การพัฒนาแนวปฏิบัติการพยาบาลเพื่อลดอุบัติการณ์ภาวะหายใจล้มเหลวในผู้ป่วยผู้ใหญ่โรคปอดอักเสบ

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บทคัดย่อ

โรคปอดอักเสบยังคงเป็นสาเหตุสำคัญของการเจ็บป่วยและเสียชีวิตทั่วโลก โดยเฉพาะในโรงพยาบาลชุมชนที่มีข้อจำกัดด้านทรัพยากร ซึ่งผู้ป่วยที่โรคลุกลามจนเกิดภาวะหายใจล้มเหลวมักมีผลลัพธ์ที่ไม่พึงประสงค์และเพิ่มภาระต่อระบบบริการสุขภาพ แม้จะมีแนวทางการพยาบาลที่อิงหลักฐานวิชาการ แต่การนำไปใช้ที่ไม่สม่ำเสมอ และขาดความสอดคล้องกับบริบทจริง ยังคงเป็นอุปสรรคต่อการดูแลที่มีประสิทธิภาพ การวิจัยนี้มีวัตถุประสงค์เพื่อพัฒนาและนำแนวปฏิบัติทางการพยาบาลไปใช้ เพื่อลดอุบัติการณ์ของภาวะหายใจล้มเหลวในผู้ป่วยผู้ใหญ่ที่เป็นโรคปอดอักเสบ ณ โรงพยาบาลชุมชนแห่งหนึ่งในจังหวัดนครราชสีมา ใช้รูปแบบการวิจัยเชิงปฏิบัติการแบบมีส่วนร่วม โดยอิงแนวคิดวัฏจักรของ Kemmis และ McTaggart กลุ่มตัวอย่างประกอบด้วยพยาบาลวิชาชีพ 47 คนจากแผนกฉุกเฉิน ผู้ป่วยนอก และผู้ป่วยใน กระบวนการพัฒนาแนวปฏิบัติประกอบด้วยการทบทวนวรรณกรรมอย่างเป็นระบบ การตรวจสอบโดยผู้เชี่ยวชาญ และการศึกษานำร่องเพื่อรับข้อเสนอแนะจากพยาบาลที่ปฏิบัติงานจริง เพื่อให้แนวปฏิบัติมีความเหมาะสมกับบริบท

ผลการวิจัยพบว่า แนวทางการวิจัยเชิงปฏิบัติการแบบมีส่วนร่วม ส่งเสริมการพัฒนาแนวปฏิบัติที่มีความชัดเจนอิงหลักฐานวิชาการ และสามารถนำไปใช้ได้จริง โดยเน้นการประเมินความเสี่ยงตั้งแต่ระยะแรก การประเมินอย่างเป็นระบบ การประสานงานข้ามสหสาขาวิชาชีพ และการจัดการที่เหมาะสมกับบริบท หลังการนำแนวปฏิบัติไปใช้ พบว่ามีการปรับปรุงในกระบวนการบันทึกข้อมูล การให้ความรู้ผู้ป่วย และการส่งต่อที่ชัดเจนมากขึ้น รวมทั้งอัตราการเกิดภาวะหายใจล้มเหลวลดลง และพยาบาลมีความพึงพอใจในความสะดวกและประสิทธิภาพของแนวปฏิบัติ การพัฒนาและนำแนวปฏิบัติแบบมีส่วนร่วมนี้ช่วยให้สามารถเฝ้าระวังและจัดการภาวะหายใจล้มเหลวได้ตั้งแต่ระยะแรก สร้างความเป็นเจ้าของในระดับพื้นที่ และส่งเสริมการดูแลร่วมกันอย่างมีประสิทธิภาพ อันเป็นต้นแบบสำหรับการขยายผลในสถานพยาบาลที่มีข้อจำกัดใกล้เคียงกัน

คำสำคัญ: ปอดอักเสบ ภาวะหายใจล้มเหลว แนวปฏิบัติการพยาบาล วิจัยเชิงปฏิบัติการแบบมีส่วนร่วม ผลลัพธ์ผู้ป่วย

แหล่งทุน: สมาคมพยาบาลแห่งประเทศไทยฯ สำนักงานสาขาภาคตะวันออกเฉียงเหนือ

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Development of Nursing Practice Guidelines to Reduce the Incidence of Respiratory Failure in Adult Patients with Pneumonia

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Abstract

Pneumonia remains a leading cause of morbidity and mortality worldwide, particularly in community hospitals with limited resources. When the disease progresses to respiratory failure, patient outcomes often worsen, placing increased strain on healthcare resource. Despite the availability of evidence-based nursing guidelines, inconsistent application and adequate contextually adaptation continue to hinder effective patient care. This study aimed to develop and implement nursing practice guidelines to reduce the incidence of respiratory failure among adult patients with pneumonia in a community hospital in Nakhon Ratchasima Province. A Participatory Action Research (PAR) approach was employed, based on the cyclical model of Kemmis and McTaggart. The study involved 47 registered nurses from the emergency department, outpatient department, and inpatient wards. The guideline development process included a systematic literature review, expert validation, and pilot testing with iterative feedback from practicing nurses to ensure contextual appropriateness and practical usability.

