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THE INFLUENCE OF NURSES' PROFICIENCY IN CHEST TUBE AFTERCARE ON POSTOPERATIVE RECOVERY DURATION: A CORRELATIONAL STUDY IN SURGICAL WARDS AT SAIDU TEACHING HOSPITAL, SWAT.

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Abstract

Background:
Chest tube aftercare is a critical component in the postoperative management of patients undergoing thoracic surgery. Inadequate nursing care can lead to complications, prolonged hospital stays, and delayed recovery. While numerous studies have explored surgical techniques, few have examined the correlation between nursing proficiency in chest tube management and patient recovery outcomes.

Aim:
This study aimed to examine the correlation between nurses' proficiency in chest tube aftercare and the postoperative recovery time of patients in the surgical wards of Saidu Teaching Hospital, Swat.

Methods:
A correlational, cross-sectional quantitative research design was employed. The sample consisted of 100 registered nurses selected through convenience sampling from surgical wards. Two data collection tools were used: a structured nurse proficiency questionnaire and a patient recovery assessment form. Data were collected over two months and analyzed using SPSS version 27. Descriptive statistics described demographics, while Pearson's correlation coefficient determined associations between nurse proficiency scores and patient recovery outcomes.

Results:
The results revealed a statistically significant negative correlation between nurses' chest tube care proficiency scores and patients' length of hospital stay ($r = -0.42$, $p < 0.01$), incidence of complications ($r = -0.35$, $p < 0.05$), and delayed chest tube removal ($r = -0.47$, $p < 0.01$). Higher proficiency was associated with improved patient recovery indicators.

Conclusion:
Nursing proficiency in chest tube aftercare has a measurable impact on surgical patient recovery. Structured training and standardized protocols are essential for

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optimizing postoperative outcomes in thoracic surgery units.

INTRODUCTION

Postoperative nursing: Chest tube care is an essential part of postoperative nursing care of patients who have had thoracic and heart operations, had pneumothorax and hemothorax (Fitzpatrick, 2025). This is a process associated with the insertion and the retention of a thoracostomy tube to relieve a pleural area of air, fluid, or blood to allow an appropriate expansion of the lungs and inhibit life-threatening issues (Anderson et al., 2022). The efficiency of nurses working with chest tubes directly causes the postoperative recovery results (Ghazali et al., 2021). Ways in which proficiency is related to this scenario are knowledge, skill and judgment of a nurse in regards to maintenance of chest tube patency, complications, and holistic care.

The aftercare performance is a deciding factor in the recovery of more than 80 percent of patients undergoing thoracic surgery across the globe who would need postoperative chest drainage (Şentürk, Goku, & Şentürk, 2022). The rates of complication due to bad management of chest tubes in resource-limited conditions like in Pakistan is 20-30%, which most of the time leads to long hospital stays, higher expenditures, and readmission. Typical trouble is the dislodgement, blockage, subcutaneous emphysema, and pleural infection, which are often explained by poor nursing care (Zaki et al., 2021).

Postoperative responsibilities of nursing involve observing the drainage system, pain management, reducing the risks of infection, facilitating mobility, and patient education (Roebker et al., 2023). Nonetheless, research results have indicated that there is a wide range of diversities in nursing practice because of gaps in training and lack of standard operating procedures. This inconsistency may prolong recovery and complicate the further development of pneumothorax recurrence or emphysema (Camicia, et al., 2025).

Poor outcomes may also be caused by improper clamping or inadequate aseptic technique or not noticing an indication of malfunction (Liu et al., 2025). It is indicated that nurses who have a formal education and simulated learning environment are more prepared to face emergencies and enhance patient safety. Formal education would make the nurses feel more confident and encourage them to make decisions in a timely manner, resulting in shorter lung re-expansion and decreased postoperative morbidity (Kunisaki & Leys, 2020).

However, on the other hand, undertrained nurses tend to use observation instead of evidence-based practice that worsens the process of recovery and negatively impacts patient care (Moslehi, et al., 2022). Although this skillset is extremely important, the chest tube care is often assigned a very small portion in many nursing curriculum, particularly in the practical realm. As such, junior nurses obtain experiences and knowledge on a case-by-case basis, as opposed to formal mentorship sessions (Moore, 2023).

Moreover, the programs on continuing professional development (CPD) of chest tube management in different clinical institutions are optional or not available in most institutions (Hussain et al., 2024). This creates a direct impact on the time taken up by the patients in the hospital in terms of their recovery and the usage of resources available in hospitals. The correlation between nurse preparation with better patient outcomes is determined (Wheeldon, 2020).

