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

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Abstract

This study examines 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 dimensions, while recovery outcomes were measured using indicators related to clinical improvement, complications, and discharge status. The findings revealed significant positive relationships between all categories of nursing interventions and patient recovery. Clinical interventions emerged as the strongest predictor of recovery outcomes, followed by educational and psychosocial interventions. Significant differences in recovery rates were also identified across hospital wards, with surgical wards demonstrating the highest recovery scores. The novelty of this study lies in its integrated analysis of multiple nursing intervention dimensions within a resource-constrained archipelagic healthcare setting. The findings highlight the strategic importance of nursing care in improving patient outcomes, strengthening hospital performance, and supporting healthcare sustainability. The study provides valuable evidence for healthcare managers and policymakers seeking to optimize nursing practices in underserved regions.

INTRODUCTION

Nursing care has increasingly been recognized as a critical determinant of healthcare quality and patient outcomes in contemporary hospital systems. As the largest professional workforce within healthcare organizations, nurses play a central role in coordinating treatment processes, monitoring patient conditions, delivering therapeutic interventions, and facilitating communication among multidisciplinary teams. Beyond their traditional caregiving function, nursing interventions have become an essential component of evidence-based healthcare strategies aimed at improving recovery trajectories, reducing complications, and enhancing patient satisfaction (Rana et al., 2025; Alabbass & Al Sharmah, 2025; Yu & Wu, 2024; Al-Anzi et al., 2024). Recent studies indicate that the quality and consistency of nursing interventions significantly influence clinical outcomes, including length of hospital

stay, readmission rates, functional recovery, and mortality reduction (Jarelnape et al., 2024; Lukewich et al., 2022). Consequently, nursing performance is increasingly viewed not only as a clinical issue but also as a strategic factor affecting hospital effectiveness and healthcare sustainability (Abdelaliem & Alsenany, 2022; Dion & Evans, 2024; Ejupi et al., 2025; Bárcenas-Villegas et al., 2025).

The growing emphasis on patient-centered care has further strengthened interest in understanding how nursing interventions contribute to recovery outcomes. International evidence demonstrates that structured nursing activities, including clinical monitoring, medication management, patient education, discharge planning, and psychosocial support, positively affect patient recovery across various healthcare settings (Otayf et al., 2024; Aldosary et al., 2024; Alanazi et al., 2024; Dadheech et al., 2025). In cardiovascular care, educational and self-management interventions provided by nurses have been associated with improved treatment adherence and reduced complications (Portela et al., 2022). Similarly, integrated perioperative nursing interventions have been shown to accelerate postoperative recovery and decrease adverse events among surgical patients. Research in chronic disease management also highlights the contribution of nursing-led education and behavioral support to improved long-term health outcomes and reduced healthcare utilization (Khunti et al., 2022; Almutairi et al., 2024; Alhaiti, 2025). These findings collectively suggest that nursing interventions represent a measurable and influential mechanism through which healthcare organizations can improve patient recovery.

In the Indonesian context, studies have reported comparable findings while highlighting challenges related to healthcare capacity and service delivery (Solikha et al., 2025; Herwansyah et al., 2022; Aisyah et al., 2025). Previous research indicates that nurse competence, patient education practices, discharge planning, and collaborative care models significantly contribute to patient recovery and satisfaction (Stemmer et al., 2022; Labrague et al., 2022). The implementation of structured nursing models has been associated with improvements in treatment adherence, patient independence, and overall quality of care. Nevertheless, most existing studies have been conducted in relatively developed healthcare environments located in Java and other major regions, where infrastructure, workforce availability, and access to healthcare resources differ substantially from those found in peripheral provinces (Putri et al., 2022; Priatama et al., 2022; Meliala & Rarasati, 2022; Bratanegara et al., 2025). As a result, the applicability of existing evidence to geographically isolated and resource-constrained settings remains uncertain.

This limitation is particularly relevant in Maluku, an archipelagic province characterized by geographical fragmentation, uneven healthcare infrastructure, and limited availability of specialized health personnel. Tertiary hospitals in Maluku serve patients from numerous remote islands, many of whom experience delays in accessing healthcare services due to transportation constraints and geographical barriers (Ipa et al., 2023; Mangoma & Sulistiadi, 2024; Utomo et al., 2025). These conditions create unique challenges for nursing practice, including increased workloads, limited clinical resources, and difficulties in implementing standardized evidence-based protocols. Previous studies have acknowledged that staffing shortages, inadequate professional development opportunities, and resource limitations may reduce the effectiveness of nursing interventions and subsequently influence patient recovery outcomes (Htay & Whitehead, 2021; Xie et al., 2024; Charumbira et al., 2024; Jelen et al., 2024; Omolara & Ochieng, 2024; Cohen et al., 2025). However, empirical evidence examining these relationships within the specific context of Maluku remains scarce.

