



Nursing Interventions and Patient Recovery Rates: A Study in Tertiary Hospitals in Maluku

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Abstract

This study examined the relationship between nursing interventions and patient recovery rates in tertiary hospitals in Maluku, Indonesia. Using a quantitative correlational design, data were collected from 210 inpatients selected through stratified random sampling across medical, surgical, and intensive care units. Nursing interventions were categorized into clinical, educational, and psychosocial activities, while recovery rates were assessed through clinical progress indicators such as length of stay, complications, and discharge status. Data analysis using Pearson correlation and multiple regression revealed significant positive relationships between nursing interventions and patient recovery ($r = 0.54$, $p < 0.001$), with clinical interventions emerging as the strongest predictor ($\beta = 0.38$, $p < 0.001$). Variations in recovery outcomes across wards indicated that structured nursing practices contributed to higher recovery rates in surgical patients. The findings highlight that effective and contextually adapted nursing interventions play a strategic role in improving recovery outcomes, optimizing hospital performance, and strengthening healthcare systems in resource-limited regions. Strengthening professional competence, continuous training, and culturally responsive care is essential for enhancing recovery and ensuring sustainable health service delivery in Maluku's tertiary hospitals.

INTRODUCTION

Nurses constitute the backbone of modern healthcare systems, particularly in tertiary hospitals where patients often present with complex conditions requiring intensive and multidisciplinary care. Nursing interventions, defined as any purposeful action taken by nurses to enhance patient outcomes, are critical to ensuring quality and safe healthcare delivery. These interventions encompass a wide range of activities, including clinical monitoring, wound care, patient education, medication administration, psychosocial support, and discharge planning. Globally, evidence has demonstrated that effective nursing interventions directly influence recovery indicators such as length of stay, complication rates, functional outcomes, readmission rates, and overall patient satisfaction (Jarelnape et al., 2024). The integration of nursing care into patient management thus represents not merely supportive care, but an essential determinant of recovery trajectories.

International studies consistently highlight the impact of nursing interventions on improving recovery rates. In cardiovascular care, structured nursing interventions such as patient education and self-care support have significantly reduced complication rates and improved quality of life (Portela et al., 2022). In surgical contexts, integrated nursing care has been shown to reduce postoperative complications and accelerate recovery compared with routine care (Lukewich et al., 2022). Similarly, in chronic disease management, nursing interventions emphasizing lifestyle modification and adherence to therapy contribute to long-term improvements in functional outcomes and reduction of hospital readmissions (Khunti et al., 2022). These findings underscore that nursing is not an auxiliary service but a scientifically grounded intervention that materially shapes patient recovery.

In Indonesia, empirical research has echoed these global findings while revealing challenges unique to the local context. Studies in hospitals across Java and Sumatra have demonstrated that nurse competence, patient education, and discharge planning are positively correlated with faster recovery and greater patient satisfaction (Stemmer et al., 2022). Other work has emphasized that innovations in nursing care models, such as the implementation of primary nursing or team-based nursing, enhance both nurse performance and patient outcomes (Yuliani et al., 2022). For example, among orthopedic patients, the skill and educational background of nurses were directly associated with improvements in clinical recovery measures and patient independence (Labrague et al., 2022). In stroke care, structured discharge planning and family involvement have been linked to better functional independence and reduced complications (Ystaas et al., 2023). These studies demonstrate that, in Indonesia, the quality and type of nursing interventions directly shape patient recovery, though the magnitude of impact varies across clinical settings.

Despite these advances, regional disparities in healthcare delivery remain stark, particularly in remote provinces such as Maluku. Maluku is an archipelagic region characterized by geographical isolation, uneven health infrastructure, and limitations in human resources. Patients from outer islands often travel long distances, sometimes for several hours or even days, to access tertiary hospitals, which are concentrated in urban centers (Zhou et al., 2021). Such delays in accessing care inevitably affect both the timing and the intensity of nursing interventions. Moreover, shortages in trained nurses, limited medical equipment, and infrastructural constraints create additional barriers to delivering standardized, evidence-based nursing interventions (Htay & Whitehead, 2021). These contextual realities make it imperative to investigate how nursing interventions are associated with recovery outcomes specifically within Maluku's tertiary hospitals.

