

Empowering Family Caregivers Through Airway Clearance Education for Children with Bronchopneumonia

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ABSTRACT

Background: Bronchopneumonia in young children may be accompanied by excessive airway secretions, dyspnea, tachypnea, and ineffective airway clearance. Family caregivers require adequate knowledge and practical skills to recognize respiratory problems, provide basic airway-clearance support, and identify conditions requiring professional healthcare.

Objectives: This community service program aimed to improve family caregivers' knowledge and practical skills in supporting airway clearance and recognizing respiratory danger signs in children with bronchopneumonia.

Methods: The program involved 30 family caregivers and was implemented through assessment, education, demonstration, guided practice, return-demonstration, feedback, and post-program evaluation. Educational activities addressed respiratory danger signs, airway-clearance support, semi-Fowler positioning, sputum observation, safe nebulizer preparation and mask placement, device hygiene, and indications for seeking professional care. Program outcomes were evaluated using pre- and post-program knowledge assessments and practical skills checklists.

Results: The mean knowledge score increased from 54.7 to 87.7. The proportion of caregivers correctly demonstrating essential inhalation-therapy and airway-support skills increased from 30.0% to 90.0%, while correct recognition of respiratory danger signs increased from 43.3% to 93.3%.

Conclusions: Structured education combined with demonstration and return-demonstration improved caregivers' knowledge and practical competencies. Caregiver education may support safer home respiratory care while reinforcing appropriate use of professional healthcare services.



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Introduction

Pneumonia remains an important cause of preventable morbidity and mortality among children worldwide, particularly in those younger than five years. The World Health Organization continues to identify pneumonia as a major child-health concern and emphasizes early recognition, appropriate treatment, immunization, adequate nutrition, and timely access to healthcare as essential components of prevention and management (World Health Organization [WHO], 2024). Despite substantial progress in reducing childhood pneumonia mortality, the burden remains disproportionately concentrated in low- and middle-income countries. Global analyses have also identified Indonesia as one of the countries contributing considerably to the burden of pneumonia among young children (McAllister et al., 2019).

In Indonesia, pneumonia continues to represent an important public-health problem among children. National child-health programs emphasize early recognition of respiratory symptoms, appropriate case management, immunization, adequate nutrition, and reduction of exposure to respiratory risk factors, particularly tobacco smoke. Respiratory symptoms such as cough, rapid breathing, difficulty breathing, and lower chest-wall indrawing require particular attention because delayed recognition may contribute to late presentation at health facilities. These conditions highlight the importance of strengthening not only clinical services but also the capacity of families to recognize respiratory problems and respond appropriately.

Bronchopneumonia may produce inflammation of the bronchioles and surrounding alveolar tissue, resulting in increased secretion production and impaired airway clearance. Children may consequently experience cough, dyspnea, tachypnea, restlessness, abnormal breath sounds, and difficulty clearing airway secretions. Younger children may be especially vulnerable because their smaller airways and limited ability to expectorate secretions can contribute to airway obstruction. Contemporary pediatric pneumonia management therefore requires assessment of respiratory rate, respiratory effort, oxygenation, airway secretions, clinical severity, and the child's overall condition (Chee et al., 2022; Rees et al., 2023; Meyer Sauter, 2024; Yun, 2024).

The clinical foundation used in developing this community service program demonstrated the relevance of airway-clearance problems in children with bronchopneumonia. The source nursing documentation identified children presenting with dyspnea, cough, thick secretions, increased respiratory rates, and additional respiratory sounds, with ineffective airway clearance identified as the priority nursing problem. The same clinical documentation also emphasized respiratory monitoring, sputum observation, semi-Fowler positioning, oxygen support when indicated, and inhalation therapy as components of airway management. These findings were used as a clinical basis for developing caregiver-oriented education rather than as outcome data for the community service program.

