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A clinical audit on compliance to administration of thrombolytic therapy by nurses working in Intensive Care Units at selected hospitals

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ABSTRACT

A clinical audit on compliance to administration of thrombolytic therapy by nurses working in Intensive Care Units at selected hospitals.

Objectives

1. To assess the knowledge of nurses regarding administration of Thrombolytic Therapy
2. To assess practices regarding Thrombolytic Therapy Before, during and after administration

3. Introduction:
Thrombolytic therapy is a high-stakes intervention where “time is tissue,” requiring strict adherence to evidence-based protocols to prevent catastrophic outcomes like intracranial haemorrhage. In the Intensive Care Unit (ICU), nurses serve as the primary gate keepers for safety, responsible for rapid assessment, precise dosing, and vigilant monitoring. This study utilizes a clinical audit to bridge the “Know-Do Gap” between theoretical protocols and bedside reality in resource-constrained environments.

Conclusion:
While ICU nurses demonstrate a strong theoretical foundation and generally high levels of practice, specific "Fatal Four" points of failure persist. There is an urgent need for targeted educational interventions focusing on stroke therapeutic windows and reinforcing the mandatory double-check of high-alert medications to ensure patient safety and minimize complications.
Keywords: Thrombolytic Therapy, Hemorrhage

I.INTRODUCTION

In the world of emergency medicine, few interventions are as high-stakes as thrombolytic therapy. When a patient suffers an ischemic stroke or a heart attack, the mission is simple but urgent: dissolve the clot (thrombus) and get oxygen-rich blood back to the brain or heart before the damage becomes permanent.

According to the World Health Organization (WHO), ischemic heart disease and stroke aren't just medical concerns they are the leading causes of death worldwide. Through their "Global Hearts" initiative, the WHO highlights a critical concept known as the "Golden Hour." This narrow window is often the dividing line between a patient returning to their normal life or facing a lifetime of disability.[1]

According to the World Health Organization (WHO), cardiovascular diseases (CVDs) are the leading cause of death globally, but the burden is disproportionately high in the Asian region. In India alone, CVDs account for nearly 27% of all deaths. The NIH supported INTERHEART study revealed a startling trend: the median age for a first myocardial infarction in Indians is 53 years, compared to 63 years in Western Europe. With a combined population in Asia exceeding 4.7 billion, the sheer volume of patients requiring emergency thrombolysis creates a massive pressure on Intensive Care Units (ICUs). The WHO emphasizes that "time is muscle" and "time is brain," yet in high-population density regions like South Asia, systemic delays often impede the gold-standard 60-minute "door-to-needle" (DTN) window. [2]

In the Indian and Asian clinical context, the ICU nurse acts as the primary gatekeeper for thrombolytic safety, often serving as the first and last line of defence against complications. While these professionals are highly skilled in administering the National Institutes of Health Stroke Scale (NIHSS) to track a patient's progress, a significant "compliance gap" persists across the region. The issue isn't a lack of knowledge in fact; audits show that roughly 90% of nurses have a firm grasp of protocols for drugs like Alteplase and Tenecteplase. The breakdown happens in the execution: due to staggering patient-to-nurse ratios, only about 60% of cases meet the rigorous requirements for 15- minute monitoring intervals and precise weight-based dosing. In these overcrowded environments, the "gold standard" of care often collides with the reality of clinical fatigue, where the intense documentation required during that first critical hour becomes nearly impossible to maintain[3]

The National Institutes of Health Stroke Scale (NIHSS) has identified significant "pre-hospital" and "in-hospital" barriers unique to the Asian region. With over 1.4 billion people in India, the diversity in hospital infrastructure means that ICU nurses often work without the automated decision-support tools common in the West. WHO reports highlight that in many Asian developing nations, the high cost of recombinant tissue plasminogen activator (rt-PA) makes any error in administration such as improper mixing or dosage wastage a significant financial and clinical loss. A clinical audit in this region is not just about checking boxes; it is an essential evaluation of how nursing staff navigate resource- constrained environments while attempting to maintain international safety standards.[4]