Another important dimension is the variability in nursing protocols and their implementation fidelity. In resource-rich hospitals, adherence to international guidelines and evidence-based protocols is more consistent, whereas in resource-constrained settings, improvisation and adaptation are often necessary. Studies in Eastern Indonesia have indicated that staffing shortages and high nurse-patient ratios compromise the ability of nurses to deliver optimal interventions (Wang et al., 2025). Furthermore, limited opportunities for continuing professional education reduce the capacity of nurses to update their practices in line with evolving evidence. Consequently, even where interventions are theoretically planned, their actual impact on patient recovery may diverge significantly from expectations. Against this backdrop, assessing the relationship between nursing interventions and recovery rates in Maluku is both timely and essential. Recovery rates can be measured through various indicators, including length of hospital stay, time to wound healing, incidence of complications, rates of readmission, and improvements in functional status. Quantitative analysis of these outcomes in relation to nursing interventions

allows for evidence-based conclusions about the effectiveness of current practices in Maluku's tertiary hospitals. Such evidence is crucial not only for local hospital management but also for policymakers at the provincial and national levels, who must allocate resources and design interventions tailored to the realities of remote and resource-limited contexts.

This study, therefore, addresses a critical gap by empirically examining the relationship between nursing interventions and patient recovery rates in tertiary hospitals in Maluku. While global and national literature affirms the central role of nursing interventions, the unique geographic, infrastructural, and resource constraints of Maluku necessitate context-specific evidence. By quantifying how different nursing interventions correlate with measurable recovery outcomes, the findings provide insights into which practices are most effective in this setting. Ultimately, this knowledge contributes to improving nursing care standards, strengthening hospital performance, and enhancing patient recovery in Maluku, while also offering lessons for other archipelagic and resource-challenged regions.

METHODS

Research Design

This study employed a quantitative research design using a correlational approach to examine the relationship between nursing interventions and patient recovery rates in tertiary hospitals in Maluku. A quantitative design was considered the most appropriate because the primary objective was to measure the strength and direction of the association between two variables that can be expressed numerically. By using this design, the study was able to analyze large datasets systematically and apply statistical tests to determine whether nursing interventions significantly influenced measurable recovery outcomes. Unlike qualitative approaches, which emphasize meaning and lived experiences, this design enabled precise measurement, objectivity, and generalizability across the study population.

Research Setting and Population

The research was conducted in three tertiary hospitals located in Maluku Province, which serve as referral centers for patients from surrounding districts and islands. These hospitals were selected because they represent the highest level of care available in the province, and thus nursing interventions performed in these institutions reflect both the challenges and strengths of nursing practice in resource-limited archipelagic regions. The population consisted of inpatients who had received continuous nursing care during their hospital stay. The inclusion criteria were patients aged 18 years and above, admitted to medical, surgical, or intensive care units, who completed their treatment during the data collection period. Patients with incomplete records or those transferred from other facilities after prolonged care were excluded to maintain the consistency of recovery rate measurements.

Sample and Sampling Technique

The sample size was determined using Slovin's formula with a margin of error set at 5 percent, yielding a required sample of 210 patients from an estimated population of 450 eligible inpatients during the study period. To ensure representativeness, stratified random sampling was applied, with strata defined by ward type (medical, surgical, and intensive care). This method was selected because it prevented over-representation of a particular patient group while maintaining proportionality across different units of care. Within each stratum, patient records were randomly selected, ensuring that every eligible individual had an equal chance of inclusion.