Family caregivers have a particularly important role in pediatric respiratory care because young children depend heavily on parents or other family members for observation, comfort, adherence to treatment, environmental management, and decisions regarding healthcare seeking. However, caregivers may have insufficient knowledge about pneumonia, respiratory danger signs, airway secretions, and appropriate supportive care. Evidence from Indonesia has demonstrated gaps in family caregivers' knowledge and healthcare-seeking behavior for childhood pneumonia, indicating the need for structured and contextually appropriate education (Purwati et al., 2021).

The need for caregiver education was also supported by the clinical source used in program development. During initial respiratory monitoring, caregivers were able to recognize the presence of sputum but had difficulty identifying signs of respiratory infection and additional breath sounds. Subsequent nursing interactions documented improvement in caregivers' ability to recognize respiratory infection signs and their participation in semi-Fowler positioning. This experience suggested that repeated education and practical participation could be developed into a more structured caregiver-empowerment program.

Family-centered education is consistent with contemporary pediatric care, which encourages information sharing, partnership, and appropriate parental participation. A systematic review by Hodgson et al. (2024) showed that family-centered interventions for hospitalized children commonly incorporate parent education, shared information, and active involvement in care. Similarly, educational preparation for caregivers frequently emphasizes symptom recognition, practical skills, and appropriate management of healthcare technology when families are expected to participate in ongoing care (High et al., 2022).

Inhalation therapy represents one area in which caregiver knowledge and practical competence are particularly important. Nebulizer therapy requires appropriate equipment preparation, child positioning, correct mask or mouthpiece placement, supervision during aerosol administration, and adequate cleaning of the equipment after use. The clinical procedure underlying this program included explanation of the intervention to the family, preparation of nebulizer equipment, appropriate positioning, mask placement, supervised inhalation, evaluation of the child's response, and cleaning of the device after use. Nevertheless, caregiver education regarding inhalation therapy should focus on safe implementation of professionally prescribed treatment and should not encourage independent selection of medication, dosage adjustment, or changes in treatment frequency.

Environmental risk reduction is also relevant to caregiver education. The clinical source documented tobacco-smoke exposure within one family, illustrating the importance of addressing household respiratory irritants as part of family education. Research conducted in Eastern Indonesia has similarly demonstrated that parents may understand some of the harmful effects of tobacco smoke on children but encounter difficulties in reducing exposure within the household (Danal et al., 2021). Strengthening caregiver awareness regarding smoke-free environments can therefore complement education on symptom recognition and airway-support practices.

Health education is more likely to produce practical competency when it includes active skills training rather than information delivery alone. Demonstration provides caregivers with a clear model of the procedure, guided practice allows immediate correction, and return-demonstration enables facilitators to determine whether participants can independently perform the essential steps. This educational approach is particularly relevant for airway-support and inhalation-therapy procedures, where incorrect technique may reduce the quality and safety of care.

Therefore, this community service program was developed using a structured sequence of assessment, education, demonstration, guided practice, return-demonstration, feedback, and post-program evaluation. The program aimed to improve family caregivers' knowledge and practical skills in supporting airway clearance and to strengthen their ability to recognize respiratory danger signs in children with bronchopneumonia.

Methods

Program Design/Approach

This community service program used a health education and skills-training approach to strengthen family caregivers' knowledge and practical competencies in supporting airway clearance among children with respiratory problems. The educational process followed seven sequential stages:



The program emphasized active participation. Caregivers were not only provided with information but were also given opportunities to observe procedures, practice under facilitator supervision, demonstrate the skills independently, and receive corrective feedback.

Target Population

The community service program involved 30 family caregivers responsible for caring for children with respiratory problems. Participants were parents or family members directly involved in daily childcare and willing to participate in the educational and practical activities. Participants were expected to be able to communicate effectively, follow instructions, and participate in practical demonstrations.

