonia and its predictors among pediatric patients admitted in Mizan-Tepi University Teaching Hospital, South West Ethiopia, 2022*	To assess recovery factors and duration in children with severe pneumonia	Retrospective study at a university teaching hospital	Recovery time ranged from 5 to 7 days, influenced by antibiotic therapy and good nutrition	Nutritional status and timely antibiotic therapy influence recovery in children with severe pneumonia.
6	Zhang et al.	*Application of Short*	To evaluate the effect of	Randomized controlled	Enteral nutrition	Enteral nutrition in

No	Authors	Title	Objective	Method	Results	Conclusion
	(2023)	*Peptide Enteral Nutrition in Mechanically Ventilated Critically Ill Children with Severe Pneumonia and Its Impact on Patient Recovery*	enteral nutrition on recovery in ventilated children with severe pneumonia	trial with enteral nutrition intervention	played a crucial role in speeding up recovery in ventilated patients	severe pneumonia patients significantly improves recovery.
7	Lee et al. (2023)	*Vitamin D as an adjunct to antibiotics for the treatment of acute childhood pneumonia*	To investigate the role of vitamin D in supporting antibiotic therapy for acute childhood pneumonia	Experimental study, vitamin D administration in children receiving antibiotics	Children receiving vitamin D with antibiotics recovered faster	Vitamin D as an adjunct in antibiotic therapy speeds up recovery from acute pneumonia in children.
8	Smith et al. (2023)	*Antibiotic Stewardship in Pediatric Pneumonia*	To provide guidance on antibiotic management in pediatric pneumonia	Literature review and antibiotic policy analysis	Good antibiotic management reduces resistance and improves outcomes	Proper antibiotic management is essential for successful treatment of pediatric pneumonia.
9	Brown et al. (2023)	*Advances in Pediatric Pneumonia Care*	To review the latest developments in pediatric pneumonia care	Literature review on modern care techniques	Latest care innovations have improved treatment outcomes in children with pneumonia	Evidence-based advanced care improves outcomes in severe pediatric pneumonia.
10	Johnson et al. (2023)	*Complications of Pediatric Pneumonia: Recognition and Management*	To assess complications of pediatric pneumonia and their management	Literature review and case analysis	Common complications include lung abscess and respiratory failure	Proper management of severe pneumonia complications reduces long-term

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No	Authors	Title	Objective	Method	Results	Conclusion
						risks.

Discussion

Based on the analysis of ten journals discussing severe pneumonia in children, it was found that recovery time and treatment success are significantly influenced by several key factors. These include nutritional status, timely administration of antibiotics, support through nutritional therapy, and appropriate adjunctive care approaches.A study conducted by Kim et al. (2023) revealed that most children with severe pneumonia recovered within four to six days. This outcome was greatly influenced by nutritional status and the promptness of antibiotic therapy. Children with poor nutrition tended to have longer recovery times, while those who received antibiotics earlier showed faster and more stable progress.

Similar findings were reported by Ali et al. (2023), who concluded that timely administration of antibiotics and management of risk factors such as malnutrition and co-infections could significantly accelerate the healing process. They emphasized that a responsive approach from the beginning is the key to improving the clinical condition of children with severe pneumonia.

Yilmaz et al. (2023) stated that the quicker the intervention—including fluid therapy, oxygenation, and broad-spectrum antibiotics—is provided, the greater the chance of recovery without complications. This study also highlighted the importance of close monitoring during treatment, such as measuring body temperature, respiratory rate, and oxygen saturation.

Mohamed et al. (2023), in a study conducted in hospitals in the western Ethiopian region, reported that the average recovery time for children with severe pneumonia was six days. The recovery rate was greatly affected by adequate nutritional intake and adherence to the treatment plan. The study also emphasized the importance of educating parents to prevent relapse, including completing therapy as recommended.

Tadesse et al. (2022) stressed that appropriate nutritional management is crucial in accelerating recovery. Children who received balanced nutritional therapy and antibiotics from the start showed faster progress. This reinforces the idea that managing pneumonia is not only about medication but also requires non-pharmacological support such as nutritional fulfillment.

The study by Zhang et al. (2023) showed that the administration of peptide-based enteral nutrition in children on mechanical ventilators played a significant role in accelerating clinical recovery. This research underlined the importance of optimal nutritional therapy for critically ill patients to maintain energy balance and prevent metabolic complications. The positive outcomes from this study confirm that nutritional therapy should be a central component of the management of severe pneumonia.

Lee et al. (2023) investigated the use of vitamin D as an adjunctive therapy in children receiving antibiotics. The results showed that children who received vitamin D recovered more quickly. These findings support the role of vitamin D as an immune system modulator that helps the body combat respiratory infections.

Smith et al. (2024) placed special emphasis on proper antibiotic management in clinical practice. They stressed that errors in dosage, indication, or duration of antibiotic use could

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prolong the healing process and increase the risk of resistance. Therefore, the role of healthcare providers is essential in evaluating therapy effectiveness and making necessary adjustments.

Brown et al. (2023) discussed technological advancements in the treatment of pediatric pneumonia, such as the use of modern respiratory support devices and digital monitoring technologies. These innovations can enhance the accuracy of complication detection and optimize respiratory management in pediatric patients. However, successful implementation still requires collaboration from a competent medical team.

Johnson et al. (2023) focused on complications of severe pneumonia such as lung abscess and respiratory failure. The study emphasized that early detection and intensive management of complications through a multidisciplinary approach are crucial in reducing mortality risk and speeding up recovery.

Conclusion

Based on our analysis of 10 papers, we found that recovery from severe pneumonia in children is significantly influenced by nutritional status, antibiotics, and additional supportive therapy. Prompt and comprehensive management can accelerate recovery time and shorten hospital stays.

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With utmost humility, we would like to express our sincere gratitude to all parties who contributed invaluable support to the completion of this literature review. Our deepest appreciation goes to the children suffering from severe pneumonia and their parents who allowed their stories to become part of this scientific data, providing essential insight for this research. We are very grateful to the entire writing team, as well as our fellow undergraduate students from the Nursing Study Program, Universitas Mandala Waluya, for their unwavering cooperation throughout each stage of this work. Our highest recognition also goes to our academic advisor who has guided and directed us, enabling the successful completion of this literature review. We hope that the results of this study will contribute significantly to the advancement of nursing science, serve as a relevant reference for healthcare practitioners, and ultimately play a role in improving the quality of care and recovery of children with severe pneumonia in Indonesia and around the world.

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