The rationale for this audit stems from the urgent need to standardize nursing care across selected hospitals to reduce the 2-4 times higher risk of intracranial haemorrhage observed in Asian populations following thrombolysis. The WHO's "Triple Billion" targets aim for better health coverage, yet without strict nursing compliance to thrombolytic checklists, the risk of fatal bleeding complications remains high. By auditing compliance in selected ICUs, this research identifies whether the deviations from protocol are due to individual lack of training or systemic issues like staff burnout in overpopulated wards.[5]

Clinical auditing is a systematic, peer-led review process designed to improve patient care by measuring current practices against evidence-based standards. The audit cycle involves five distinct stages: setting standards, measuring practice, comparing with standards, implementing change, and re-auditing. For ICU nurses in India and Asia, the audit serves as a vital feedback loop. It identifies whether non-compliance is a result of a "knowledge deficit" (lack of training) or a "system deficit" (lack of equipment or excessive workload). By focusing on "selected hospitals," this research provides a granular look at how institutional culture in the Asian region influences the adherence to lifesaving thrombolytic protocols.[6]

The role of the ICU nurse in thrombolytic therapy is multifaceted, involving rapid assessment, precise dosage calculation, and vigilant monitoring. Unlike general ward nursing, ICU nursing requires the ability to interpret real-time hemodynamic changes and neurological shifts using the NIH Stroke Scale (NIHSS). Compliance involves adhering to the "Five Rights" of medication administration while simultaneously managing the risk of intracranial haemorrhage the most lethal side effect of thrombolysis. In the Indian context, where advanced practice nursing is still an evolving field, the adherence to these protocols often depends on the quality of institutional training and the availability of standardized clinical pathways.[7]

Clinical auditing is a quality improvement process that seeks to bridge the gap between evidence-based guidelines and actual bedside practice. The WHO emphasizes that "quality of care" is as important as "access to care." By auditing the compliance of ICU nurses in selected hospitals, this study identifies where the "Know-Do Gap" exists. Is the lack of compliance due to a lack of knowledge (education), or is it a systemic failure (lack of staffing or supplies)? In Maharashtra, where healthcare is rapidly digitizing, clinical audits provide the empirical data needed to justify investments in automated infusion pumps and tele-nursing support systems.[8]

Need for the Study

Despite the existence of globally recognized standards, such as those provided by the World Health Organization (WHO), a persistent gap remains between "paper protocols" and "bedside reality." In high-acuity environments like the ICU, the administration of thrombolytic therapy is frequently marred by variations in practice. These inconsistencies ranging from subtle delays in drug preparation to the omission of vital sign checks are not merely administrative lapses; they are life-threatening deviations. The need for this

study is rooted in the "Standardization Paradox": while we have more clinical data than ever before, the actual application of that data remains fragmented. For an ICU nurse, the pressure to perform within the "Golden Hour" often conflicts with the chaos of a busy ward, making a systematic audit the only objective way to measure where we are failing our patients.[1]

The need for this study is underscored by the high-risk nature of thrombolytic agents, which the AACN classifies as "High-Alert Medications." There are four specific points of failure that this research seeks to address. First, delays in drug preparation (such as the complex reconstitution of Alteplase) can push a patient outside the 4.5-hour therapeutic window. Second, incorrect dosage calculations, often due to the lack of automated weight-based systems in developing regions, carry a risk of fatal haemorrhage. Third, incomplete documentation leads to a "data vacuum," making it impossible for the medical team to track a patient's progress. Finally, a failure to monitor for adverse effects, such as neurological deterioration or allergic reactions, can result in preventable mortality. This audit is needed to pinpoint which of these "Fatal Four" is most prevalent in our selected hospitals.[7]

The rationale for choosing a clinical audit as the research tool is supported by the proven success of Audit-Feedback Mechanisms. Studies have shown that when nurses are presented with objective data regarding their own performance, adherence to protocols improves significantly. In the Asian region, where nursing education is often top- down and theoretical, there is a desperate need for a more interactive, data-driven approach to professional development. This study is essential because it moves beyond "one-off" training sessions and establishes a cycle of continuous improvement. By comparing current ICU practices against the gold-standard benchmarks of the NIH and WHO, we provide the nursing staff with a clear roadmap for excellence.[8]