The findings indicated that the PAR approach effectively facilitated the development of clear, evidence-based, and applicable nursing practice guidelines. Key elements of the guidelines included early risk assessment, systematic evaluation, interdisciplinary coordination, and context-specific management strategies. After implementation, improvements were observed in the documentation processes, patient education, and clarity of referral pathways. Additionally, the incidence of respiratory failure among pneumonia patients declined and nurses expressed high satisfaction with the usability and effectiveness of the guidelines. The collaborative development and implementation of the guidelines not only enhanced early recognition and management of respiratory failure, but also promoted local ownership and improved interprofessional care coordination. These outcomes highlight the value of ongoing evaluation and active nurse participation to sustain the effectiveness and adaptability of the guidelines and serve as a model for similar resource-limited healthcare settings.

Keywords: pneumonia, respiratory failure, nursing practice guidelines, participatory action research, patient outcome

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Introduction

Pneumonia remains a critical global health concern, persistently ranking among the leading causes of morbidity and mortality worldwide. It primarily manifests as community-acquired pneumonia (CAP) or hospital-acquired pneumonia (HAP), both of which can progress to severe respiratory failure requiring mechanical ventilation. This progression significantly elevates the risk of poor clinical outcomes, including increased mortality and prolonged hospitalization.[1,2] Ventilator-associated pneumonia (VAP), a subset of HAP, is particularly associated with even higher morbidity and mortality, further intensifying the burden on healthcare systems.[3]

The pathogenesis of respiratory failure in pneumonia involves complex pulmonary changes. Alveolar inflammation, edema, and consolidation disrupt the alveolar-capillary membrane, impairing oxygen diffusion and carbon dioxide elimination. These alterations lead to hypoxemia and, in severe cases, hypercapnia.[4] The resultant pulmonary edema and reduced surfactant production cause atelectasis and ventilation-perfusion mismatch, which exacerbate respiratory insufficiency. Additionally, respiratory muscle fatigue or impaired neural control can worsen respiratory pump failure, compounding clinical severity.[5] These pathophysiological mechanisms underscore the urgent need for timely recognition and effective management of respiratory failure in pneumonia patients.

Clinically and economically, pneumonia-induced respiratory failure imposes substantial burdens. It is associated with increased mortality rates and extended hospital stays, which translate into significant healthcare costs and resource utilization.[2] VAP further aggravates these outcomes by prolonging mechanical ventilation duration and increasing treatment complexity.[3,6] Globally, pneumonia remains a major public health challenge, particularly in resource-limited settings, where its mortality and economic impacts are most pronounced.[7-9] Effective management strategies emphasize prompt antimicrobial therapy combined with lung-protective ventilation to mitigate lung injury and improve outcomes.[5] Early detection and intervention for respiratory failure are crucial to reducing mortality and healthcare burdens.[6,9]

In one community hospital in Nakhon Ratchasima, pneumonia has consistently ranked among the top three causes of mortality over the past five years, with respiratory failure remaining the principal, unresolved complication. An internal review by the pneumonia care team identified delayed diagnosis and delayed antibiotic administration as key contributors to this issue. In response, the team introduced sepsis assessment protocols to facilitate earlier detection and intervention. However, these measures have not sufficiently reduced the incidence of respiratory failure, particularly among pneumonia patients who do not meet sepsis criteria, such as those presenting without a fever, not classified as critical, or not triaged as urgent case, resulting in delayed treatment.

Additionally, the absence of clear, disease-specific nursing guidelines and standardized criteria for physician notification has hindered timely problem-solving before the onset of severe complications. Consequently, nurses are depending primarily on personal clinical judement for patient assessment and care. This approach has not effectively reduced the rate of respiratory failure in pneumonia patients and has, at times, jeopardized patient safety. Therefore, this study aimed to develop nursing practice guidelines to reduce the incidence of respiratory failure in pneumonia patients. The goal was to establish a unified, practical protocol that is easy to implement, with the expectation that its adoption would lead to a tangible reduction in respiratory failure events and improved patient outcomes.

A retrospective review at a community hospital in Nakhon Ratchasima province highlighted an alarming increase in pneumonia cases and respiratory failure rates. Admissions rose by 28%, from 180 cases in 2021 to 230 in 2023, while respiratory failure incidence increased from 12.20% to 18.70%.[10] This trend signals a growing clinical and resource challenge, emphasizing the need for evidence-based nursing guidelines tailored to the local context. In this setting, Emergency Room (ER) nurses are pivotal in the initial assessment, stabilization, and early management of pneumonia patients, including oxygen therapy initiation, antibiotic administration, and diagnostic coordination. Outpatient Department (OPD) nurses manage milder cases, focusing on patient education, monitoring for deterioration, ensuring adherence to treatment, and facilitating timely escalation to inpatient care. Engaging nurses from both ER and OPD ensures comprehensive coverage of the pneumonia care continuum, enriching guideline development with practical insights.

Despite established nursing interventions for pneumonia, inconsistent application remains a significant barrier to optimal care.[11] The absence of standardized, contextually adapted protocols results in inconsistency implementation of evidence-based practices such as early warning scores[12], structured respiratory assessments[13], patient positioning[14], and breathing exercises.[15] This inconsistency can delay recognition of respiratory distress and timely treatment, adversely affecting patient outcomes. Therefore, there is a pressing need for structured nursing protocols that promote consistency and improve recovery.