Needs Assessment

Needs assessment was conducted before the educational intervention using discussion, observation, and baseline assessment of caregivers' knowledge and practical skills. The assessment focused on caregivers' understanding of childhood respiratory problems, respiratory danger signs, sputum observation, basic airway-clearance support, semi-Fowler positioning, nebulizer preparation, mask placement, equipment hygiene, and situations requiring professional healthcare.

The baseline assessment indicated that several caregivers had limited understanding of respiratory danger signs and demonstrated incomplete skills in airway-support and inhalation-therapy procedures. These findings supported the need for a structured educational and practical training program.

Community Service Intervention

During the **education stage**, caregivers received information regarding bronchopneumonia, airway-secretions accumulation, common respiratory symptoms, respiratory danger signs, basic airway-support measures, and indications for seeking professional healthcare. Caregivers were taught to observe signs such as breathing difficulty, rapid breathing, worsening cough, excessive secretions, reduced activity, feeding difficulty, cyanosis, and deterioration in the child's general condition.

The education also included supportive airway-clearance measures. Caregivers were introduced to semi-Fowler positioning as a supportive position that may promote comfort and facilitate breathing when clinically appropriate. The facilitator subsequently explained the principles of inhalation therapy. Caregivers were informed that nebulized medications should only be administered according to healthcare-professional instructions. The educational content focused on safe device use rather than medication prescribing.

During the demonstration stage, the facilitator demonstrated preparation of the nebulizer equipment, appropriate child positioning, correct placement of the mask, supervision during therapy, completion of the procedure, and post-use equipment cleaning. During guided practice, caregivers performed the procedures under facilitator supervision. Verbal cues and direct correction were provided when inappropriate steps were observed. During return-demonstration, caregivers independently demonstrated the essential airway-support and inhalation-therapy procedures. A structured checklist was used to assess competency. During the feedback stage, facilitators reinforced correct performance, corrected remaining procedural errors, answered questions, and emphasized respiratory danger signs requiring professional healthcare. The final stage consisted of post-program evaluation of knowledge, practical skills, and recognition of respiratory danger signs.

Table 1. Components of the Community Service Program

Component	Main Content	Educational Strategy	Expected Competency
Assessment	Knowledge and baseline respiratory-care skills	Questionnaire and observation	Identify caregiver learning needs
Education	Bronchopneumonia, airway secretions, danger signs	Health education and discussion	Understand respiratory problems
Airway support	Semi-Fowler positioning and sputum observation	Demonstration	Provide basic supportive care

Inhalation therapy	Purpose and safe use of nebulizer	Explanation	Understand appropriate device use
Demonstration	Equipment preparation, positioning, mask placement, hygiene	Facilitator demonstration	Observe correct procedure
Guided practice	Supervised caregiver practice	Coaching	Perform procedural steps
Return-demonstration	Independent performance	Skills checklist	Demonstrate competency
Feedback	Correction and reinforcement	Individual feedback	Improve accuracy and confidence
Evaluation	Knowledge, practical skills, and danger signs	Post-test and checklist	Demonstrate program outcomes

Instruments and Program Evaluation

Program evaluation focused on three outcome domains: knowledge, practical skills, and recognition of respiratory danger signs. Knowledge was evaluated using a structured questionnaire covering childhood respiratory problems, airway secretion management, respiratory danger signs, semi-Fowler positioning, inhalation therapy, nebulizer hygiene, and appropriate healthcare-seeking behavior. Scores were converted to a 0–100 scale. Practical competency was evaluated using an observational checklist. The checklist included equipment preparation, appropriate positioning, correct mask placement, supervision during inhalation therapy, completion of the procedure, and appropriate equipment cleaning and storage. Recognition of respiratory danger signs was assessed using structured questions and clinical scenarios. Participants were categorized as correctly recognizing danger signs when they were able to identify major signs requiring professional healthcare assessment.

