

ORIGINAL ARTICLE

NURSING COMPETENCE IN THROMBOLYTIC THERAPY FOR MYOCARDIAL INFARCTION: A PUBLIC TEACHING HOSPITAL STUDY

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Objectives: This study aims to evaluate the knowledge and proficiency of nurses in managing thrombolytic therapy for myocardial infarction.

Methodology: A cross-sectional research design was adopted and conducted in a public teaching hospital from May 2020 to September 2020. Registered professional nurses (n=52) working in the emergency department (ED) and cardiac care unit (CCU) were invited to participate. A structured, pre-validated questionnaire was used for data collection. The study received approval from the institutional review board and ethics committee. Data were analyzed using SPSS version 25.0.

Results: Fifty ED nurses participated in the study, predominantly male, aged ≤ 34 years, with ≤ 3 years of experience. The overall knowledge score of nurses regarding thrombolytic therapy was 71%, while the practice score was 79%. The lowest level of knowledge was related to contraindications (65%) and treatment protocols (66%), while the highest was for therapy considerations (85.2%). The lowest task performance (47.8%) was observed in the pre-administration phase. There was a negative correlation ($r = -0.226$) between knowledge and practice. Knowledge levels were higher among male nurses, while task performance was better among those with cardiac certification.

Conclusion: The study revealed that while nurses had a favorable level of knowledge about thrombolytic therapy, their practical implementation was poor. This gap highlights the need for targeted educational programs and the establishment of efficient documentation systems to enhance clinical practice.

Keywords: Streptokinase, Thrombolytic Therapy, Knowledge, Practice, Nurses, Emergency Department, Cardiac Care Unit

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INTRODUCTION

Cardiovascular diseases are the leading cause of death worldwide. In 2016, approximately 17 million people died from cardiovascular diseases, accounting for 31% of all global deaths.¹ Among these, myocardial infarction stands out as the most prominent condition.² Clinical trials have demonstrated the efficacy of streptokinase, a thrombolytic agent, when administered within 1.5 to 3 hours of symptom onset, achieving a 90% reperfusion rate.³ Streptokinase works by dissolving clots and reopening occluded arteries or veins, but its administration must adhere to specific criteria and protocols.⁴

Emergency department (ED) nurses are pivotal in the administration of thrombolytic therapy. They must be knowledgeable about the therapy and capable of making timely decisions regarding its use.⁵ The preparation, administration, and monitoring of thrombolytic therapy demand experienced and well-trained nursing staff.⁶

Effective management of patients experiencing myocardial infarction requires nurses to have a solid foundation of knowledge and skills.⁷ However, studies indicate that nurses often lack adequate knowledge in critical areas. For example, one study found deficiencies in nurses' knowledge regarding initial pain management (38.1%), indications for streptokinase (76.2%), relative contraindications (66.7%), and complications (33.3%). Another study in

Egypt reported that a significant proportion of nurses (86.7%) had inadequate knowledge of thrombolytic therapy, with a majority (90%) demonstrating substandard practices in administering the treatment.⁴

Complications during and after thrombolytic therapy administration further emphasize the critical role of nurses in cardiac patient care. A study in Turkey identified complications such as hypotension, arrhythmias, and bleeding in patients receiving thrombolytic therapy.⁸ These complications highlight the necessity for continuous monitoring from ED admission to hospital discharge. Inadequate knowledge and skills among nurses pose significant risks, potentially leading to life-threatening conditions.⁹ Prompt defibrillation may be required due to adverse effects like ventricular fibrillation and pulseless ventricular tachycardia.¹⁰

Nurses' ability to promptly identify adverse reactions is crucial. The literature presents varied findings on nurses' knowledge of thrombolytic therapy, with some studies highlighting practice issues, especially in private sector hospitals.¹¹ There is a limited number of studies on this topic, particularly in public teaching hospitals. This study aims to evaluate the knowledge and task performance related to the administration of thrombolytic therapy among nurses in a public teaching hospital.