Gupta, R., & Singh, A. (2025). The researchers highlight a persistent "global-local divide" in critical care. Their findings indicate that while international benchmarks for thrombolysis are frequently adopted in theory, they are rarely fully met in high-volume Asian ICUs. The study notes a significant disparity: Indian nurses often exceed 85% in knowledge assessments, yet their actual practice specifically the serial monitoring using the NIHSS drops below 50% during peak hospital hours.[9]

II.MATERIAL AND METHOD OBJECTIVE OF THE STUDY

1. To assess the knowledge of nurses regarding administration of Thrombolytic Therapy
2. To assess practices regarding Thrombolytic Therapy Before, during and after administration

OPERATIONAL DEFINITION

Clinical Audit

a clinical audit refers to a systematic review of current nursing practices related to the administration of thrombolytic therapy in Intensive Care Units.

Thrombolytic Therapy

In this study Thrombolytic therapy refers to the intravenous administration of fibrinolytic agents including Alteplase or Streptokinase along with monitoring of patient before, during and after administration of thrombolytic drugs.

Administration

In this study administration refers to injecting the thrombolytic drugs through parenteral route.

Nurses

In this study nurses refers to staff nurses working in intensive care units who are directly involved in the preparation, administration, and monitoring of patients receiving thrombolytic therapy.

Intensive Care Unit (ICU)

In this study Intensive Care Unit refers to a specialized hospital units providing continuous monitoring, emergency life- support to the patient, administering thrombolytics and life saving treatments.

Research Approach : Quantitative research approach
Research Design : Descriptive cross sectional resaerch design

Population
Target Population : registered nurses working in Intensive Care Units.
Accessible population :nurses who are available at the time of data collection

Sample
Sample size 30
Sampling Technique : Purposive sampling teachique

Inclusion Criteria
In this study inclusion criteria is -
1.staff nurses who are working in critical care units.
2. staff nurses who are Present at the time of data collection
3.staff nurses who are willing to participate in the study.
4.staff nurses with more than 6-months of experience in critical care unit
Exclusion Criteria
In this study exclusion criteria is -
1. Staff Nurses who are absent during time of data collection
2. Staff Nurses who are not willing to participate in this study.

Description of Tool
Section A: Demographic Profile: Including
designation, department, professional qualification, years of ICU experience
Section B: knowledge questionnaire
A structured knowledge questionnaire was used to assess knowledge of nurses
Section C: Observation Checklist
A structured clinical audit checklist was used to evaluate nurses' adherence.

In this study data collection instrument prepared is a structured multiple-choice questionnaire and observation checklist on administration of thrombolytic therapy by nurses working in Intensive Care Units at selected hospitals. Validity was done by eight experts from the research methodology. By using Test-retest Karl Pearson correlation coefficient calculation was used. The reliability of the tool was 0.70.

IV.ANALYSIS

Section I

Table 1: Description of samples (nurses) based on their personal characteristics in terms of frequency and percentage

N=30

Demographic variable	Freq	%
Designation		
Senior staff	2	6.7%
Staff nurse	26	86.7%
Ward in charge	2	6.7%
Department	22	
Casualty	22	73.3%
CVTSICU	8	26.7%
Qualification		
B.Sc.	12	40.0%
GNM	16	53.3%
P.B.B.Sc.	2	6.7%
Experience		
1 year	16	53.3%
2-3 years	7	23.3%
More than 3 years	7	23.3%

Table 4.1 This demographic data was shows the 6.7% of the nurses were senior staff, 86.7% of them were staff nurses and 6.7% of them were ward in charge. 73.3% of them were from casualty department and 26.7% of them were from CVTSIVU department. 40% of them were B.Sc., 53.3% of them were GNM and 6.7% of them had P.B.B.Sc. nursing. 53.3% of them had one year of experience, 23.3% of them had 23.3% of them had 2-3 years of experience and 23.3% of them had more than 3 years of experience.

Section 4.2 Section II

Analysis of data related to the knowledge of nurses regarding administration of Thrombolytic Therapy

Table 2: Knowledge of nurses regarding administration of Thrombolytic Therapy

N=30

Knowledge	***Freq***	***%***
Poor	0	0.0%
Average	9	30.0%
Good	21	70.0%

30% of the nurses had average knowledge and 70% of them had good knowledge regarding administration of Thrombolytic Therapy.