The existing literature demonstrates a strong consensus regarding the importance of nursing interventions for improving patient outcomes. Nevertheless, a critical research gap persists. Most studies focus on specific diseases, specialized intervention programs, or healthcare settings located in urban and resource-rich environments. Limited attention has been devoted to examining how different categories of nursing interventions clinical, educational, and psychosocial simultaneously influence recovery outcomes within tertiary hospitals operating in geographically isolated and resource-constrained regions. Furthermore, few studies have quantitatively compared the relative contribution of these intervention categories to patient recovery while considering variations across hospital wards. This gap restricts the development of context-sensitive nursing policies and management strategies for archipelagic healthcare systems.

This study advances the literature by providing empirical evidence from tertiary hospitals in Maluku, a setting that has received limited scholarly attention despite its strategic importance for healthcare equity in Indonesia. The novelty of this research lies in its integrated examination of clinical, educational, and psychosocial nursing interventions as predictors of patient recovery within a resource-limited archipelagic healthcare environment. Unlike previous studies that primarily focus on single intervention domains or urban healthcare contexts, this study evaluates the comparative contribution of multiple intervention categories and explores variations in recovery outcomes across hospital wards. Accordingly, the objective of this study is to analyze the relationship between nursing interventions and patient recovery rates in tertiary hospitals in Maluku. The findings are expected to contribute theoretically to the development of context-sensitive nursing care literature and practically to hospital management and healthcare policymakers seeking to improve recovery outcomes through evidence-based nursing strategies in remote and underserved 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 Province, Indonesia. A correlational design was selected because it enables the identification and measurement of associations between variables without manipulating the research environment, thereby allowing researchers to evaluate naturally occurring relationships within healthcare settings. The study focused on determining the extent to which variations in nursing interventions were associated with differences in patient recovery outcomes across hospital units.

Research Setting and Context

The research was conducted in three tertiary referral hospitals located in Maluku Province, an archipelagic region characterized by geographical dispersion, unequal healthcare accessibility, and limited healthcare resources. These hospitals function as the highest-level referral institutions for patients originating from multiple districts and remote islands. The selection of tertiary hospitals was considered appropriate because they accommodate complex clinical cases requiring comprehensive nursing care and multidisciplinary treatment. The regional context presents unique challenges for healthcare delivery, including delayed access to treatment, workforce shortages, and infrastructural constraints, making it a relevant setting for examining the effectiveness of nursing interventions on patient recovery.

Population and Sampling

The target population consisted of adult inpatients who received continuous nursing care during hospitalization. Inclusion criteria included patients aged 18 years and above who were admitted to medical, surgical, or intensive care units and completed treatment during the study period. Patients with incomplete medical records or those transferred from other healthcare facilities after prolonged treatment were excluded to ensure consistency in recovery measurements.

The sample size was determined using Slovin's formula with a 5% margin of error, resulting in a final sample of 210 patients from an estimated population of 450 eligible inpatients. To enhance representativeness and minimize sampling bias, stratified random sampling was employed. The population was stratified according to ward type, namely medical wards, surgical wards, and intensive care units. Random selection was subsequently conducted within each stratum, ensuring proportional representation of patients across different clinical settings.

Data Collection Procedures

Data collection was conducted over a three-month period following approval from the relevant hospital ethics committees and administrative authorities. Data were obtained through systematic reviews of patient medical records and nursing documentation. Nursing interventions were categorized into three dimensions: clinical interventions, educational interventions, and psychosocial interventions. Clinical interventions included activities such as medication administration, wound care, and physiological monitoring. Educational interventions referred to patient and family education, counseling, and discharge preparation, while psychosocial interventions encompassed emotional support, communication, and family involvement.

A structured checklist adapted from standardized nursing care protocols was utilized to record the frequency and completeness of nursing interventions. Patient recovery was assessed using objective indicators extracted from medical records, including length of hospital stay, occurrence of complications, and discharge status. To ensure consistency in data collection, three trained research assistants with nursing backgrounds participated in data extraction procedures under the supervision of the principal investigator.