Participatory Action Research (PAR) offers an innovative approach by involving frontline nursing staff in co-creating sustainable interventions.[16] Unlike traditional top-down protocols, PAR fosters local ownership and continuous adaptation, ensuring guidelines are evidence-based and tailored to the hospital's unique needs.[17] Previous models in tertiary hospitals have shown success but often lack ongoing reflection and broad nurse participation, limiting adaptability in smaller community hospitals. This study's PAR approach addresses these gaps through iterative reflection and active nurse engagement[18,19], producing practical, well-accepted guidelines that have reduced respiratory failure rates, shortened hospital stays, enhanced care coordination, and increased nurse satisfaction.[20] These findings highlights the potential to enhance pneumonia care locally and provide a scalable framework for resource-limited settings, advancing nursing practice with sustained evaluation to maintain effectiveness.[21]

Objectives

1. To develop evidence-based nursing practice guidelines for preventing respiratory failure in pneumonia patients at a community hospital.
2. To evaluate the effectiveness of the guidelines in reducing respiratory failure rates.
3. To assess nurses' satisfaction with the guidelines in clinical practice.

Scope of the Research:

This research aimed to create and assess nursing practice guidelines specifically designed for adult patients (aged 18 and above) diagnosed with pneumonia at a community hospital located in Nakhon Ratchasima Province, Thailand. The participants included registered nurses from the emergency room, outpatient department (OPD), and inpatient department (IPD), all of whom play a direct role in managing pneumonia cases. Data gathering and guideline implementation occured between July 2024 and April 2025.

Conceptual Framework:

This study employed the PAR framework as conceptualized by Kemmis and McTaggart[22], which revolves around a dynamic, cyclical process comprising four interrelated stages: planning, action, observation, and reflection. This iterative approach promotes ongoing learning and enhancement by actively engaging frontline nurses in problem identification, collaborative intervention development, implementation of changes, and evaluation of outcomes within their clinical environment.

The planning phase involves a collaborative diagnosis of existing challenges, critical analysis of current nursing practices, and the formulation of improvement strategies grounded in both empirical evidence and the practical experiences of nursing staff. This stage lays the groundwork for change by involving participants in setting clear objectives and crafting actionable plans tailored to the specific context of the community hospital.

During the action phase, the devised interventions are put into practice. Nurses and relevant stakeholders implement the newly developed or adapted nursing guidelines within real-world clinical settings, emphasizing practical integration and accommodation of local workflows and resource limitations.

The observation phase focuses on systematic monitoring and data collection to evaluate the impact of the interventions. This includes soliciting feedback from nursing personnel, assessing patient outcomes, and documenting both obstacles and successes encountered during implementation. Such comprehensive observation yields valuable insights into the effectiveness and feasibility of the changes introduced.

Finally, the reflection phase entails a collective and critical appraisal of the observed results and processes. Participants engage in in-depth discussions to discern what aspects were successful, which were not, and the underlying reasons. This reflective dialogue fosters a shared understanding that informs necessary modifications to the action plan, encouraging continuous improvement and empowering nurses to take ownership of sustained practice enhancements.

Unlike conventional research methodologies that often impose externally developed protocols, the Kemmis and McTaggart PAR model prioritizes co-creation and contextual tailoring, ensuring that nursing guidelines are relevant, practical, and sustainable within the hospital's unique environment. This participatory approach effectively bridges the gap between theoretical knowledge and clinical practice while nurturing a culture of reflective practice and professional empowerment among nursing staff.

In contrast to more rigid, protocol-centric frameworks such as the Sawanpracharak Hospital model[18], which emphasizes standardized clinical supervision predominantly in tertiary care settings, this study's PAR approach is distinguished by its inclusiveness and flexibility. It actively incorporates continuous input from nurses across emergency, outpatient, and inpatient departments, enabling real-time adjustments responsive to local patient risk profiles and operational realities. Through structured group dialogue and consensus-building, the framework facilitates the creation of nursing guidelines that are both evidence-based and pragmatically applicable, thereby advancing the quality and safety of pneumonia care in resource-constrained community hospital settings.

Methods

Study Design: This study utilized a PAR methodology based on Kemmis and McTaggart's cyclical model of planning, action, observation, and reflection.[22] This approach was selected for its effectiveness in addressing practical clinical challenges within the community hospital setting by actively engaging frontline nurses, thereby promoting the integration of research outcomes into sustainable practice improvements.

Population and Sample: 1. Adult patients aged 18 years and older who were admitted with pneumonia during July 2024 to April 2025 were included in the study. The pre-implementation period (January–June 2024) served as the baseline, during which the Clinical Nursing Practice Guidelines (CNPG) had not yet been introduced. The intervention period (July 2024–April 2025) followed the implementation of the CNPG. Prior to this study, the hospital did not have formal, written nursing practice guidelines for pneumonia care; nurses primarily relied on sepsis assessment tools and individual clinical experience to guide patient management.

1.1 Patients in this study are defined as adults aged 18 years and older who are admitted to the community hospital with a clinical diagnosis of pneumonia. Diagnosis is based on the presence of new or progressive pulmonary infiltrates on chest imaging, accompanied by at least one of the following clinical features: fever, cough, purulent sputum, dyspnea, or abnormal breath sounds on auscultation.[1,2] Both community-acquired and hospital-acquired pneumonia cases are included, excluding patients with COVID-19, active malignancy, or those already intubated at admission.

1.2 Patient with respiratory failure refer to pneumonia patients who develop acute respiratory failure during hospitalization. Respiratory failure is defined as the inability to maintain adequate gas exchange, evidenced by at least one of the following criteria[5,7]:

- Arterial oxygen saturation (SpO_2) 50 mmHg.
- Clinical signs of severe respiratory distress, such as tachypnea (respiratory rate > 30 breaths/min), use of accessory muscles, altered mental status, or the need for escalation to non-invasive or invasive ventilatory support.