Data Collection

Data collection consisted of baseline assessment, implementation of the educational intervention, and post-program evaluation. Before the program, caregivers completed the knowledge assessment, practical skills assessment, and respiratory danger-sign recognition assessment. Following education and demonstration, participants completed guided practice and return-demonstration. Facilitators provided immediate corrective feedback. At the end of the program, participants repeated the knowledge assessment and were reassessed using the same practical skills and danger-sign recognition domains.

Data Analysis

Program outcomes were analyzed descriptively. Mean scores were used to summarize caregiver knowledge, while frequencies and percentages were used to describe practical competency and respiratory danger-sign recognition. Absolute differences between pre-program and post-program values were calculated. No claims of statistical significance were made because inferential statistical analysis was not included in the program evaluation.

Results

Program Implementation

A total of 30 family caregivers participated in and completed all components of the community service program, including assessment, education, demonstration, guided practice, return-demonstration, feedback, and post-program evaluation. Caregivers actively participated in discussions and practical activities addressing respiratory symptoms, airway secretions, respiratory danger signs, semi-Fowler positioning, inhalation therapy, and equipment hygiene.

Changes in Caregiver Knowledge

The mean knowledge score increased from 54.7 before the program to 87.7 after the program, representing an absolute improvement of 33.0 points.

Table 2. Caregiver Knowledge Before and After the Program

Indicator	Pre-program	Post-program	Absolute Change
Mean knowledge score	54.7	87.7	+33.0

The improvement reflected greater understanding of respiratory symptoms, airway-clearance support, nebulizer use, device hygiene, respiratory danger signs, and appropriate healthcare-seeking behavior.

Changes in Practical Skills

Before the intervention, 30.0% of caregivers correctly demonstrated the essential airway-support and inhalation-therapy procedures. Following education, demonstration, guided practice, return-demonstration, and feedback, this proportion increased to 90.0%, representing an improvement of 60.0 percentage points.

Table 3. Practical Skills Before and After the Program

Indicator	Before Program	After Program	Absolute Change
Correct airway-support and inhalation-therapy skills	30.0%	90.0%	+60.0 percentage points

Post-program evaluation showed improvement in equipment preparation, child positioning, mask placement, supervision during inhalation therapy, and equipment hygiene.

Changes in Respiratory Danger-Sign Recognition

Before education, 43.3% of caregivers correctly recognized major respiratory danger signs. Following the intervention, this proportion increased to 93.3%, representing an improvement of 50.0 percentage points.

Table 4. Recognition of Respiratory Danger Signs

Indicator	Before Program	After Program	Change
Correct recognition of respiratory danger signs	43.3%	93.3%	+50.0 percentage points

Following education, most caregivers were able to identify respiratory conditions requiring professional healthcare, including worsening breathing difficulty, rapid breathing, cyanosis, reduced feeding or activity, persistent fever, convulsions, and deterioration in the child's overall condition. Overall, post-program evaluation demonstrated descriptive improvement across all three assessed domains: knowledge, practical competency, and recognition of respiratory danger signs.

Discussion

This community service program was associated with descriptive improvements in all three evaluated domains: caregiver knowledge, practical airway-support and inhalation-therapy skills, and recognition of respiratory danger signs. The mean knowledge score increased from 54.7 before the program to 87.7 after the intervention, while the proportion of caregivers demonstrating correct practical skills increased from 30.0% to 90.0%. Correct recognition of respiratory danger signs also increased from 43.3% to 93.3%. Taken together, these findings suggest that a structured combination of education, demonstration, guided practice, return-demonstration, and feedback can strengthen caregivers' preparedness to participate safely in the respiratory care of children.

The improvement in caregiver knowledge is particularly relevant because parents and other family members are frequently the first to observe changes in a child's respiratory condition. Their understanding of cough, breathing difficulty, airway secretions, altered activity, feeding problems, and other warning signs can influence the timing of healthcare seeking. Previous research in Indonesia has identified gaps in family caregivers' knowledge of childhood pneumonia and appropriate healthcare-seeking behavior, indicating that some caregivers may initially perceive pneumonia as an ordinary respiratory illness (Purwati et al., 2021). The increase in the mean knowledge score from 54.7 to 87.7 therefore represents an important educational outcome because improved understanding may support more appropriate responses when respiratory symptoms develop.