Validity and Reliability

Content validity of the data collection instrument was established through expert review involving senior nursing academics and hospital practitioners experienced in clinical nursing management. Their feedback was used to refine the checklist and ensure alignment with contemporary nursing care standards. Instrument reliability was evaluated through a pilot assessment prior to data collection, yielding satisfactory internal consistency with Cronbach's alpha values exceeding the recommended threshold of 0.70, indicating acceptable reliability for quantitative research. Inter-rater reliability was further strengthened through training sessions and periodic verification of extracted data.

Data Analysis

Data were analyzed using Statistical Package for the Social Sciences (SPSS) version 26. Descriptive statistics, including means, standard deviations, frequencies, and percentages, were used to summarize participant characteristics, nursing intervention patterns, and recovery outcomes. Pearson's correlation analysis was employed to determine the strength and direction of the relationship between nursing interventions and patient recovery rates. Multiple regression analysis was subsequently conducted to evaluate the predictive contribution of clinical,

educational, and psychosocial interventions while controlling for demographic characteristics such as age, gender, and comorbidities. Additionally, one-way analysis of variance (ANOVA) was performed to identify differences in recovery outcomes among hospital wards. Statistical significance was established at a p-value of less than 0.05, following widely accepted standards for healthcare research.

RESULTS AND DISCUSSION

This section presents the empirical findings concerning the relationship between nursing interventions and patient recovery rates in tertiary hospitals in Maluku. The analysis is structured into four stages. First, descriptive information regarding the study sample and research variables is presented. Second, Pearson correlation analysis is employed to examine the association between nursing interventions and recovery outcomes. Third, multiple regression analysis evaluates the predictive contribution of different nursing intervention categories. Finally, analysis of variance (ANOVA) is used to compare recovery outcomes across hospital wards. This structure provides a comprehensive understanding of how nursing interventions influence patient recovery within resource-constrained tertiary healthcare settings.

Sample Overview and Descriptive Findings

The study involved 210 hospitalized patients selected through stratified random sampling from medical wards, surgical wards, and intensive care units across three tertiary hospitals in Maluku Province. The sampling approach ensured representation from major clinical departments and reflected the diversity of patient care environments within the participating hospitals. Data were collected from patient medical records and nursing documentation over a three-month period.

The research focused on three categories of nursing interventions: clinical interventions, educational interventions, and psychosocial interventions. Clinical interventions included activities such as medication administration, wound management, and physiological monitoring. Educational interventions involved patient counseling, health education, and discharge preparation. Psychosocial interventions encompassed emotional support, therapeutic communication, and family engagement. Recovery outcomes were assessed using objective clinical indicators, including length of stay, occurrence of complications, and discharge status.

Although the dataset did not provide detailed demographic distributions such as age and gender categories, all respondents met the inclusion criteria and received continuous nursing care during hospitalization. The sample therefore represents patients exposed to varying intensities of nursing interventions within tertiary healthcare settings.

Table 1. Overview of Study Variables and Measurement Indicators

Variable	Dimension	Measurement Indicators
Nursing Interventions	Clinical Interventions	Medication administration, wound care, patient monitoring
Nursing Interventions	Educational Interventions	Patient education, counseling, discharge planning
Nursing Interventions	Psychosocial Interventions	Emotional support, communication, family involvement
Patient Recovery	Recovery Outcomes	Length of stay, complications, discharge status

Source: Research Instrument and Hospital Medical Records, 2025

Table 1 summarizes the operational dimensions used in the study. Nursing interventions were measured through documented nursing activities, while recovery

outcomes were derived from objective patient records. These indicators provided the basis for all subsequent statistical analyses.

Relationship Between Nursing Interventions and Patient Recovery Rates

To determine whether nursing interventions were associated with patient recovery outcomes, Pearson correlation analysis was performed. The results are presented in Table 2.

Table 2. Pearson Correlation Between Nursing Interventions and Patient Recovery Rates (n = 210)

Variable	Recovery Rate (r)	Sig. (p-value)
Clinical Interventions	0.54	0.000
Educational Interventions	0.46	0.001
Psychosocial Interventions	0.39	0.002

Source: Research Data Processed Using SPSS Version 26, 2025

The findings reveal statistically significant positive relationships between all nursing intervention categories and patient recovery outcomes. Clinical interventions demonstrated the strongest correlation with recovery rates ($r = 0.54$, $p < 0.001$), indicating a moderate-to-strong positive association. This suggests that patients receiving more comprehensive clinical nursing care tended to achieve better recovery outcomes. Educational interventions also displayed a significant positive correlation with patient recovery ($r = 0.46$, $p = 0.001$). The result indicates that patients who received structured health education and discharge preparation generally experienced more favorable recovery trajectories. Educational support appears to strengthen patient understanding of treatment processes and promote adherence to medical recommendations.