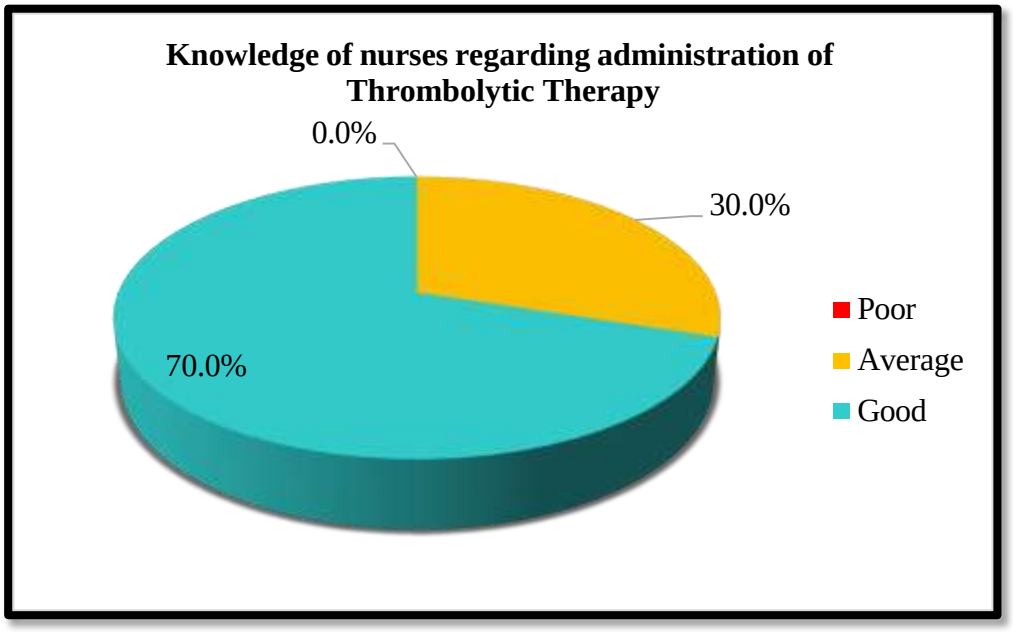

figure 1. The following is the distribution of staff nurses according to their knowledge of nurses regarding administration of Thrombolytic Therapy.

Table 3: Knowledge item analysis
N=30

Knowledge item	***Freq***	***%***
Thrombolytic therapy is used to:	27	90.0%
Thrombolytic drugs act mainly by:	23	76.7%
Thrombolysis is indicated in:	18	60.0%
The ideal window time for stroke thrombolysis is:	10	33.3%
Before stroke thrombolysis, mandatory investigation is:	20	66.7%
Thrombolytics are contraindicated in:	24	80.0%
Vital signs during infusion should be monitored every:	28	93.3%
Thrombolytic drugs are classified as:	27	90.0%
What is the most important safety precaution before starting thrombolytic infusion?	24	80.0%
Before preparing a thrombolytic drug, the nurse must first:	23	76.7%
An allergic reaction (rash, dyspnoea) occurs during administration of thrombolytic therapy	28	93.3%
The most serious complication of thrombolytic therapy is:	25	83.3%
During thrombolytic infusion, the patient develops hypotension	25	83.3%
A patient receiving Alteplase develops sudden neurological deterioration	28	93.3%
After thrombolysis, patient should be monitored for:	29	96.7%

The item-wise analysis of knowledge revealed that the majority of nurses demonstrated adequate understanding of key aspects of thrombolytic therapy. High levels of knowledge were observed regarding post-thrombolysis monitoring (96.7%), management of allergic reactions during thrombolytic therapy (93.3%), monitoring of vital signs during infusion (93.3%), immediate management of sudden neurological deterioration following Alteplase administration (93.3%), indications for thrombolytic therapy (90%), and classification of thrombolytic drugs (90%). Knowledge regarding contraindications and safety precautions before thrombolytic infusion was satisfactory (80%). However, moderate knowledge levels were noted concerning the mechanism of action of thrombolytic drugs (76.7%), preparation of thrombolytic agents

(76.7%), mandatory investigations before thrombolysis (66.7%), and indications for thrombolysis (60%). A significant knowledge deficit was identified regarding the ideal therapeutic window for stroke thrombolysis, with only 33.3% of nurses answering correctly. These findings suggest that while overall knowledge was satisfactory, specific gaps in time-sensitive aspects of thrombolytic therapy require focused educational interventions.