METHODOLOGY

Study Design: An analytical cross-sectional survey research design was employed to evaluate the knowledge and task performance of registered nurses regarding thrombolytic therapy in the emergency department (ED) of a public teaching hospital in Khyber Pakhtunkhwa, Pakistan. The study received approval from the Institutional Review Board and Ethics Committee (IRB # 115-935-2020).

Setting: The research was conducted in the emergency department of a public teaching hospital in Khyber Pakhtunkhwa from March 2020 to September 2020. This setting was chosen due to its high patient turnover and the critical nature of care provided, which includes thrombolytic therapy.

Participants: Registered nurses with at least six months of experience in the ED and CCU were eligible to participate in the study. Nurses who were in their resignation or probation periods were excluded to ensure consistency in the experience and employment status of participants. A census sampling method was used, inviting all 52 eligible nurses to participate.¹²

Variables: The study focused on two main variables:

Knowledge of Thrombolytic Therapy: Measured by a 20-item questionnaire covering considerations, contraindications, complications, treatment protocols, dosage, and administration.

Task Performance in Thrombolytic Therapy Administration: Assessed through a 28-item observation checklist evaluating tasks performed prior to, during, and after the administration of thrombolytic therapy.

Data Sources/Measurement: Data collection instruments included a questionnaire and an observation checklist:

Demographic Information: The first section of the questionnaire gathered basic demographic data such as age, gender, qualification, and experience.

Knowledge Assessment: The second section included multiple-choice questions and true/false statements regarding thrombolytic therapy. This self-rated questionnaire was distributed to ED nurses and collected the following day.

Task Performance Assessment: A nurse researcher observed and recorded the performance of thrombolytic therapy tasks, categorized into pre-administration, peri-administration, and post-administration phases.

The questionnaire was developed based on literature and validated by emergency room experts, achieving a content validity index of 0.90.¹³

Bias: To minimize bias, the study utilized a validated questionnaire and standardized observation protocols. However, potential bias could arise from self-reporting in the knowledge assessment and observer bias during task performance evaluation.

Study Size: All 52 eligible nurses in the ED were invited to participate, ensuring comprehensive data collection from the target population within the study period.

Quantitative Variables: Knowledge scores were calculated based on the percentage of correct responses, while task performance scores were determined by the percentage of complete tasks. Both sets of scores were categorized using Bloom's cut-off scores: <60% (poor), 60-80% (moderate), and >80% (good).¹⁴

Statistical Methods: Data were analyzed using SPSS Version 25. Descriptive statistics, such as frequencies and percentages, were used to summarize demographic variables. Knowledge and task performance scores were also presented as

percentages. The association between knowledge and task performance was assessed using the Chi-square test of association. Additionally, the Pearson correlation coefficient (r) with confidence intervals was reported to determine the strength and direction of the relationship between these variables.

RESULTS

Participants: Out of the 52 eligible ED nurses, 50 consented to participate in the study, yielding a participation rate of 96%. The majority of the participants (42%) were between 30-34 years old, followed by those aged ≤ 29 years (32%). The gender distribution showed a predominance of males (68%) compared to females (32%).

Demographic Variables: The demographic characteristics of the participants are detailed in Table 1. Most nurses had a post basic diploma (52%), with smaller proportions holding general nursing qualifications (10%), a cardiac specialization (16%), or a bachelor of science in nursing (22%). experience varied, with 34% of nurses having ≤ 1 year of experience, while only 8% had more than 7 years of experience.