2. The study population included all registered nurses employed in the Emergency Room (ER), Outpatient Department (OPD), and Inpatient Department (IPD) of a 60-bed community hospital, all directly involved in the care of adult pneumonia patients. A total of 47 nurses were recruited to ensure representation from key units along the pneumonia care continuum. This comprehensive inclusion was essential to capture diverse clinical perspectives, facilitate collaborative identification of practice gaps, and support the co-development of tailored nursing guidelines.

Given the absence of an intensive care unit (ICU) at the hospital, including all IPD nurses alongside ER and OPD staff ensured full coverage of personnel managing pneumonia cases, particularly those at risk of respiratory failure. This inclusive strategy aligns with PAR's principles of broad stakeholder involvement and cross-departmental collaboration, enhancing the relevance and applicability of the resulting nursing protocols.

Inclusion Criteria

1. Registered professional nurses currently employed at the study hospital.
2. Nurses actively engaged in direct care of adult patients diagnosed with pneumonia, defined as providing nursing interventions, continuous assessment, monitoring, or patient education during the care episode in ER, OPD, or IPD.

3. Willing to participate throughout all phases of the PAR process and provide informed consent.

Exclusion Criteria

1. Nurses not directly involved in pneumonia patient care as defined above.
2. Nursing students or nurse assistants.
3. Nurses on extended leave (e.g., maternity leave, sabbatical during the study period).

Research Instruments:

Data were collected using the following instruments.

1. Nursing Practice Guidelines for Prevention of Respiratory Failure in Pneumonia Patients

The Nursing Practice Guidelines were developed through an iterative PAR process, informed by a systematic review of literature from PubMed and TCI-ThaiJo databases covering 2015–2025. The search targeted studies on respiratory failure and pneumonia in adult populations, excluding intubated patients, cancer cases, and COVID-19-specific studies. The evidence was synthesized narratively, categorized by level, and reviewed by clinical experts to draft the initial guidelines. A multidisciplinary expert panel of seven-comprising respiratory specialists, senior nurses, a clinical epidemiologist, and a nurse educator-validated the draft using the AGREE II instrument, achieving a Content Validity Index (CVI) of 0.85. Pilot testing over four weeks in the inpatient ward involved 12 nurses applying the guidelines in routine care.

2. Nurse Satisfaction Questionnaire

A concise, five-item questionnaire was developed to measure nurses' satisfaction with the guidelines, focusing on usability, appropriateness of activities, and perceived effectiveness in reducing adverse events. Development began with a review of existing satisfaction tools and relevant literature to identify key domains related to guideline implementation. Draft items were iteratively refined through research team discussions and expert review.

The same expert panel that validated the guidelines assessed the questionnaire's content validity, resulting in a CVI of 0.80. Internal consistency was high, with a Cronbach's alpha of 0.95. Responses were recorded on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). This rigorous validation process ensured the instrument's relevance and reliability for evaluating nurse satisfaction.

3. Respiratory Failure Record Form

This form was designed to systematically document adult pneumonia patients who developed respiratory failure. It captures demographic data, relevant medical history (e.g., chronic illnesses, age), risk factors (e.g., smoking, alcohol use), and clinical details of the respiratory failure event, including date, presentation, and interventions. Nurses in the ER and IPD completed the form for patients meeting respiratory failure criteria or requiring intubation.

Since intubation and advanced airway management are not performed in the OPD, the form was not used there. Instead, OPD nurses documented suspected respiratory deterioration and referred such cases to the ER or IPD for further evaluation. Patients initially seen in OPD who required admission or escalation were tracked through hospital admission and transfer records, ensuring comprehensive case capture.

To ensure data completeness and accuracy, monthly reviews of pneumonia admission and discharge registers were conducted across departments. This process verified respiratory failure identification and reflected the distinct clinical pathways within the hospital setting.

Data Collection Procedures

Ethical approval was obtained from the Ethics Committee of the Provincial Public Health Office (Approval Number: CHREC-2024-007). Data were collected from July 2024 to April 2025. The PAR process involved:

1. Planning (P): Initial meetings with nurses to discuss existing practices, identify challenges in pneumonia care, review evidence from the literature, and collaboratively draft the initial guidelines.

2. Action (A): Implementation of the drafted guidelines by participating nurses in their respective units (ER, OPD, IPD). Training sessions were conducted to ensure understanding of the guidelines.

3. Observation (O): Monitoring of guideline implementation through direct observation (by researchers/team leaders), feedback sessions, and review of the Respiratory Failure Record Forms. Data on patient outcomes, including rates of respiratory failure and hospital readmissions (from medical records), were collected.

4. Reflection (R): Regular reflective meetings with nurses to discuss experiences with the guidelines, identify barriers and facilitators, and suggest modifications. This feedback informed us of iterative refinements of the guidelines. The satisfaction questionnaire was administered to nurses after they had used the guidelines for a specified period of three months). Data privacy and confidentiality were maintained by anonymizing all data and storing it securely.

Data Analysis

Data was analyzed using IBM SPSS Statistics version 22. Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to summarize the demographic characteristics of nurse participants and their satisfaction levels.

To evaluate the effectiveness of the nursing practice guidelines in reducing respiratory failure rates, monthly rates of respiratory failure per 100 adult patients with pneumonia were compared between the pre-implementation period (January 2024 to June 2024) and the post-implementation period (July 2024 to April 2025). Independent samples t-tests were used to compare mean monthly respiratory failure rates between the two periods, while chi-square tests were employed to compare the proportions of patients developing respiratory failure before and after implementation.