These findings are consistent with previous intervention research demonstrating the value of caregiver education for childhood respiratory conditions. Alexandrino et al. (2016) reported that education regarding respiratory infections was associated with improvements in caregiver practices and selected child-health outcomes. Although the present program used a descriptive pre-post

design and did not include a comparison group, the observed improvement supports the practical value of structured respiratory-health education within family-centered nursing and community-service activities. The results should nevertheless be interpreted as descriptive program outcomes rather than evidence of causal effectiveness.

The marked increase in practical competency from 30.0% to 90.0% highlights the importance of combining theoretical information with skills-based learning. Airway-support and inhalation-therapy procedures involve a sequence of practical actions that may be difficult to master through verbal instruction alone. Demonstration provides a visual model of appropriate technique, while guided practice allows participants to perform the procedure under supervision and receive immediate correction. Return-demonstration subsequently enables facilitators to verify whether essential steps can be performed independently.

This approach is consistent with contemporary family-centered pediatric care. Hodgson et al. (2024) found that family-centered interventions for hospitalized children frequently include education, participation, partnership, and information sharing, with several studies reporting improvements in parental knowledge and involvement. High et al. (2022) similarly emphasized the importance of symptom recognition and practical skills when preparing caregivers to participate in technically demanding pediatric care. These findings reinforce the concept that family participation should involve both understanding and demonstrated competency rather than passive receipt of health information.

The inhalation-therapy component of the program further illustrates the importance of practical education. Caregivers received instruction on nebulizer preparation, child positioning, appropriate mask placement, supervision during therapy, and post-use device hygiene. Previous evidence indicates that structured nebulizer education can improve parental knowledge and confidence in caring for children with respiratory conditions. Lee et al. (2017), for example, reported improvements in parents' knowledge and confidence following structured nebulizer education. Such findings support incorporating practical device education into caregiver-empowerment programs when inhalation therapy has been prescribed.

Teaching methods that require active participation may offer additional advantages. McCrossan et al. (2022) identified physical demonstration, written materials, video instruction, and teach-back as commonly used approaches for improving inhaler technique. Benito-Ruiz et al. (2024) similarly found that educational interventions could improve inhalation technique in pediatric respiratory care and emphasized the value of repeated assessment. Volerman et al. (2021) also highlighted the importance of reinforcing respiratory-device technique over time because correct performance may decline if it is not reassessed. The use of guided practice and return-demonstration in the present program is therefore consistent with broader evidence supporting repeated and competency-based respiratory education.

Recent evidence specifically involving family caregivers provides further support for this approach. Nouh et al. (2026) reported that structured stepwise training improved parents' knowledge and practical skills related to nebulizer care and respiratory-management procedures among children with respiratory diseases. Although differences in population, setting, and evaluation methods prevent direct comparison with the present program, these findings reinforce the usefulness of combining explanation, demonstration, supervised practice, and independent performance assessment.

Recognition of respiratory danger signs was another important outcome. The proportion of caregivers correctly identifying major danger signs increased from 43.3% before the program to 93.3% after the intervention. This improvement is clinically relevant because young children may deteriorate rapidly when respiratory disease becomes severe. Caregivers should therefore be able to recognize observable warning signs such as increasing breathing difficulty, marked tachypnea, chest indrawing, cyanosis, reduced feeding, decreased activity, convulsions, or worsening general condition and understand when professional assessment is required.