Table 1: Demographic Variables

Variable	Summary
Total (N)	50
Age (years)	
≤ 29 years	16 (32%)
30-34 years	21 (42%)
35-39 years	9 (18%)
≥ 40 years	4 (8%)
Gender	
Male	34 (68%)
Female	16 (32%)
Qualification	
General Nursing	5 (10%)
Post Basic Diploma	26 (52%)
Cardiac Specialization	8 (16%)
Bachelor of Science in Nursing	11 (22%)
Experience (years)	
≤ 1 year	17 (34%)
1-3 years	12 (24%)
3-5 years	8 (16%)
5-7 years	9 (18%)
> 7 years	4 (8%)

Knowledge Assessment: The nurses exhibited varying levels of knowledge regarding thrombolytic therapy. All participants correctly identified the alternative name for thrombolytic therapy and its route of administration. However, only 46% correctly identified clinical features indicative of a late adverse reaction, and 56% knew the absolute contraindications of thrombolytic therapy. The highest knowledge scores were in therapy consideration (85.2%), while

the lowest were in contraindications (65%). The mean overall knowledge score was 71%.

Table 2: Knowledge about Thrombolytic Therapy (n=50)

Questions	Incorrect (%)	Correct (%)
Therapy Consideration	14.8	85.2
Alternate name for thrombolytic therapy	0.0	100.0
Relevant action of thrombolytic therapy	28.0	72.0
Clinical condition indicated for thrombolytic therapy	2.0	98.0
Thrombolytic therapy is anti-arrhythmic drug	36.0	64.0
Vitamin K is the antidote for a drug overdose SK	16.0	84.0
Clotting time check prior thrombolytic therapy	12.0	88.0
Streptokinase is synthesized by B-haemolytic streptococci	10.0	90.0
Contraindication	35.0	65.0
Absolute contraindication of thrombolytic therapy	44.0	56.0
Relative contraindication of thrombolytic therapy	26.0	74.0
Complications	25.0	75.0
Late complication of thrombolytic therapy	10.0	90.0
Clinical features indicative of early adverse reaction	32.0	68.0
Clinical features indicative of late adverse reaction	54.0	46.0
Complications of streptokinase are allergy and bleeding	4.0	96.0
Treatment Protocol	44.0	66.0
Essential intervention before thrombolytic therapy	6.0	94.0
Common administration route of thrombolytic therapy	0.0	100.0
Parameters to be assessed during thrombolytic therapy	6.0	94.0
Duration of bed rest after thrombolytic therapy	32.0	68.0
Dosage and Administration	27.4	72.6
Recommended streptokinase dose in myocardial infarction	18.0	82.0
Maximum time limit to administer streptokinase	28.0	72.0
Recommended dose for thrombolytic therapy alteplase	36.0	64.0
Mean Overall Knowledge	29.0	71.0

Task Performance: Task performance was assessed across pre-administration, peri-administration, and post-administration phases of thrombolytic therapy. High performance was noted in tasks such as obtaining a 12-lead ECG post-administration (92%), placing two intravenous catheters (80%), and maintaining patient body alignment (80%). Conversely, the lowest performance was observed in tasks like collecting blood samples for coagulation and cardiac enzymes (16%), cardiac assessment (24%), and reassessment

for perfusion (26%). The overall task completion rate was 49%.

Table 3: Thrombolytic Therapy Tasks Performance (n=50)

Thrombolytic Therapy Administration Tasks	Incomplete Task (%)	Complete Task (%)
Pre-Administration Tasks	52.3	47.8
Patient's orientation (time, place, and person) checked	30.0	70.0
Heart attack symptoms documented every 15 minutes	54.0	46.0
Heart attack symptoms <12 hours	52.0	48.0
ST Segment elevation of 2 mm or more	26.0	74.0
Blood pressure measurements within recommended ranges	50.0	50.0
Pregnancy or childbirth within the last two weeks	64.0	36.0
Bleeding ulcer within the last six months	56.0	44.0
Surgical intervention within the last three months	58.0	42.0
History of head trauma within the last three months	70.0	30.0
Vital signs & Pain scale checked	70.0	30.0
Physical assessment of heart performed	76.0	24.0
Cardiac monitor attached and parameters recording set at 30 minutes	42.0	58.0
Two intravenous catheters inserted	20.0	80.0
Blood samples collected for coagulation and cardiac enzymes	84.0	16.0
Five rights of medication administration ensured	40.0	60.0
Informed consent obtained	44.0	56.0
Peri-Administration Tasks	49.6	50.4
ECG continuous monitoring and vital signs assessed every 15 minutes	68.0	32.0
Infusion site assessed for hematoma or bleeding every 15 minutes	62.0	38.0
Color and sensory assessment every 15 minutes	68.0	32.0
Body alignment maintained	20.0	80.0
Emergency cart and defibrillator readily available	30.0	70.0
Post-Administration Tasks	50.9	49.2
Obtained 12-lead ECG one hourly	8.0	92.0
Reassessed patient for chest pain (0-10 scale)	24.0	76.0
Reassessment (Blood Pressure, capillary refill, Skin color, Heart Rate)	74.0	26.0
Instructed the patient to 24-hour bed rest and ensured safety	64.0	36.0
Assessed intravenous line for bleeding	56.0	44.0