Additionally, the average hospital length of stay for pneumonia patients who developed respiratory failure was compared between the pre- and post-implementation periods using independent samples t-tests. Nurse satisfaction scores were summarized using means and standard deviations, and differences in satisfaction across departments were explored using one-way ANOVA where appropriate. The significance level of $p < .05$ was used for all statistical tests.

Results

The results of this study are presented according to the research objectives:

Objective 1: Development of Evidence-Based Nursing Practice Guidelines

The "Nursing Practice Guidelines for Prevention of Respiratory Failure in Adult Patients with Pneumonia" were systematically developed through a PAR framework, grounded in the cyclical model proposed by Kemmis and McTaggart.[22] A comprehensive systematic review was conducted utilizing PubMed and TCI-ThaiJo databases, encompassing literature published between 2015 and 2025. This selective approach aimed to collate evidence

directly pertinent to nursing interventions for preventing respiratory failure in general pneumonia cases. From an initial pool of 412 articles, 98 were subjected to full-text review, with 26 meeting stringent inclusion criteria and quality standards as assessed by Joanna Briggs Institute (JBI) appraisal tools. Only studies rated moderate to high quality were incorporated into the final evidence synthesis (Figure 1). Core findings underscored the critical role of early warning scoring systems, timely administration of oxygen therapy, strategic patient positioning, and structured clinical monitoring as foundational nursing interventions. Recommendations were stratified by evidence level and strength, subsequently refined through expert consultation.

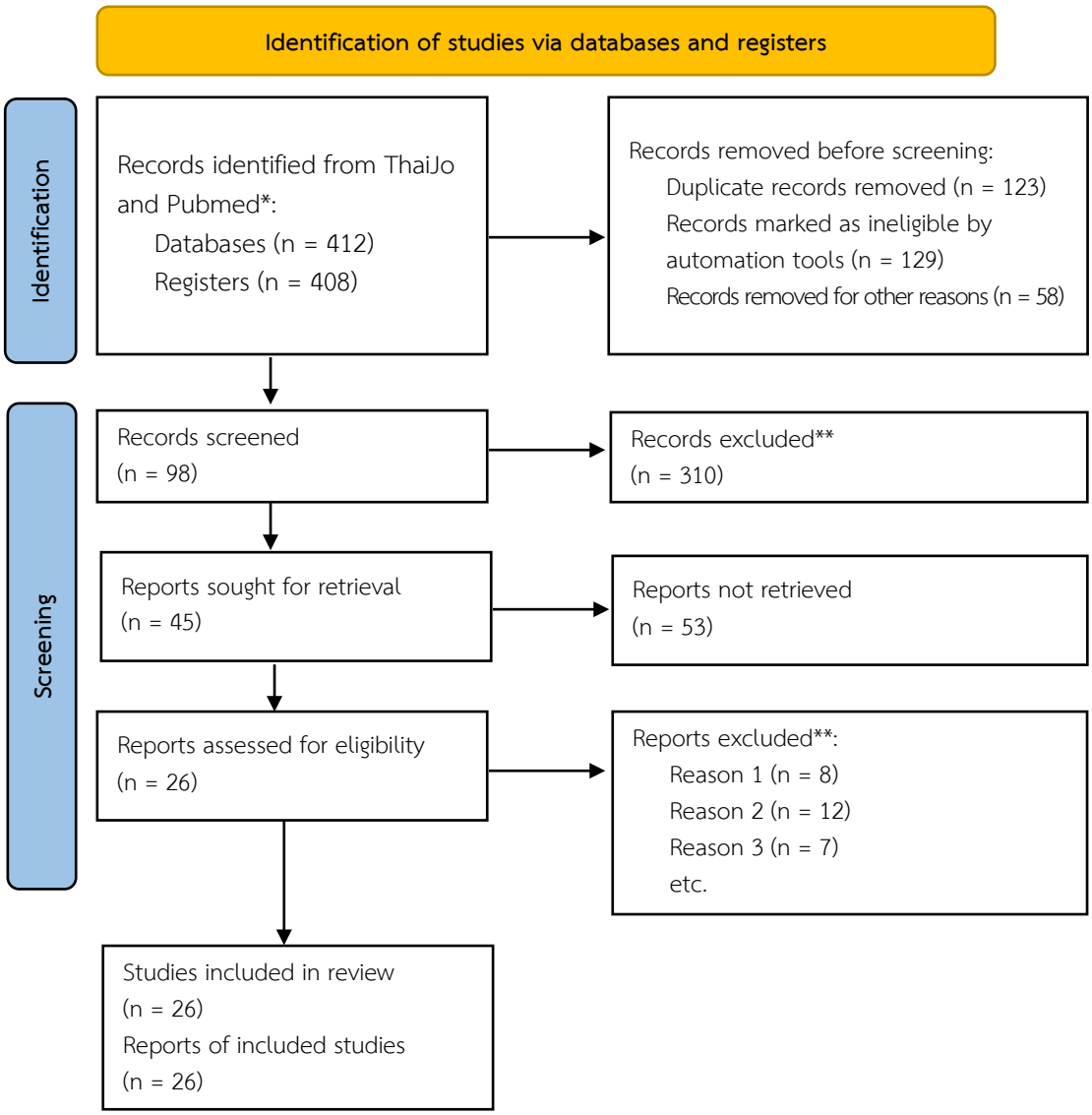

Figure 1 PRISMA Flow Diagram

**The search was conducted for articles published between 2015 and 2025 using the following keywords and Boolean operators: - "respiratory failure" AND "pneumonia" AND "guideline"*