It was demonstrated that improved competency in chest tube aftercare means decreased stays, less complication, and increased patient satisfaction (Fitzpatrick, 2025). Since the insertion of chest tube is very common and the outcomes vary, there is intense urgency to test the influence of nursing expertise on the duration that a patient takes to recover after surgery occurs in reality, in a clinical environment (Anderson et al., 2022).

This study aims to explore the relationship between nurses' proficiency in chest tube aftercare and the postoperative recovery duration of patients in Pakistani hospitals. By identifying the existing knowledge gaps and barriers in practice, the study intends to advocate for stronger training programs, curriculum reforms, and evidence-based clinical guidelines.

Methodology

The identified study to be carried out using the proposed research was a quantitative study since it is

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a correlational study aimed at examining the effect of the effectiveness of nurses in the process of chest tube after care on post-surgical recovery time of the patients in surgical wards at Saidu Teaching Hospital situated in Swat. The study implemented the cross-sectional research design which was a helpful component in the analysis of information that belonged to both nurses and in the collection of patient records at one point to examine the relationship between nursing expertise and the outcome of recovery.

The sample size was computed using the sample size calculator in the OpenEpi on the basis of 95 % confidence level, 80 % power along with expected correlation coefficient. The sample obtained as a result of this calculation was 100 and thus this was adequate and statistically sufficient in determining statistically significant correlations between two variables under study.

A convenience sampling technique was used to select registered nurses working at the surgical units of Saidu Teaching Hospital and who have the experience of treating patients based on the chest tubes. In addition, the data were retrieved through the medical record of the patients who approached the provided nurses due to the thoracic operations that required the insertion of chest tubes and who were under their agencies in the postoperative treatment.

Data Collection Procedure

Two structured tools were used for data collection. The former was a nurse proficiency questionnaire, which was a revision of the validated ones in the past, with additional new questions assessing proficiency in knowledge, skills and the most common practice of chest tube management. The second was a patient recovery assessment form, which was used to derive information on the length of stay spent in the common hospital wards, the presence of complications, as well as whether the chest tube was being removed. The pilot test was done to test the reliability and the capability of the two instruments to be understood.

Data collection was conducted in two months, that is, April-May 2025. The ulterior purpose of the study was notified to the volunteers, and informed consent was obtained. The personal and confidential data of the patients, as well as the secrecy and anonymity of the nurses, were kept secret. To avoid misunderstanding, researchers addressed the issue of voluntariness of the phenomenon of the study and the fact that its participants received adequate remuneration by permitting them to quit at any point without any punitive consequences.

Data Analysis Procedure

The data entered was compared using an SPSS version 27. Demographical attributes and capacity of the nurses were quoted in frequencies and mean. To have the connection between the scores of the proficiencies of the nurses and the length of postoperative recovery, Pearson correlation coefficient was used. The statistical significance was considered as p-value of less than 0.05.

Ethical Considerations

The administrative approval of the study was obtained by the management of Saidu teaching hospital and ethical approval granted by Institutional Review Board (IRB) of Saidu Medical College swat. The research process adhered to all the aspects of ethics including voluntary participation, confidentiality and data protection to the latter.

Results and Analysis

Demographic Characteristics of Nurses

Out of 100 participants, 58% were female and 42% were male. Most had 4–6 years of experience (38%), while 25% had 1–3 years, 21% had 7–10 years, and 16% had more than 10 years. A majority (73%) had received chest tube care training, while 27% had not. This highlights a relatively experienced and trained nursing workforce (Table 1).

Table 1. Demographic Characteristics of Nurses (n = 100)

Variable	Frequency (n)	Percentage (%)
Gender		
- Male	42	42.0%
- Female	58	58.0%

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Years of Experience		
- 1–3 years	25	25.0%
- 4–6 years	38	38.0%
- 7–10 years	21	21.0%
- >10 years	16	16.0%
Chest Tube Care Training		
- Yes	73	73.0%
- No	27	27.0%

The majority of participants (38) had 4–6 years of experience, followed by 25 with 1–3 years. Fewer participants had 7–10 years (21) and over 10 years (16) of experience (Figure 1).