Assessed body fluids for bleeding	70.0	30.0
Documented the process of thrombolytic therapy	60.0	40.0
Overall Task Completion	51.0	49.0

Main Results: The overall performance of ED nurses in administering thrombolytic therapy was suboptimal, with only 4% demonstrating poor knowledge and 72% displaying poor task performance. Moderate knowledge levels were observed in 50% of nurses, while 28% showed moderate task performance. Notably, 46% of nurses demonstrated good knowledge of thrombolysis in myocardial infarction, but none exhibited good practice in thrombolytic therapy administration. The negative correlation between knowledge and practice was reflected by a Pearson correlation coefficient (R) of -0.226.

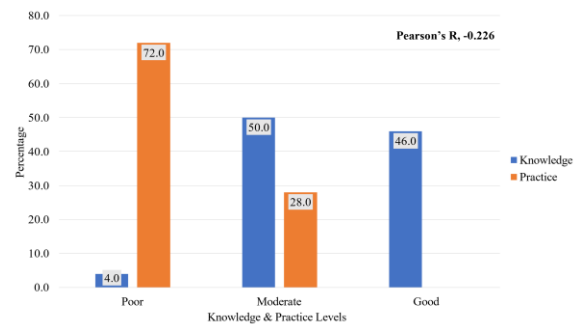


Figure 1: Association between Knowledge and Practice

Correlation analysis showed that gender had the highest positive correlation with knowledge ($r = 0.130$, 95% CI [-0.15, 0.39]). Advanced cardiac life support training had the highest positive correlation with task performance ($r = 0.178$, 95% CI [-0.11, 0.43]). Overall, most correlations between demographic variables and both knowledge and task performance were weak.

Table 4: Correlation of Knowledge and Task Performance with Demographic Variables

Demographic Variable	r-Value	95% Confidence Interval
Knowledge		
Gender	0.130	-0.15, 0.39
Qualification	0.056	-0.23, 0.33
Experience	0.111	-0.17, 0.38
Advanced Cardiac Life Support	0.105	-0.18, 0.37
Task Performance		
Gender	-0.094	-0.36, 0.19
Qualification	-0.094	-0.36, 0.19
Experience	0.071	-0.21, 0.34
Advanced Cardiac Life Support	0.178	-0.11, 0.43

DISCUSSION

The demographic findings of this study revealed a predominantly male workforce among the emergency department (ED) nurses. This contrasts with the common perception of nursing being a female-dominated profession. However, several studies have reported a higher number of male nurses in ED and critical care units. This trend may be attributed to males being more inclined toward specialized clinical settings like the ED. Similar findings have been reported in international studies, where more men work in intensive and critical care units.^{15,16}

Most nurses in this study held a basic nursing diploma, with very few having a cardiac nursing specialization, and none possessing an emergency nursing specialization. This reflects a broader trend in Pakistan, where nurses are increasingly pursuing higher education, such as Bachelor of Science in Nursing (BSN) degrees, over specialized education. The preference for higher education over specialized training might be contributing to a gap in the availability of specialized nursing skills in critical areas like thrombolytic therapy.^{4,5,17,18}

The study highlighted significant findings regarding knowledge and task performance in thrombolytic therapy administration. The overall knowledge score was relatively high at 71%, but the task performance score was notably low at 49%. This discrepancy underscores a substantial gap between knowledge and practice among nurses administering thrombolytic therapy for myocardial infarction.