***Additional filters included: English or Thai language, studies on adults (≥18 years), and exclusion of articles focused on (Reason 1) patients already intubated/ventilated, those with (Reason 2) cancer, or (Reason 3) COVID-19-specific populations.*

Validation of the draft guidelines was conducted by a multidisciplinary expert panel using the AGREE II instrument. The panel systematically evaluated the guidelines for relevance, clarity, and practical applicability, resulting in a Content Validity Index (CVI) of 0.85, which reflects a strong level of consensus. Based on their review, the panel recommended enhancements focused on early detection and escalation protocols, pragmatic adaptations for resource-limited settings, improved frameworks for multidisciplinary communication, and simplification of documentation and patient education materials. In response, the guidelines were revised to incorporate comprehensive assessment checklists, algorithmic intervention pathways, structured communication tools such as SBAR, and user-friendly educational resources tailored to the hospital's operational context.

Subsequent pilot testing was conducted over four weeks within the inpatient medical ward, involving 12 nurses who integrated the guidelines into routine care. Structured feedback identified areas for improvement including clarification of early warning score documentation, simplification and increased accessibility of patient education materials, introduction of a quick-reference checklist for oxygen therapy escalation and streamlining of documentation to mitigate time burdens during shift transitions. These insights informed further refinement of documentation protocols, enhancement of educational content with simplified language and visual aids, provision of laminated bedside checklists, and reduction of redundant paperwork.

Through this rigorous, iterative process combining systematic evidence review, expert validation, and frontline practitioner feedback, the final nursing practice guidelines were optimized to balance scientific rigor with contextual feasibility. The guidelines encompass protocols for early respiratory distress detection, oxygen therapy administration, patient positioning, and pulmonary rehabilitation exercises, supported by practical implementation tools designed for resource-constrained environments. Supplementary materials, including a PRISMA flow diagram and detailed development summary, are appended to demonstrate methodological transparency and robustness.

Objective 2: Impact of Guidelines on Respiratory Failure Rates

Between January 2024 and April 2025, comprehensive data were collected on adult pneumonia admissions, incidence of respiratory failure, and hospital length of stay to evaluate the effectiveness of newly implemented nursing practice guidelines. During the six-month pre-implementation phase (January–June 2024), the hospital recorded 272 pneumonia admissions, with a mean length of stay of 5.79 days. Respiratory failure developed in seven patients, yielding an average monthly respiratory failure rate of 2.57%. Notably, the length of hospital stay may not serve as a reliable indicator of disease severity among patients with respiratory failure in this study, as the community hospital lacked ICU capacity. All patients requiring advanced respiratory support were referred to higher-level tertiary care facilities following initial airway management, thereby limiting the ability to fully assess their clinical trajectory and outcomes within the admitting institution (Table 1).

In the subsequent ten-month post-implementation period (July 2024–April 2025), pneumonia admissions increased to 552 cases, while the mean hospital stay marginally decreased to 5.49 days. Respiratory failure occurred in 12 patients, corresponding to a reduced overall incidence rate of 2.17%. Among these cases, the mean length of stay declined to 5.33 days, indicative of enhanced clinical management. Monthly respiratory failure rates exhibited an initial rise during the transitional phase but demonstrated a consistent downward trend

following formal guideline adoption, culminating in a zero-incidence rate from February to April 2025. Although these trends may partially reflect seasonal variations, they likely also signify improved nursing practices; nevertheless, continued surveillance is necessary to substantiate these observations (Table 1).

Table 1. Monthly Respiratory Failure Rates and Patient Characteristics (Jan 2024 – Apr 2025)

Period	Month/Year	Total Pneumonia Cases	Respiratory Failure Cases (%)	Mean Age (years)	% Male	% with ≥1 Comorbidity
Pre-implementation	Jan 2024	46	1 (2.17%)	69	100	100
	Feb 2024	49	1 (2.04%)	64	100	100
	Mar 2024	46	1 (2.17%)	49	100	0
	Apr 2024	47	1 (2.13%)	57	100	0
	May 2024	46	2 (4.35%)	57	100	100
	Jun 2024	38	1 (2.63%)	59	100	0
Average (Pre)		272	7 (2.58%)	64.6	100	*
Post-implementation	Jul 2024	47	1 (2.13%)	69	100	0
	Aug 2024	51	1 (1.96%)	64	100	100
	Sep 2024	49	2 (4.08%)	53	100	0
	Oct 2024	71	3 (4.23%)	57.7	100	33.3
	Nov 2024	47	1 (2.13%)	61	100	100
	Dec 2024	78	2 (2.56%)	77	50	50
	Jan 2025	73	2 (2.74%)	71	0	50
	Feb 2025	62	0 (0.00%)	-	-	-
	Mar 2025	49	0 (0.00%)	-	-	-
	Apr 2025	25	0 (0.00%)	-	-	-
Average (Post)		552	12 (1.24%)	69.0	52.6	**

* Hypertension (HT): 4/7 (57.1%)
Diabetes mellitus: 0/7 (0%)
COPD: 1/7 (14.3%)
Chronic kidney disease (CKD): 1/7 (14.3%)
Atrial fibrillation (AF): 1/7 (14.3%)
Old CVA: 1/7 (14.3%)
Bedridden: 2/7 (28.6%)
Smoking history: 5/7 (71.4%)
Alcohol use: 4/7 (57.1%)

** Hypertension: 39.7% (about 5 cases)
Diabetes mellitus: 37.2% (about 4 cases)
COPD: 16.1% (about 2 cases)
Chronic kidney disease: 10.2% (about 1 case)
No cases in February–April 2025

Statistical analysis indicated a significant reduction in the mean monthly respiratory failure rate, decreasing from 2.58 (S.D. = 0.89) pre-implementation to 1.98 (S.D. = 1.57) post-implementation ($t = 5.694$, $df = 14$, $p = .032$). The decrease in hospital length of stay among patients who developed respiratory failure, from 5.75 days (S.D. = 3.2) to 5.48 days (S.D. = 2.7), did not reach statistical significance (Table 2).