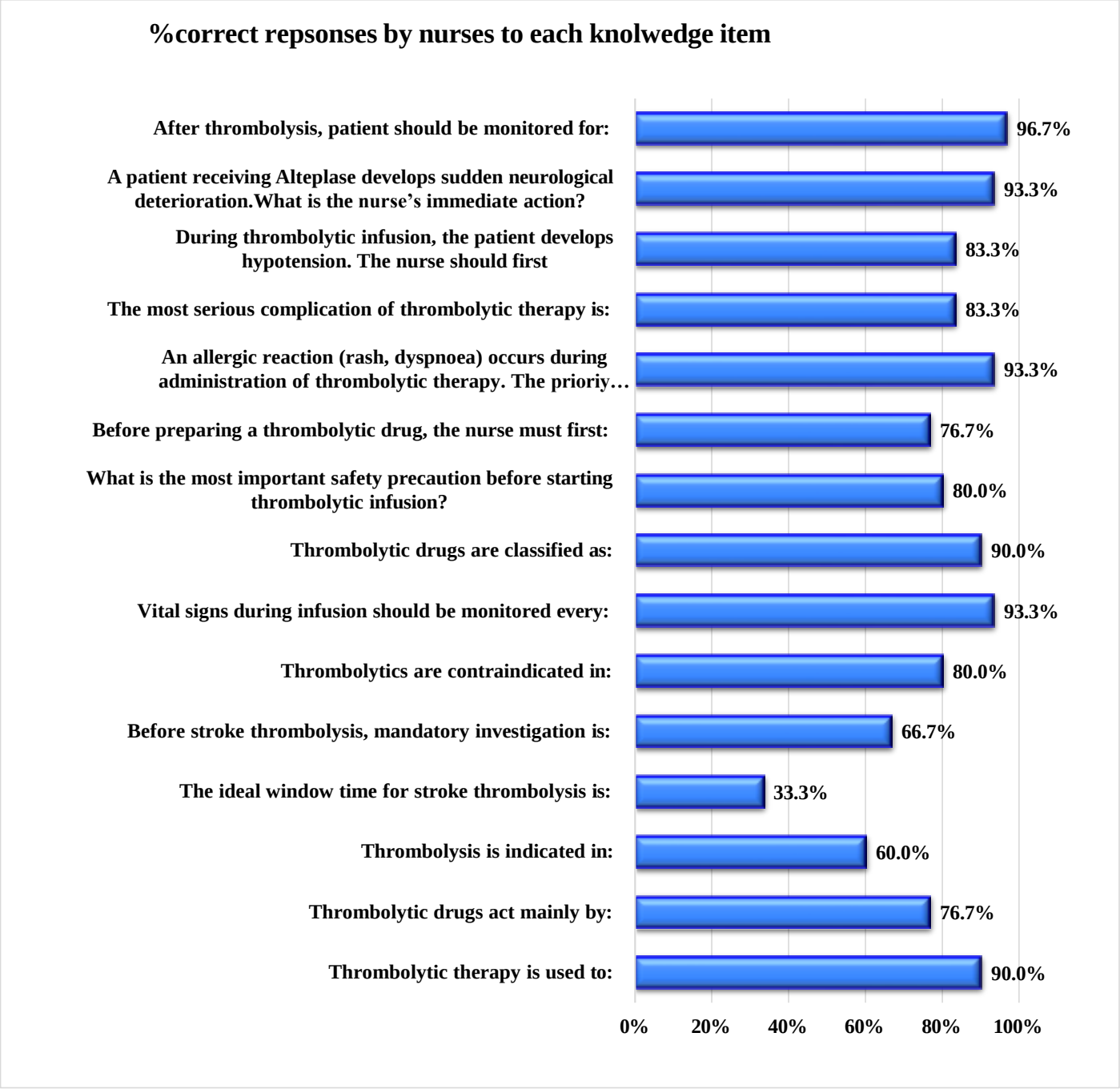

figure 2. The following is the distribution of staff nurses according to their knowledge item analysis administration of Thrombolytic Therapy.