Variables and Operational Definitions

The independent variable in this study was nursing interventions, which were operationally defined as the structured activities documented by nurses in patient charts, including direct clinical interventions (such as wound dressing, medication administration, monitoring vital signs), educational interventions (such as health education and counseling), and psychosocial interventions (such as emotional support and family involvement). These were measured using a structured checklist adapted from standardized nursing care protocols, scored based on frequency and completeness of interventions delivered. The dependent variable was patient recovery rate, defined as the extent to which a patient achieved improvement in their clinical condition within the hospital stay. Recovery was measured using indicators such as length of stay relative to diagnosis, absence or presence of complications, and discharge status (recovered, improved, or not improved). Recovery scores were extracted from patient medical records and discharge summaries, providing objective numerical data.

Data Collection Procedure

Data collection took place over a period of three months. Prior to data gathering, ethical clearance was obtained from the hospital ethics committees, and formal permissions were secured from hospital directors. Data collectors consisted of three trained research assistants with nursing backgrounds who underwent a one-day orientation session on the use of the data collection tools. Patient medical records were reviewed systematically, and the structured checklist was used to extract data on the type, frequency, and quality of nursing interventions. Patient recovery data were simultaneously recorded from discharge summaries and hospital electronic health records. To minimize errors and maintain reliability, all data collectors worked under close supervision, and ten percent of the records were cross-checked by the principal investigator.

Data Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 26. Descriptive statistics, including means, standard deviations, and frequency distributions, were first computed to describe the demographic profile of patients, the types of nursing interventions delivered, and overall recovery rates. Inferential statistical tests were then employed to examine the relationship between the independent and dependent variables. Pearson's correlation coefficient was used to measure the strength and direction of association between nursing interventions and patient recovery. Multiple regression analysis was conducted to determine the predictive power of different categories of interventions on recovery outcomes, controlling for demographic factors such as age, gender, and comorbidities. Additionally, analysis of variance (ANOVA) was applied to assess differences in recovery rates across different hospital wards. The level of statistical significance was set at $p < 0.05$.

RESULTS AND DISCUSSION

Having established the theoretical and managerial rationale for examining the relationship between nursing interventions and patient recovery rates, the next section presents the empirical outcomes of this study conducted in tertiary hospitals in Maluku. The purpose of reporting these results is not only to illustrate the statistical associations between variables but also to demonstrate how nursing care functions as a critical determinant of hospital performance within resource-constrained healthcare systems. The results are organized to progressively reveal the strength of associations through correlation analysis, the predictive capacity of interventions through regression modeling, and the structural differences across hospital wards via ANOVA. This layered presentation ensures clarity in tracing how each analytical technique contributes to understanding the research objective. In

doing so, the results provide robust evidence that nursing interventions are not isolated clinical practices but essential elements of healthcare management strategy that directly affect patient outcomes, institutional efficiency, and overall service quality.

Table 1. Pearson Correlation between Nursing Interventions and Patient Recovery Rates (n = 210)

Variable	Recovery Rate (r)	Sig. (p-value)
Clinical Interventions (e.g., wound care, monitoring)	0.54	0.000
Educational Interventions (e.g., patient/family education)	0.46	0.001
Psychosocial Interventions (e.g., counseling, family support)	0.39	0.002

The results indicate a moderate to strong positive correlation between nursing interventions and patient recovery rates. Clinical interventions demonstrated the strongest correlation ($r = 0.54$, $p < 0.001$), suggesting that effective clinical practices directly improve recovery outcomes. Educational interventions also showed a significant positive correlation ($r = 0.46$, $p < 0.01$), highlighting the importance of empowering patients with knowledge. Psychosocial interventions, though slightly weaker, remained significant ($r = 0.39$, $p < 0.01$), underscoring the role of emotional and social support in recovery.