Table 2. Independent samples t-test of means Pre- and Post-Guideline Implementation

	Period	Mean Monthly Rate (%)	S.D.	t	p-value
Percentage of respiratory failure	Pre-guideline adoption	2.58	0.89	5.594	.03*
	Post-guideline adoption	1.98	1.57	df=14	
Number of pneumonias	Pre-guideline adoption	45.33	3.77	7.67	.015*
	Post-guideline adoption	55.20	15.89	df=14	
Number of respiratory failures	Pre-guideline adoption	1.16	0.41	1.88	.52
	Post-guideline adoption	1.20	1.03	df=14	
Mean LOS of pneumonias	Pre-guideline adoption	5.79	0.95	.028	.87
	Post-guideline adoption	5.49	1.15	df=14	
Mean LOS of respiratory failure	Pre-guideline adoption	4.92	4.10	.973	.19
	Post-guideline adoption	2.62	3.36	df=14	

The study found that adult pneumonia patients who developed respiratory failure commonly fell into two groups: those with a history of chronic alcohol use or heavy smoking for more than 20 years but without underlying chronic diseases, and elderly patients aged 60 years or older with multiple comorbidities such as diabetes, hypertension, heart disease, or renal failure. These patients typically presented with fever, cough, dyspnea, and respiratory distress. This aligns with the findings of Klaiphim[21], who identified significant risk factors for respiratory failure among hospitalized pneumonia patients at Chao Phraya Abhaibhubej Hospital, including bilateral or multilobar infiltrates on chest X-ray, oxygen saturation less than 90%, heart rate ≥125 beats per minute, atrial fibrillation, pleural effusion on chest X-ray, serum creatinine ≥1.2 mg/dL, and body temperature ≥38°C.

Similarly, the study by Klongklaew[19] analyzing risk factors for 24-hour mortality in pneumonia patients found that a history of heavy alcohol consumption, initial PSI class 3–4, acute renal failure with creatinine >3 mg/dL on admission, heart rate greater than 130 beats per minute, and respiratory rate over 25 breaths per minute were significantly associated with increased mortality. These findings highlight the importance of early risk identification and comprehensive assessment in pneumonia patients, particularly those with these high-risk characteristics, to prevent the progression to respiratory failure and reduce mortality.

Baseline patient characteristics, including age, sex, and prevalence of chronic comorbidities, were statistically comparable between the pre- and post-implementation cohorts. This homogeneity supports the internal validity of the outcome comparisons and suggests that observed improvements in respiratory failure rates and hospital length of stay are unlikely to be attributable to differences in patient demographics or

underlying health status. To confirm these findings and elucidate the sustained impact of the nursing guidelines, further research employing larger sample sizes and extended follow-up periods is warranted.

Objective 3: Nurses' Satisfaction with the Guidelines

Forty-seven nurses completed the satisfaction questionnaire. Nurses reported high overall satisfaction with the guidelines (Mean = 4.48, S.D. = 0.52 on a 5-point scale, where 1=strongly disagree and 5=strongly agree; potential range of scores 1-5). The specific mean scores were as follows: ease of use (Mean = 4.45, S.D. = 0.51), appropriateness of activities (Mean = 4.38, S.D. = 0.49), and effectiveness in reducing adverse events (Mean = 4.50, S.D. = 0.53).

Qualitative feedback gathered during PAR reflective meetings with participating nurses was collected after each PAR cycle. These structured discussions were facilitated by the research team using open-ended questions such as "What changes have you observed in patient care since implementing the guidelines?" and "What aspects of the guidelines have been most helpful in your practice?" Three key themes emerged from the thematic analysis of meeting transcripts: (1) standardized care processes ("The guidelines helped us ensure every patient receives the same high-quality assessments regardless of which nurse is on duty"); (2) improved interdisciplinary communication ("Now we have a common language when discussing respiratory status with physicians"); and (3) increased confidence in managing patients with pneumonia ("I feel more confident identifying early warning signs and knowing exactly what interventions to initiate"). These qualitative findings complement the quantitative satisfaction scores and provide context for understanding how the guidelines improved nursing practice beyond statistical outcomes.

Discussion

This study examined the development, implementation, and evaluation of evidence-based nursing practice guidelines to prevent respiratory failure among pneumonia patients in a Thai community hospital, using a PAR framework. The findings suggest a positive influence of the intervention on patient outcomes and nursing practice, reflected by a reduction in respiratory failure rates and high levels of nurse satisfaction. The results highlight the value of contextually adapted collaborative approaches in enhancing care quality in resource-constrained settings.