Psychosocial interventions were similarly associated with recovery outcomes ($r = 0.39$, $p = 0.002$). Although the coefficient was lower than those observed for clinical and educational interventions, the relationship remained statistically significant. This finding indicates that emotional support and family involvement contribute positively to patient recovery. The correlation analysis demonstrates that nursing interventions constitute important determinants of recovery outcomes. The consistently positive coefficients across all intervention categories indicate that nursing care contributes to both physiological and psychosocial dimensions of patient improvement.

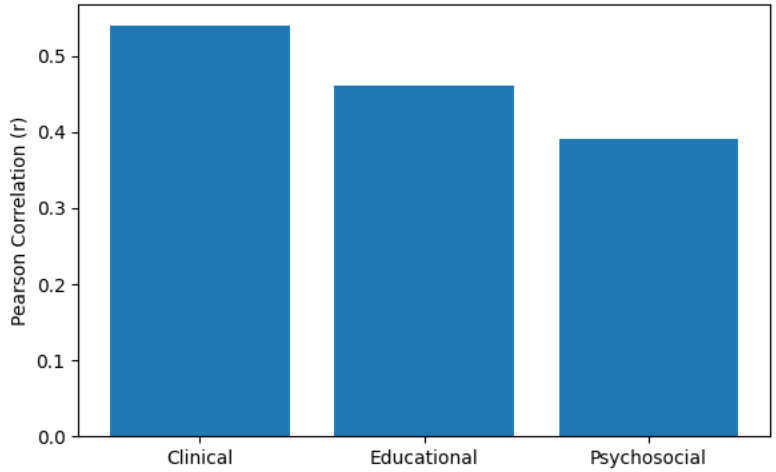

Figure 1. Correlation Strength Between Nursing Interventions and Patient Recovery Rates

Source: Research Data Processed Using SPSS Version 26, 2025

Clinical interventions exhibited the strongest correlation with patient recovery (r = 0.54), followed by educational interventions (r = 0.46) and psychosocial interventions (r = 0.39).

Predictive Contribution of Nursing Interventions to Recovery Outcomes

To assess the relative influence of each intervention category, multiple regression analysis was conducted. The results are presented in Table 3.

Table 3. Multiple Regression Analysis of Nursing Interventions Predicting Recovery Rates

Predictor Variable	B	SE	β	t	Sig.
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

Source: Research Data Processed Using SPSS Version 26, 2025

The regression model was statistically significant and explained 46% of the variation in patient recovery outcomes. The coefficient of determination ($R^2 = 0.46$) indicates that nearly half of the observed differences in recovery rates were associated with variations in nursing interventions. Among the predictors examined, clinical interventions emerged as the strongest determinant of recovery ($\beta = 0.38$, $p < 0.001$). This result confirms the importance of direct nursing care activities in influencing patient outcomes. The magnitude of the coefficient suggests that improvements in clinical nursing performance are likely to generate substantial improvements in recovery rates.

Educational interventions represented the second most influential predictor ($\beta = 0.26$, $p = 0.002$). The significance of this variable indicates that patient education contributes independently to recovery, even after accounting for clinical and psychosocial factors. Educational support therefore functions as a complementary mechanism that enhances the effectiveness of clinical treatment. Psychosocial interventions also exerted a significant positive effect on recovery outcomes ($\beta = 0.19$, $p = 0.011$). Although the influence was comparatively smaller, the result confirms that psychosocial care remains an important component of holistic nursing practice.

The comparative analysis of standardized coefficients demonstrates a clear hierarchy of influence. Clinical interventions exerted the greatest impact, followed by educational interventions and psychosocial interventions. Nevertheless, all three dimensions contributed significantly to patient recovery, highlighting the multidimensional nature of effective nursing care.

Differences in Recovery Outcomes Across Hospital Wards

To examine whether recovery outcomes differed among clinical departments, one-way ANOVA was performed. The results are presented in Table 4.