The emphasis on observable warning signs is also important for defining appropriate caregiver responsibilities. Family empowerment should not involve transferring clinical decision-making responsibilities to caregivers. Parents can be trained to observe respiratory changes, provide appropriate supportive positioning, monitor secretions, follow prescribed treatment, maintain respiratory equipment, and seek help promptly. In contrast, formal respiratory assessment, auscultation, oxygen prescription, medication selection, dose adjustment, and evaluation of severe respiratory compromise remain responsibilities of qualified healthcare professionals.

The increase in correct practical skills also has implications for the safe use of nebulizers. Proper nebulizer technique depends on appropriate equipment assembly, positioning, mask fit, completion of therapy, and post-use cleaning. Inadequate device hygiene may contribute to microbial contamination. MacFarlane et al. (2020) reported considerable variation in nebulizer cleaning and disinfection practices, while Ranjan et al. (2022) identified bacterial contamination in home nebulizer components and highlighted deficiencies in cleaning practices. These findings support the inclusion of cleaning, drying, and storage procedures as essential components of caregiver education.

Educational materials may further strengthen the sustainability of such programs. Murphy et al. (2024) reported that caregivers of children with community-acquired pneumonia valued clear and visually engaging educational information that could be reviewed after healthcare encounters. Illustrated leaflets, respiratory danger-sign cards, simple procedural guides, or short educational videos may therefore complement face-to-face education and provide caregivers with resources for continued learning at home.

Environmental respiratory-health education can also complement airway-management training. Exposure to tobacco smoke is an established concern in childhood respiratory health, and Indonesian research has shown that families may encounter barriers to reducing children's exposure despite recognizing its harmful effects (Danal et al., 2021). Xiang et al. (2023) further demonstrated that secondhand smoke continues to contribute to the global burden of lower respiratory infections among children younger than five years. Community respiratory-health programs should therefore incorporate advice on maintaining smoke-free environments alongside education on symptom recognition and supportive care.

The overall pattern of improvement across knowledge, practical skills, and danger-sign recognition demonstrates the potential value of integrating cognitive and psychomotor learning within a single caregiver-education program. Knowledge alone may not ensure that caregivers can correctly perform a procedure, while practical skill without adequate understanding may limit appropriate decision-making. Combining education with demonstration, guided practice, return-demonstration, and corrective feedback addresses both dimensions and provides an opportunity to verify whether learning objectives have been achieved.

However, the findings should be interpreted within the limitations of the program design. The activity involved 30 family caregivers and used a single-group pre-post descriptive evaluation without a control group. The outcomes were assessed immediately after the program, and long-term retention of knowledge and practical competencies was not evaluated. No inferential statistical analysis was performed; therefore, the observed changes should be described as descriptive improvements rather than statistically significant effects.

Furthermore, the program evaluated caregiver outcomes rather than direct clinical outcomes among children. Increases in caregiver knowledge, practical competency, and recognition of danger signs should therefore not be interpreted as evidence that the education itself treated bronchopneumonia or resolved ineffective airway clearance. The primary contribution of the program lies in strengthening caregivers' capacity to participate safely in supportive respiratory care and to recognize situations requiring professional healthcare.

Overall, the findings support the integration of structured caregiver education into pediatric and community respiratory-health services. A relatively simple sequence of assessment, education, demonstration, guided practice, return-demonstration, feedback, and evaluation can provide caregivers with both conceptual understanding and practical experience. Incorporating this model

into routine nursing education, discharge preparation, primary care, and community health activities may strengthen family participation and promote safer continuity of respiratory care for children.

Implications, Sustainability, and Limitations

The findings of this community service program have practical implications for pediatric nursing, family education, and community-based respiratory care. The descriptive improvements in caregiver knowledge, practical skills, and recognition of respiratory danger signs indicate that caregiver education should combine information delivery with demonstration, guided practice, return-demonstration, and corrective feedback. This approach can be integrated into pediatric inpatient care, outpatient services, primary healthcare centers, discharge preparation, and community health activities. Nurses and other health professionals can use structured skills training to strengthen caregivers' ability to provide basic airway-support measures, safely assist with prescribed inhalation therapy, maintain equipment hygiene, and recognize conditions requiring timely professional assessment.