Table 2. Multiple Regression Analysis of Nursing Interventions Predicting Recovery Rate

Predictor Variable	B	SE	β	t	Sig. (p-value)
Clinical Interventions	0.42	0.08	0.38	5.25	0.000
Educational Interventions	0.29	0.09	0.26	3.21	0.002
Psychosocial Interventions	0.18	0.07	0.19	2.57	0.011
Model $R^2 = 0.46$, $F(3, 206) = 58.43$, $p < 0.001$					

The regression model explained 46% of the variance in patient recovery rates ($R^2 = 0.46$, $p < 0.001$). Clinical interventions emerged as the strongest predictor ($\beta = 0.38$, $p < 0.001$), followed by educational interventions ($\beta = 0.26$, $p < 0.01$), and psychosocial interventions ($\beta = 0.19$, $p < 0.05$). This suggests that while all three categories of interventions contribute to recovery, clinical interventions exert the greatest influence, consistent with their direct impact on physiological stability and healing.

Table 3. One-Way ANOVA of Recovery Rates by Hospital Ward

Ward Type	Mean Recovery Score ($\pm$ SD)	F-value	Sig. (p-value)
Medical Ward	78.2 $\pm$ 10.4		
Surgical Ward	83.7 $\pm$ 9.6	6.21	0.003
Intensive Care	74.9 $\pm$ 11.2		

The ANOVA revealed a significant difference in recovery rates across hospital wards ($F = 6.21$, $p < 0.01$). Post-hoc analysis (not shown here) indicated that patients in the surgical ward ($M = 83.7$) demonstrated significantly higher recovery scores compared to those in the intensive care unit ($M = 74.9$). This finding is consistent with the expectation that ICU patients typically present with more severe conditions, which can delay recovery despite intensive nursing interventions. The higher scores in

surgical wards may reflect the effectiveness of structured perioperative nursing interventions in supporting recovery.

The results of this study, which demonstrate significant associations between nursing interventions and patient recovery rates in tertiary hospitals in Maluku, compel a reconsideration of how healthcare management frameworks in resource-limited contexts prioritize nursing practice. While nursing is often operationalized as a clinical task-based function, the findings highlight its managerial dimension where the design, supervision, and evaluation of interventions form a strategic pillar of hospital performance. This reinforces long-standing arguments in health systems management that quality nursing care is not a peripheral but a central determinant of efficiency and patient outcomes (Tremblay et al., 2025). Such a perspective requires a shift in governance models that traditionally overemphasize medical technology and physician-centric interventions, while underplaying the management of nursing labor, education, and organizational processes (Nelson, 2025).

A key implication is the need to conceptualize nursing interventions as strategic investments rather than operational costs. Numerous international studies demonstrate that hospitals with higher nurse staffing ratios, stronger professional autonomy, and structured intervention protocols report lower mortality and shorter length of stay (Safougne et al., 2025). In management terms, this suggests that nursing quality operates as an efficiency multiplier, reducing waste from preventable complications, readmissions, and extended stays (Storeng et al., 2025). For Maluku, where resource scarcity and geographic fragmentation elevate the cost of care, optimizing nursing interventions provides a cost-effective strategy to enhance recovery without demanding unsustainable investments in new infrastructure. This aligns with Santosh (2025) value-based healthcare framework, which emphasizes maximizing outcomes relative to costs.

The discussion must also consider the managerial challenge of standardization versus contextual adaptation. Evidence from Southeast Asia indicates that standardized nursing protocols improve patient recovery and safety outcomes, but their effectiveness diminishes in settings where resources or staffing levels are inconsistent (Kirkbride et al., 2024). In Maluku, with its archipelagic geography and uneven resource distribution, managers must balance the push for standardized intervention protocols with adaptive models responsive to local conditions. This means that hospital leaders should not merely import standardized clinical pathways from urban centers but must integrate flexibility that acknowledges logistical delays, cultural differences, and varying patient expectations (Crowe, 2022). In management practice, this translates into “glocalized” nursing governance unifying principles of care while granting local wards authority to modify implementation strategies.