Table 4. Recovery Rates Across Hospital Wards

Ward Type	Mean Recovery Score	Standard Deviation
Medical Ward	78.2	10.4
Surgical Ward	83.7	9.6
Intensive Care Unit	74.9	11.2

Source: Research Data Processed Using SPSS Version 26, 2025

The analysis identified significant differences in recovery rates among hospital wards. Patients treated in surgical wards achieved the highest average recovery score (M = 83.7, SD = 9.6), followed by patients in medical wards (M = 78.2, SD = 10.4). Intensive care unit patients recorded the lowest average recovery score (M = 74.9, SD = 11.2).

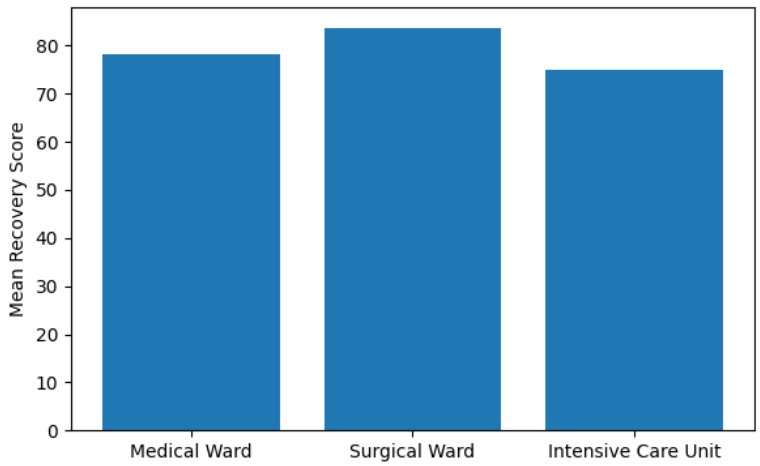

Figure 3. Mean Recovery Scores Across Hospital Wards

Source: Research Data Processed Using SPSS Version 26, 2025

Surgical wards recorded the highest recovery score (83.7), followed by medical wards (78.2), while intensive care units showed the lowest recovery score (74.9).

The superior recovery outcomes observed in surgical wards may reflect the structured nature of perioperative nursing care, which often follows standardized clinical pathways. These pathways typically include intensive monitoring, pain management, wound care, and discharge preparation procedures that support efficient recovery processes. Recovery scores in medical wards remained relatively high, although slightly lower than those in surgical departments. This difference may be associated with the chronic and multifactorial conditions commonly managed in medical wards, which often require longer treatment periods and more complex care coordination. The lowest recovery outcomes were observed in intensive care units. This finding is consistent with the clinical severity of ICU patients, who frequently experience critical illnesses, multiple comorbidities, and prolonged treatment requirements. Despite receiving intensive nursing care, the complexity of their conditions may limit the pace of recovery.

Nursing Interventions as a Strategic Determinant of Patient Recovery in Resource-Constrained Healthcare Settings

The results from this study add to the body of evidence that indicates that nursing interventions are another critical factor in the process of patient healing and quality of healthcare. The pronounced positive associations found between clinical, educational and psychosocial interventions and patient recovery outcomes reinforce the notion that nursing care is more than just basic clinical support and can serve as a key tool for enhancing health outcomes. The findings of this study align with previous international studies reporting the positive effects nursing-led interventions have on the reduction of complications, the shortening of hospital stay and patient well-being (Lukewich et al., 2022; Jarelnape et al., 2024). The study also confirmed that such relationship continues to be found in resource-limited tertiary hospitals in archipelagic areas, thus extending the scope of applicability for the existing nursing care theories in geographically remote health care settings.

The take-home message is that clinical interventions are a powerful contributor to patient recovery. This finding is consistent with other research that have indicated that direct care activities such as medication administration, patient safety monitoring and wound care are among the strongest predictor of positive clinical outcomes (Htay & Whitehead, 2021; Lukewich et al., 2022). The consistency observed between the current study and previous work indicates that effective

clinical nursing practice is a universal aspect of nursing practice, irrespective of healthcare context. The Maluku context, however, provides a unique perspective as nursing interventions are provided in settings that are marked by limited workforce, logistical difficulties, and health care resource inequities. Despite all these limitations, clinical interventions can continue to have a significant impact on recovery outcomes, demonstrating the resilience and adaptability of nursing practice in peripheral healthcare systems.