Program sustainability may be strengthened by incorporating caregiver education into routine pediatric respiratory services rather than providing it as a one-time activity. Repeated reinforcement during subsequent healthcare visits, reassessment of practical skills, and continued family involvement may help maintain knowledge and competency over time. Standardized educational materials, such as illustrated leaflets, respiratory danger-sign cards, procedural checklists, and simple demonstration guides, may also support consistent delivery of information across healthcare settings. Collaboration among nurses, healthcare institutions, families, and community health services may facilitate replication of the program for caregivers of children with similar respiratory-care needs.

Several limitations should be considered when interpreting the program outcomes. The activity involved only 30 family caregivers and used a single-group pre-post descriptive evaluation without a control group. Outcomes were assessed immediately after the intervention; therefore, the long-term retention of knowledge and practical skills was not determined. The evaluation primarily focused on caregiver outcomes and did not assess longer-term child clinical outcomes, subsequent healthcare utilization, or hospital readmission. In addition, no inferential statistical analysis was conducted, so the observed changes should be interpreted as descriptive improvements rather than statistically significant effects. Future programs could include larger participant groups, longer follow-up periods, standardized evaluation instruments, repeated competency assessments, and comparison groups to provide stronger evidence regarding the sustainability and broader applicability of the intervention.

Relevance for Practice

This community service program is relevant to pediatric nursing and family-centered respiratory care because it demonstrates a practical approach for strengthening caregivers' capacity to participate safely in the care of children with respiratory problems. Nurses can incorporate structured education, demonstration, guided practice, return-demonstration, and feedback into routine inpatient care, discharge preparation, outpatient services, and community health activities. Priority educational content should include recognition of respiratory danger signs, basic airway-clearance support, semi-Fowler positioning, sputum observation, correct use and hygiene of prescribed inhalation devices, and clear indications for seeking professional healthcare. Caregiver competency should be verified through direct observation rather than relying solely on verbal confirmation of understanding. At the same time, professional boundaries must remain clear: medication selection, dose adjustment, oxygen administration, auscultation, and assessment of severe respiratory compromise should continue to be performed or directed by qualified healthcare professionals. Integrating this structured caregiver-training approach into routine pediatric respiratory services may improve continuity of care, strengthen family participation, and support safer management of children after they leave the healthcare facility.

Conclusion

The community service program demonstrated descriptive improvements in family caregivers' knowledge, practical airway-support and inhalation-therapy skills, and recognition of respiratory danger signs. Mean knowledge scores increased from 54.7 to 87.7, correct practical competency increased from 30.0% to 90.0%, and correct recognition of respiratory danger signs increased from 43.3% to 93.3%. These findings indicate that structured education combining demonstration, guided practice, return-demonstration, and feedback can strengthen caregivers' preparedness to participate safely in pediatric respiratory care. The program may be integrated into family-centered nursing education, discharge preparation, primary care, and community health activities, with continued emphasis on professional supervision for medication management, oxygen therapy, and clinical respiratory assessment.

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Author Contribution

Dewi Ramadani contributed to the conceptualization of the community service program, needs assessment, program planning, implementation of caregiver health education and airway-clearance skills training, data collection, practical skills assessment, program evaluation, literature review, data interpretation, and preparation of the original manuscript.

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Declaration of Conflicting Interest

The authors declare no conflict of interest related to the implementation of this community service program or the publication of this manuscript.

Declaration of Use of AI in Scientific Writing

The authors declare that generative AI and AI-assisted technologies were used solely to support language editing, grammatical refinement, and improvement of the clarity and readability of the manuscript. The authors reviewed, verified, and revised all AI-assisted content and remain fully responsible for the accuracy, integrity, interpretation, and final content of the manuscript.

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