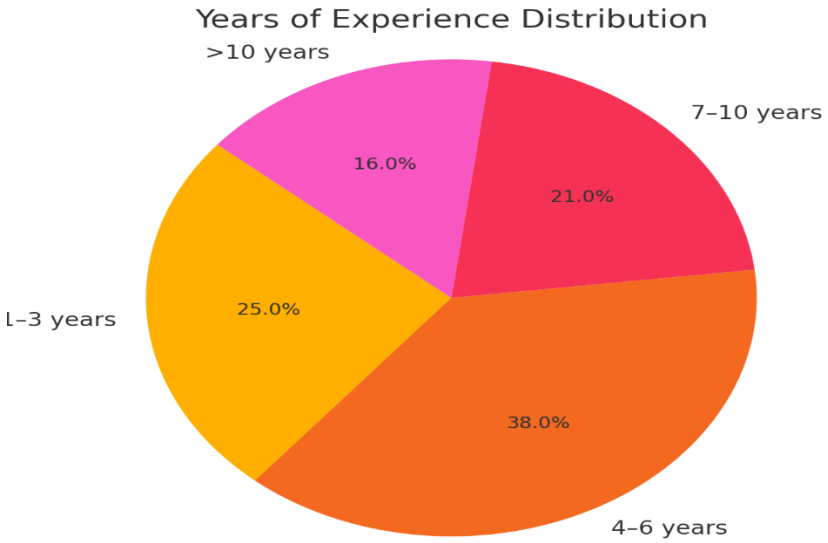

Figure 1: year of experience of Participants

The average length of hospital stay was 7.3 ± 2.1 days, ranging from 4 to 14 days. Chest tube removal occurred on average at 4.8 ± 1.5 days, with a range of 2 to 9 days. Postoperative complications were observed in 19% of patients, while 81% experienced no complications, indicating generally favorable outcomes (Table 2).

Table 2. Patient Recovery Outcomes (n = 100)

Variable	Mean ± SD	Min – Max
Length of Hospital Stay (days)	7.3 ± 2.1	4 – 14
Time to Chest Tube Removal (days)	4.8 ± 1.5	2 – 9
Postoperative Complications		
- Present	19	19.0%
- Absent	81	81.0%

The mean score for the knowledge domain was 8.2 ± 1.1, indicating strong theoretical understanding among nurses. The skills domain averaged 7.5 ± 1.3, while the practice frequency scored 7.8 ± 1.2, reflecting good but slightly variable practical application. The total proficiency score was 23.5 ±

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2.4 out of 30, suggesting an overall high level of proficiency in chest tube (Table 3).

Table 3. Nurse Proficiency Scores in Chest Tube Aftercare

Proficiency Domain	Mean Score ± SD (Max = 10)
Knowledge	8.2 ± 1.1
Skills	7.5 ± 1.3
Practice Frequency	7.8 ± 1.2
Total Proficiency Score	**23.5 ± 2.4** (out of 30)

The data shows a moderate negative correlation between length of hospital stay and recovery outcome ($r = -0.41$, $p < 0.001$), indicating that shorter stays are linked to better recovery. Time to chest tube removal also has a moderate negative correlation ($r = -0.35$, $p = 0.001$), suggesting quicker removal improves outcomes. Postoperative complications show a weak negative correlation with recovery ($r = -0.29$, $p = 0.004$), meaning fewer complications are mildly associated with better recovery. All results are statistically significant, highlighting meaningful associations (Table 4).

Table 4. Correlation Between Nurse Proficiency and Patient Recovery Indicators

Recovery Outcome	r-value	p-value	Interpretation
Length of Hospital Stay	-0.41	0.000	Moderate negative correlation
Time to Chest Tube Removal	-0.35	0.001	Moderate negative correlation
Postoperative Complications	-0.29	0.004	Weak negative correlation

Discussion

The results of the current research indicated that there was an excellent correlation between proficiency on post-thoracic surgery patients by means of chest tube caregivers and recovery of such individuals. Precisely, the elevated scores of the nurse proficiency were linked to less stay of hospitals, removal of chest tubes at an earlier stage, and postoperative complications. These findings reinforce the importance of nursing competence and contribute to patient recovery patterns, which is consistent with previous research on positive effects of skilled nursing care on patient clinical outcomes in postoperative environments (Vincent et al., 2022; Hussain et al., 2024).

As compared to a study that was done by Lin et al. (2020) where they also documented the same pattern between nurse competence and shorter hospitalization among patients in the intensive care unit, our results confirm that this relationship can vary in importance even when considering surgical wards. Lin and others placed importance on standardized steps and systematic training, which can also affect patient outcomes in our case with trained nurses showing superior patient results (Wheeldon, 2020). Nonetheless, in comparison with their work, our study is more specific in nature as it only dwells upon the adjustment regarding the chest tubes, hence contributing to the sphere of focus to the literature (Adewale, 2023).