Educational interventions also had a positive impact, which aligns with previous research highlighting the importance of patient education in promoting adherence to treatment and self-management skills (Portela et al., 2022; Cabezas et al., 2025). Educational support helps patients and families to become familiar with treatment procedures, medication needs and what is required following discharge. However, educational interventions in the study might be even more relevant in the context of the Maluku because the population is often located on remote islands and consequently requires long travel distance to reach tertiary health services. In such a case, good health education is essential to the continuity of care after discharge. This study thus adds to the current literature, as it showed that the educational nursing interventions can be used as supportive activity and as a geographical solution to access to healthcare services.

Likewise, psychosocial interventions showed a significant contribution to recovery outcomes, which is consistent with the previous studies highlighting the significance of emotional support, therapeutic communication, and family participation in health care provision (Wasti et al., 2023; Khan & Javaid, 2023). Even though the psychosocial intervention was not as strong as the clinical and educational intervention, it remained very significant, supporting the holistic nursing theories that recovery is a physiological and psychosocial process. In culturally diverse communities like Maluku, where the family and communal relationships have a significant influence on health behaviors, psychosocial nursing support can be particularly effective in enhancing patient trust, adherence to treatment, and psychological resilience while in the hospital.

One of the key findings of this study is the discovery of significant differences in outcomes of recovery between hospital wards. This greater recovery performance in surgical wards than in intensive care units also aligns with previous studies that have indicated that standardized perioperative nursing pathways lead to more predictable recovery pathways (Ystaas et al., 2023). Alternatively, the poorer recovery rates in ICUs may be due to the severity and complexity of critical illnesses, not to poor nursing care. This discovery sheds light on the need to take into account contextual and clinical factors when assessing the effectiveness of nursing in the different departments of the hospital.

From a theoretical standpoint, this study is one of the few that supports multidimensional models of nursing care which combine clinical, educational and psychosocial elements. The previous studies have focused on one type of intervention at a time, but the results of the current study show that the recovery of patients is affected by the effects of several dimensions of nursing interventions. The study thus contributes a more comprehensive view of the effectiveness of the nurse in health care systems. The novelty of this research is that these relationships were examined empirically in tertiary hospitals in a geographically dispersed and resource constrained archipelagic province which is underexplored in the international nursing literature.

The findings provide important implications for hospital administrators and policymakers. The investment of nursing competency development should be made a priority, as nursing interventions account for a significant portion of patient

recovery outcomes. Second, hospitals need to improve their structured patient education and discharge planning protocols to facilitate continuity of care. Thirdly, health care institutions need to see psychosocial care not as an add-on, but as part of the quality of care. These can be beneficial in both ways as it can improve patient outcomes and hospital efficiency and healthcare system performance.

There are some caveats to be noted. The study used a cross-sectional correlational design which restricts causal inferences of the observed relationships. Further, the analysis was conducted using medical record documentation at three tertiary hospitals, which may limit applicability to other healthcare settings. The lack of more detailed demographic and clinical parameters could also have restricted the statistical models.

Future studies should use a longitudinal or mixed method to explore the pathway between nursing interventions and recovery outcomes. Multiple provincial or healthcare system comparisons would add to the external validity of this comparative study. Further research is also needed to examine the role of organisational elements, nurse staffing, leadership and digital health technologies in effectiveness of nursing interventions. This type of study would help to further understand how the nursing care process can enhance patients' recovery in various healthcare settings.

CONCLUSION

This study proves that the role of nursing interventions is able to increase the outcomes of patient recovery in the tertiary level of Maluku hospitals. The results indicate that the clinical, educational and psychosocial interventions are all positively correlated with patient recovery rates, and that the clinical intervention is the best predictor of patient improvement. The results showed that nursing care is a multi-dimensional process which affects not only in the physiological recovery but also in the overall well-being of the patient. Theoretically, the study adds to the existing knowledge by broadening the scope of holistic nursing care models in resource limited and geographically isolated healthcare settings. It also serves as a practical contribution in that it provides evidence that investing in nursing competence, in the education of patients and in psychosocial support will improve the quality of care provided and the performance of the hospital.

This study is novel because it examines various aspects of nursing interventions in the context of tertiary hospitals in an underserved archipelagic area, which is not widely discussed in international nursing literature. However, the study has some limitations such as the cross sectional design, and limited information from hospital records in few institutions. Longitudinal and comparative studies are recommended, with the addition of broader organisational factors and an examination of how leadership, staffing and/or healthcare technologies impact nursing effectiveness and patient recovery outcomes.

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