Effectiveness and Limitations of the Guidelines

A downward trend in respiratory failure incidence was observed following the implementation of the structured nursing guidelines. While this trend is encouraging, interpretation requires caution due to the study's pre-post design. Although the data collection period (January 2024 to April 2025) helped reduce potential seasonal bias, the absence of a control group limits causal inference. External factors such as fluctuations in hospital admissions, staffing changes, or parallel quality improvement efforts could also have influenced the results.[23]

Demographic and clinical profiles of patients in the pre- and post-implementation phases were comparable, reducing the likelihood that changes in case mix accounted for outcome differences. However, the 0% respiratory failure rate observed in April 2025 may partly reflect seasonal variations in pneumonia prevalence rather than guideline efficacy alone.[14] Therefore, while the findings align with literature supporting evidence-based interventions in pneumonia care, further research using quasi-experimental or randomized designs is necessary to validate the observed effects and establish causality.[24]

Participatory Action Research and Nurse Empowerment

The use of Kemmis and McTaggart's PAR model was instrumental in achieving the study's objectives. Nurses were engaged throughout all research cycles-planning, action, observation, and reflection—allowing for the co-creation of practical, evidence-informed guidelines suited to the local context.[23] This inclusive process ensured that the intervention was not only clinically sound but also operationally feasible and aligned with frontline workflows.[16]

Nurses reported increased professional confidence, improved interdepartmental communication, and greater clarity in clinical roles. The collaborative process contributed to a sense of ownership and commitment, which likely supported the successful implementation and sustainability of the guidelines.[11] These findings reinforce the broader value of participatory methods in healthcare improvement initiatives, particularly where top-down implementation often fails to capture on-the-ground realities.[12]

Patient Complexity and Opportunities for Refinement

Despite overall improvements, a subset of patients developed respiratory failure during the study period. These individuals were typically older (mean age 74.10 years, S.D. = 9.60) and had multiple chronic conditions, such as COPD, diabetes, and chronic kidney disease. Delayed hospital presentations or interfacility transfers were common in this group, highlighting vulnerabilities not fully addressed by the current protocol.[8,13]

Qualitative data from reflective PAR sessions illuminated additional challenges. Nurses expressed difficulties in detecting subtle signs of deterioration in elderly patients with multimorbidity[13]. These insights suggest that, while the guidelines were broadly effective, targeted refinements are needed for high-risk groups.[14] Potential enhancements include incorporating frailty assessments, strengthening escalation protocols, and providing advanced training on atypical symptom recognition.[11]

Study Limitations

Several limitations should be acknowledged in interpreting the findings of this study. First, the research was conducted in a single community hospital in Thailand, which may restrict the generalizability of the results to other healthcare settings with different resource availabilities, patient populations, or institutional cultures.[23] Although the guideline was carefully adapted to the local context through a participatory process, its applicability in more technologically advanced or structurally distinct environments remains uncertain.

Second, the use of a pre-post intervention design without a concurrent control group precludes causal inference. While the observed reduction in respiratory failure rates is promising and temporally aligned with the implementation of the guideline[11], the influence of confounding variables, such as seasonal variations in pneumonia severity[13], changes in staffing patterns, or overlapping quality improvement initiatives, cannot be entirely excluded.

Third, although the study demonstrated an improvement in respiratory failure incidence, it did not systematically assess other important clinical outcomes, such as in-hospital mortality, length of stay, or readmission rates[12]. Furthermore, an economic evaluation was beyond be scope of this study but is recommended for future research.

Finally, the post-implementation observation period was relatively brief. While short-term improvements in clinical outcomes and nurse satisfaction were evident[15], the long-term sustainability of guideline adherence, as well as the persistence of benefits over time, remain unknown. Ongoing monitoring and follow-up studies are necessary to assess the intervention's durability and inform potential scaling to other institutions.

Implications and Recommendations

The successful implementation of evidence-based nursing practice guidelines in a Thai community hospital highlights important implications for clinical practice in resource-limited settings. This study demonstrates that locally adapted, participatory interventions can enhance pneumonia care by reducing respiratory failure and improving nurse engagement. For scalability, healthcare organizations should ensure inclusive stakeholder involvement, structured staff training, and sustained institutional support to integrate such guidelines into routine practice effectively.

Equally important is the institutionalization of integrated monitoring mechanisms. Regular audits of guideline adherence, systematic tracking of respiratory failure rates, and responsive feedback loops can drive continuous quality improvement. Embedding these processes within existing quality assurance frameworks will help maintain fidelity, responsiveness, and long-term impact.

Future Research

To build upon these findings, future research should employ more rigorous designs—such as stepped-wedge or cluster randomized controlled trials—to validate the effectiveness and generalizability of the guidelines. These studies should also examine broader clinical indicators, including mortality, readmission rates, and cost-effectiveness, as well as incorporate holistic assessments of nursing performance and patient experiences. In parallel, qualitative research can explore contextual barriers and enablers that influence implementation, particularly in high-risk populations or underserved settings.

Conclusion

This participatory action research successfully developed and implemented evidence-based nursing guidelines tailored to the prevention of respiratory failure among pneumonia patients in a community hospital. The intervention was associated with improved clinical outcomes and high levels of nurse satisfaction, underscoring its feasibility and contextual relevance.

While the study’s limitations—such as the lack of a control group and ICU capacity—necessitate cautious interpretation, the findings suggest that participatory, evidence-informed strategies can effectively bridge the gap between research and practice. Continued evaluation, adaptation, and rigorous research will be essential to sustain and expand the impact of such interventions across diverse healthcare settings.

Declaration of AI Use:

Artificial intelligence (AI) tools, specifically Perplexity AI, were used to assist with language editing, formatting, and improving the clarity of this manuscript. All content was reviewed and approved by the authors to ensure accuracy and integrity.

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