Previous studies have reported varying levels of knowledge among nurses regarding thrombolytic therapy. Contrary to the current study's findings, several studies have reported unsatisfactory knowledge levels. For instance, studies in Egypt reported unsatisfactory knowledge levels of 82.5%, 95%, and 86.7% among nurses.^{4,17,18} Similarly, a study in Sudan found a significant lack of knowledge regarding Streptokinase.⁵ Conversely, studies in Palestine and South Africa reported good knowledge among nurses.^{6,11} The differences in knowledge levels could be attributed to the varying emphasis on nursing responsibilities and continuous professional development in different healthcare systems.

Interestingly, the current study found that male nurses exhibited higher knowledge levels. This gender correlation was not examined in the cited studies. The high knowledge levels among the study participants may also be attributed to ongoing professional development programs, as improvement in knowledge

has been observed following educational interventions.¹⁸

Despite the high knowledge levels, the thrombolytic therapy administration task performance was poor. This finding is consistent with studies from Egypt, Sudan, Palestine, and South Africa, where nurses struggled to translate their knowledge into practice.^{4,6,11,17,18} The cognitive biases and heuristic practices among ED nurses, who must make quick decisions under pressure, could contribute to this gap.¹⁹ Incomplete task performance was most evident during the pre-administration phase, which involves detailed assessments and history-taking.²⁰ Conversely, procedural tasks, such as placing intravenous catheters and assessing ST segment elevation, were more consistently performed.²¹

The focus on procedural tasks during thrombolysis suggests that nurses prioritize immediate clinical interventions over comprehensive patient assessments and documentation.²² This procedural focus may stem from the urgency of initiating thrombolytic therapy. However, it highlights a critical area for improvement, particularly in obtaining informed consent and ensuring thorough patient evaluations.

Implications for Patient Safety and Recommendations

The gaps in task performance pose a significant concern for patient safety, particularly for those receiving thrombolytic therapy for acute myocardial infarction. Effective thrombolysis can significantly reduce all-cause mortality in these patients. However, poor knowledge and practice in administering thrombolytic therapy can lead to adverse outcomes.

The study found that thrombolytic therapy administration performance was better among nurses with cardiac specialization. This emphasizes the need for continuous professional development and specialized training for ED nurses. Implementing regular in-service educational programs could bridge the gap between knowledge and practice, ensuring better patient outcomes.

This study has several limitations. The findings are specific to a single public teaching hospital in Khyber Pakhtunkhwa, limiting their generalizability to other settings or regions. Expanding the study to include multiple centers, including private sector hospitals, and a larger sample size would enhance the robustness and applicability of the results.

CONCLUSION

This study identified a significant gap between the knowledge and task performance of nurses regarding

the administration of thrombolytic therapy, highlighting a theory-practice disconnect. While nurses demonstrated a solid understanding of thrombolytic therapy, their practical application of this knowledge was lacking. This disparity raises serious concerns for patient safety and clinical outcomes.

To address these issues, we recommend the implementation of comprehensive educational programs aimed at enhancing both the knowledge and practical skills of nurses in thrombolytic therapy administration. Additionally, the establishment of an effective documentation system is crucial, as it can help ensure that nurses are not overly focused on procedural tasks to the detriment of patient care.

Future research should explore the heuristic practices of ED nurses, evaluate clinical outcomes associated with improved thrombolytic therapy administration, and test the efficacy of targeted educational programs. Addressing these areas can contribute to better patient care and outcomes in emergency settings.

AUTHORS' CONTRIBUTION

ZU, AJP, and GV: Concept and design, data acquisition, interpretation, drafting, final approval, and agree to be accountable for all aspects of the work. ZU, AJP, and GV: Data acquisition, interpretation, drafting, final approval and agree to be accountable for all aspects of the work.

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