Section III

Analysis of data related to practices regarding Thrombolytic Therapy Before, during and after administration

Table 4: Practices regarding Thrombolytic Therapy Before, during and after administration N=30

Practices	*Freq*	*%*
Low	3	10.0%
Moderate	8	26.7%
High	19	63.3%

10% of the nurses had low compliance, 26.7% of them had 26.7% of them had moderate compliance and 63.3% of them had high compliance for practices regarding Thrombolytic Therapy Before, during and after administration.

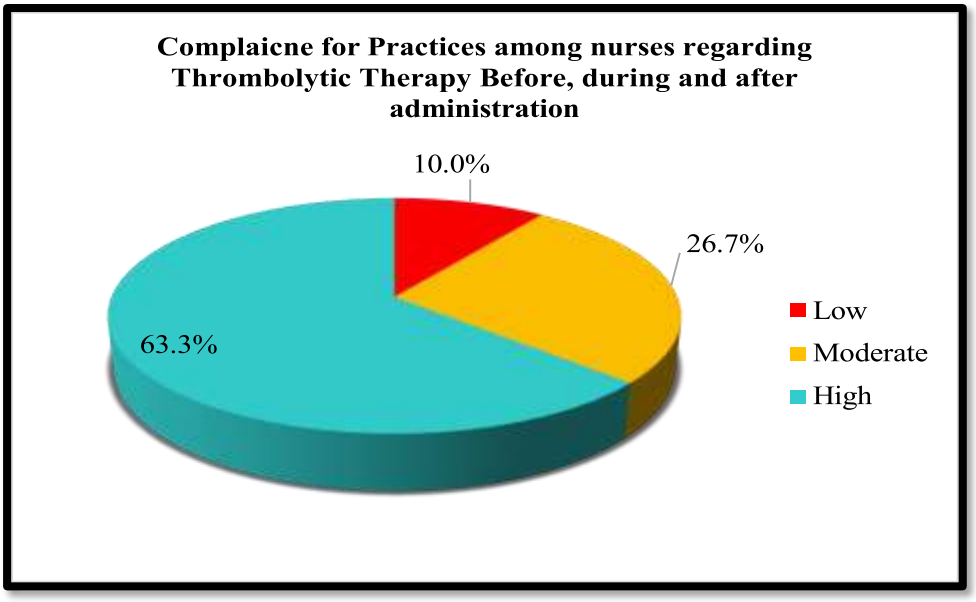

figure 7. The following is the distribution of staff nurses according to their Practices regarding Thrombolytic Therapy Before, during and after administration

Table 5: Practices item analysis **N=30**

Practice item	***Freq***	***%***
Verifies written physician order before administration	25	83.3%
Patient identification is confirmed using two identifiers	25	83.3%
Records baseline vital signs prior to thrombolysis	28	93.3%
Evaluates and documents Neurological status prior to administration	26	86.7%
Verifies written informed consent before administration	27	90.0%
Confirms insertion of any invasive lines before the thrombolysis	25	83.3%

Establishes two large bore IV lines	26	86.7%
Sends blood for routine investigation prior to administration of thrombolytic therapy	25	83.3%
Ensures availability of emergency resuscitation equipment's with crash cart at bedside	27	90.0%
Calculates thrombolytic dose according to patients' weight	22	73.3%
Double-checks drug and dose with two nurse's staff.	18	60.0%
Wears the mask, head cap, performs hand hygiene and wears sterile gloves.	23	76.7%
Ensures continuous ECG monitoring	24	80.0%
Monitors vital signs every 15 minutes as per protocol	26	86.7%
Observes for signs and symptoms of bleeding	25	83.3%
Prepares the drug according to the protocol	26	86.7%
Administers bolus of 10% of prepared drug for 2 min's	24	80.0%
Administers remaining 90% of prepared drug for 1 hour	21	70.0%
Monitors vital signs every 15 minutes for 1st one hour.	27	90.0%
Documents procedure with date, time, dose and name of the thrombolytic drug administered.	26	86.7%
Reassesses and documents neurological status at regular intervals	22	73.3%
Monitors for any signs of active bleeding	21	70.0%
Checks infusion site for any signs of bleeding or hematoma	26	86.7%
Reports immediately any adverse event to physician	23	76.7%
Ensures attachment of 'Do not prick 24 hrs' tag	24	80.0%
Educate to patient /relatives post thrombolysis administration for bleeding, sign of any reaction, fever.	25	83.3%