In contrast, Ahmed et al. (2019) did not prove any significant linkage between nursing interventions and postoperative outcomes among patients undergoing general surgical interventions. This inconsistency could have been blamed on the deviations in methodology, sampling characteristics, or evaluation of particular nursing procedures (Mthombeni, 2021). The focus of our study was on a more narrow option of chest tube aftercare, which enabled us to conduct a more specific analysis of how the identified parts of nursing care can impact indicators of recovery (Sliwinski et al., 2024).

Further, the positive relationship between proficiency and early removal of a chest tube confirms research by Kim and Choi (2021), which concluded that timely and suitable nursing assessments played a critical role in clinical decision-making when it comes to removal of a chest tube.

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Their research study in Korean tertiary hospital stated that monitoring and evidence-based practice among the nurses resulted in reduced complications, which was similar to the results of our study in Pakistan (Assaye et al., 2021). This cross-national unity contributes to the conclusion that nurse competency is a very important factor when managing a patient undergoing thoracic surgery (Mthombeni, 2021).

Interestingly, our research findings showed that there existed a moderate negative relationship between nurse proficiency and post operative complications also. This is similar to evidence provided by Wang et al. (2018), who found that when skills level of chest tube care, especially prevention of blockage and promotion of sterile practices was high, the cases of pneumothorax and infections decreased (Anderson et al., 2022). Nevertheless, the study performed by Wang was bigger in terms of its sample and followed interventional design, whereas our one was cross-sectional and observational. In spite of these differences in methodology, result similarity indicates the significant role of hands-on training and consistent assessment of nursing knowledge (Abuejheisheh et al., 2021).

Educationally speaking, the noted correlations in this paper endorse formal skill training interventions in surgical nursing. The results adhere to the proposals of Phillips and Morrow (2017) who insisted on the inclusion of chest tube care where nurses would be subjected to simulator-based care sessions that would help foster confidence and accuracy (Platnick et al., 2021). The research contributes to the topic since it provides empirical evidence of the practical results of such expertise, such as faster patient recovery. It is especially essential in lesser endowed environments such as Swat, where quality of human resources can counterbalance poor infrastructural conditions (Hussain et al., 2024).

In conclusion, the present study underscores the importance of nurse proficiency in chest tube aftercare as a determinant of postoperative recovery outcomes. While consistent with the global literature on the significance of nursing skills, our study is distinct in its focus on chest tube care within a specific cultural and clinical setting. It highlights the necessity of ongoing training and evaluation systems in surgical nursing to ensure that patient care outcomes continue to improve. Further research, particularly with a longitudinal or interventional design, is recommended to explore causal relationships and long-term impacts.

Conclusion:

The current research has established a strong relationship between the effectiveness of nurses in chest tube aftercare and the postoperative curative results of other patients who have undergone thoracic procedures. To be more concrete, when nurses treated patients of more proficient caliber, their stays in the hospital were shorter, the chest tubes were removed earlier, and fewer postoperative complications were recorded. The results strengthen the importance of nursing care competency in improving patient outcomes in surgical units. The paper identifies that there is need to have intensive emphasis on the development of skills in the field of managing chest tubes in nursing practice, especially in such surgical units like in the Saidu Teaching Hospital, Swat.

Recommendations:

Regular Training Programs: Hospitals should implement continuous professional development sessions focusing on chest tube aftercare, including updated guidelines, simulation-based training, and hands-on practice.

Standardized Protocols: The development and enforcement of standardized chest tube management protocols should be encouraged across surgical wards to ensure uniformity and best practices in patient care.

Competency Assessments: Routine evaluations and practical assessments of nursing staff's competencies in thoracic care should be integrated into hospital quality assurance measures.

Curriculum Enhancement: Nursing education institutions should incorporate detailed modules on chest tube care in both theoretical and clinical training components to better prepare students for real-world clinical situations.

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Supervision and Mentorship: Senior nursing staff should mentor junior nurses to improve real-time decision-making and foster clinical confidence in managing chest tubes effectively.

Future Research: Further longitudinal or interventional studies should be conducted to assess the long-term impact of improved nursing proficiency on patient morbidity and mortality, allowing for more comprehensive healthcare planning.

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