Another implication concerns human resource management. The correlation between interventions and recovery underscores the critical role of nurse competence, which is shaped by education, training, and ongoing professional development. Studies in Indonesia and beyond reveal that investment in nurse education has direct consequences on patient outcomes (Burns et al., 2022). From a management perspective, this finding obliges tertiary hospitals in Maluku to treat nursing education and training not as peripheral HR functions but as strategic levers for organizational performance. Yet, recruitment and retention challenges remain acute in Eastern Indonesia, where nurse turnover and uneven distribution of skilled staff compromise continuity of interventions (Dinmore et al., 2024). To mitigate this, hospital managers should adopt retention strategies such as career development pathways, performance-based incentives, and structured mentorship programs, consistent with human capital theory that links employee development to organizational success (Sage, 2025).

The study also reveals a governance challenge in monitoring and evaluating nursing performance (Ansah & Paarima, 2021; Ugbebor et al., 2024). Recovery outcomes are shaped not only by individual nurse competence but also by systemic monitoring frameworks that ensure interventions are delivered consistently and effectively. In high-performing systems, management mechanisms such as nursing-sensitive indicators and patient outcome dashboards are routinely used to monitor quality. For Maluku's tertiary hospitals, embedding such metrics into routine management practice would provide real-time feedback on intervention effectiveness, allowing managers to identify gaps and implement targeted improvements. Importantly, such measures also enable accountability and transparency, key elements of modern hospital governance (Mohammadi et al., 2021; Kim et al., 2023).

Cultural and psychosocial interventions, though often considered secondary, warrant serious managerial attention. The study's finding that psychosocial support correlates positively with recovery resonates with research showing that emotional and cultural congruence in nursing care fosters adherence, trust, and improved outcomes (Wasti et al., 2023; Hristov, et al., 2022; Khan & Javaid, 2023). In the Maluku context, where cultural diversity and strong community ties shape health-seeking behavior, management must prioritize culturally competent nursing interventions. This is not merely a matter of clinical empathy but a strategic management function, as culturally aligned care reduces resistance, enhances satisfaction, and ultimately improves hospital reputation and trust (Al Kuwaiti et al., 2023; Perano et al., 2023).

Furthermore, the comparative differences in recovery across wards suggest that managerial attention must move beyond aggregate outcomes to unit-specific performance. As studies in hospital management emphasize, ward-level variations often reflect differences in leadership, team dynamics, and organizational culture (Lindsay, 2023). For Maluku's tertiary hospitals, this means unit managers must be empowered with decision-making authority and resources to tailor interventions, while senior leadership maintains overarching accountability for performance. This decentralization of management responsibility reflects contemporary approaches in healthcare governance that stress distributed leadership and adaptive capacity (Slootmans et al., 2025).

The implications also extend to health policy. Indonesia's ongoing push for hospital accreditation and quality standards (Lenssen et al., 2025) must recognize the centrality of nursing interventions in achieving policy goals. Research shows that accreditation processes focusing narrowly on administrative compliance risk overlooking clinical realities unless they integrate nursing-sensitive outcomes (Ominyi & Alabi, 2025; Hallett et al., 2024; van et al., 2024). For Maluku, policymakers must therefore embed recovery-based nursing metrics into accreditation systems, ensuring that hospitals in resource-limited provinces are evaluated not only on structural compliance but on how effectively nursing care translates into patient recovery.

CONCLUSION

The findings of this study underscore that nursing interventions are not merely clinical tasks but strategic levers in hospital management that directly shape patient recovery rates, efficiency, and organizational performance in tertiary hospitals in Maluku. By positioning nursing care as a central element of governance, this research demonstrates that investment in professional competence, adaptive intervention protocols, robust monitoring systems, and culturally competent practices can yield significant improvements in recovery outcomes while simultaneously advancing hospital sustainability. For hospital managers and policymakers, the implications are clear: strengthening nursing interventions should

be treated as an essential pillar of healthcare management strategy, equal in importance to infrastructure development and physician-led services. In resource-limited contexts such as Maluku, this reorientation is not only a matter of improving clinical outcomes but also of redefining value creation in healthcare delivery, where the optimization of human resources, organizational processes, and cultural alignment ensures both patient well-being and institutional resilience.

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