The assessment of nursing practices related to thrombolytic therapy administration demonstrated generally high compliance with recommended protocols. Most nurses adhered to essential pre-administration procedures, including verification of physician orders, patient identification, baseline assessment, informed consent, establishment of intravenous access, and preparation of emergency equipment. During administration, high compliance was observed in vital sign monitoring, drug preparation, ECG monitoring, and documentation practices. Post-thrombolysis care, including patient education, monitoring for complications, and assessment of the infusion site, was also performed by the majority of participants. However, lower compliance was noted in critical safety practices such as independent double-checking of drug dosage (60%), monitoring for active bleeding (70%), administration of the remaining thrombolytic infusion according to protocol (70%), and reassessment of neurological status (73.3%). Overall, the findings indicate satisfactory adherence to thrombolytic therapy protocols, while highlighting specific areas requiring further training and quality improvement initiatives to enhance patient safety.

Educate to patient /relatives post thrombolysis… Ensures attachment of 'Do not prick 24 hrs' tag

Reports immediately any adverse event to physician Checks infusion site for any signs of bleeding or hematoma Monitors for any signs of active bleeding

Reassesses and documents neurological status at regular… Documents procedure with date, time, dose and name of… Monitors vital signs every 15 minutes for 1st one hour.

Administers remaining 90% of prepared drug for 1 hour Administers bolus of 10% of prepared drug for 2 min's Prepares the drug according to the protocol

Observes for signs and symptoms of bleeding Monitors vital signs every 15 minutes as per protocol Ensures continuous ECG monitoring

Wears the mask, head cap, performs hand hygiene and…

Double-checks drug and dose with two nurse's staff. Calculates thrombolytic dose according to patients' weight

Ensures availability of emergency resuscitation… Sends blood for routine investigation prior to…

Establishes two large bore IV lines

Confirms insertion of any invasive lines before the…

Verifies written informed consent before administration

Evaluates and documents Neurological status prior to…

Records baseline vital signs prior to thrombolysis Patient identification is confirmed using two identifiers Verifies written physician order before administration

figure 8. The following is the distribution of staff nurses according to their Practices regarding Thrombolytic Therapy.

Discussion

This study evaluated nurses' knowledge and practice compliance regarding the administration of thrombolytic therapy in selected critical care settings. The findings demonstrated that the majority of nurses possessed good knowledge (70%) and exhibited high practice compliance (63.3%), reflecting an overall satisfactory level of preparedness for thrombolytic therapy administration. Nurses showed strong competency in post-thrombolysis monitoring, management of allergic reactions, and vital sign assessment. However, a notable knowledge gap was observed regarding the ideal therapeutic window for stroke thrombolysis, with only 33.3% of participants answering correctly. In addition, compliance with the critical safety practice of independently double-checking medication dosage was comparatively low (60%). These findings indicate that although nurses are generally competent in routine thrombolytic care, deficiencies remain in time-sensitive clinical decision-making and medication safety procedures. Targeted educational programs, simulation-based training, and reinforcement of standardized protocols may help bridge these gaps and enhance the quality and safety of thrombolytic therapy administration.

Conclusion

The study concludes that nurses working in critical care areas possess adequate knowledge and demonstrate satisfactory practice compliance regarding thrombolytic therapy administration. High levels of competency

were observed in patient monitoring and adherence to several essential procedural steps. Nevertheless, deficiencies in knowledge related to the therapeutic window for stroke thrombolysis and inconsistent compliance with medication double-checking procedures highlight areas requiring improvement. Strengthening continuing education, competency-based training, and adherence to evidence-based protocols is essential to improve clinical performance and patient safety. Addressing these identified gaps will contribute to more effective and safer administration of thrombolytic therapy in clinical practice.

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