

Effect of Educational Guidelines Implementation on Nurses' Performance Regarding Thrombolytic Therapy Management among Patients with Acute Myocardial Infarction

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Abstract

A well-established treatment for acute myocardial infarction, thrombolytic therapy has time-dependent advantages. When patients are admitted to the hospital with a suspected myocardial infarction, nurses are frequently the first medical personnel to evaluate them. There are various procedures for prompt evaluation and treatment. **Aim:** to determine the effect of educational guidelines implementation on nurses' performance regarding thrombolytic therapy management among patients with acute myocardial infarction. **Subject and Methods:** Quasi-Experimental research design was utilized to achieve the aim of the study. A sample of convenience of 50 nurses working in the coronary care unit. Data was collected at a coronary care unit affiliated with Sohag University Hospital. Three tools were utilized; included: (I) Personal data, (II) a Thrombolytic knowledge questionnaire, and (III) a Thrombolytic management observational checklist. **Results:** There was a statistically significant improvement in the nurses' knowledge and practice mean scores regarding thrombolytic therapy management post-educational guidelines implementation compared to pre-educational guidelines implementation. A highly statistically significant correlation was found between the overall performance before and after a month of implementing educational guidelines. **Conclusion:** Educational guidelines implementation has a positive effect on improving nurses' performance regarding thrombolytic therapy management among patients with acute myocardial infarction. **Recommendations:** The study suggested providing upgrading courses equipped with evidence-based recommendations based on nurses' need to enhance their performance in administering thrombolytic therapy. Furthermore, it is advised to monitor nurses' practices regarding the delivery of thrombolytic therapy.

Keywords: Educational guidelines, Nurses' performance, Patients with acute myocardial infarction, Thrombolytic therapy

Introduction:

Coronary Artery Disease (CAD) is the leading cause of death worldwide. According to the World Health Organization (WHO), CAD was ranked number one of the top ten killing diseases, causing the death of more than 7 million people (WHO, 2020). Myocardial infarction (MI) is the most common form of coronary artery disease and is one of the leading causes of morbidity and mortality in the world with approximately a 30% mortality rate (Rick and Leslie, 2022). According to the American Heart Association, the prevalence of CAD in the United States is 16.8 million, and

it is the number one killer for both men and women, accounting for 1 of every 5 deaths, with coronary events occurring every 25 seconds and death occurring every minute. Approximately 335,000 people per year die of CAD before arrival at the hospital or in the emergency department. Most of these deaths are due to sudden cardiac death (American Heart Association, 2021).

Acute Myocardial infarction (AMI) commonly known as a heart attack, results from the interruption of blood supply to a part of the heart, causing heart cells to die. This is most commonly due to occlusion (blockage) of

a coronary artery following the rupture of a vulnerable atherosclerotic plaque, in the wall of an artery. The resulting ischemia (restriction in blood supply) if left untreated for a sufficient period, can cause damage or death (infarction) of the heart muscle (**Reznik, 2020**). If a patient is diagnosed with an (AMI), thrombolytic therapy can be used to establish reperfusion if there are no contraindications to its use. Thrombolytic therapy drugs lyse coronary thrombi by converting plasminogen to plasmin, this conversion causes the degradation of fibrin and fibrinogen, resulting in clot lysis. Thrombolytic therapy provides the maximum benefits if given within the first three hours after the onset of symptoms, minimal benefits are realized, whoever if thrombolytic therapy is given more than 12 hours after the onset of symptoms (**Smeltzer, et al., 2020**).

Thrombolytic therapy is the most common medical management adopted in cases of AMI caused by occlusion of blood vessels by a thrombus. Thrombolytic therapy is used to break up or dissolve blood clots, which are the main cause of heart attacks. Thrombolytic therapy uses drugs called thrombolytic agents, such as alteplase, streptokinase, and tissue plasminogen activator (TPA) to dissolve clots (**Kenneth & Ouriel, 2018**). Thrombolytic therapy has been available for the last 5 decades, but the modern era of thrombolysis began in the early 1990s. The principal clinical syndromes for which thrombolytic therapy is indicated in acute myocardial infarction (AMI), deep vein thrombosis (DVT), pulmonary embolism (PE), acute ischemic stroke (AIS), and acute peripheral arterial occlusion (APAO) (**Wanda, et al., 2022**).

Despite the benefits of thrombolytic therapy and its ease of administration, several contraindications are forbidding its use. The thrombolysis in acute myocardial infarction (TIAMI) registry has shown that 10.3% of patients had contraindications for the use of thrombolytic therapy. The absolute contraindications such as hemorrhagic stroke, ischemic stroke in the preceding 6 months, central nervous system trauma, active gastrointestinal bleeding within the last month,

known bleeding disorder, and aortic dissection. The relative contraindications are transient ischemic attack in the preceding 6 months, streptokinase prior exposure (less than 1 year ago) due to allergic reaction to this agent, pregnancy or within 1 week postpartum, uncontrolled hypertension (BP > 180/110 mmHg), advanced liver disease, peptic ulcer and infective endocarditic (**Iyengar, & Godbole, 2021**).

Within the cardiac practice, one area that has seen much development involves the nurses assessing, diagnosing, and management of thrombolytic therapy for patients with an AMI. The nursing implications in the management of these patients have not been clearly defined, but the nurse's role is of vital importance in the observation and early detection of complications that can occur such as reperfusion arrhythmias, bleeding, and – occlusion. In addition, careful and continuous patient assessment enables the nurses to detect and manage these complications immediately (**Albarran, 2024**).

One of the main responsibilities of nurses and other healthcare professionals in the majority of healthcare settings is to provide medications. Unfortunately, mistakes are often made when administering medications. Any healthcare professional can make a mistake. The features of the nurses who typically make medication errors do not correlate with the frequency of medication errors, according to several research addressing the issue (**WHO, 2020**). The regularity with which nurses make prescription mistakes and the resulting consequences impact not only the patient's health but also the entire expense of healthcare. Longer hospital stays, higher costs, patient incapacity, and even death are all consequences of these pharmaceutical errors and the reactions they produce. These include injury to the nurse in question with reference to his or her practice, confidence, and position both personally and professionally (**Pickar, 2022**).

Significance of the study

In Egypt, according to the World Health Organization, the incidence of AMI by the year 2020 is 3.5% and the mortality rate statistics are estimated to be 477,000 deaths

each year. AMI may be a minor event in a lifelong chronic disease, it may even go undetected, but it may also be a major catastrophic event leading to sudden death or severe hemodynamic deterioration. Administration of thrombolytic therapy for AMI patients causes a relative reduction in mortality by 18% and an absolute reduction of nearly 2% (World Health Organization, 2020).

Through a clinical observation in the coronary care unit, it was observed that many of the common problems in clinical practice related to the administration of thrombolytic therapy among AMI patients, such as severe bleeding, reperfusion arrhythmias, and sudden cardiac death. This study emphasizes the need to improve patient care by all healthcare personnel the improvement of awareness by healthcare providers such as nurses, and ambulance personnel, can be achieved through assessment, education, and training. This study ultimately shows, that assessing the coronary care nurses' knowledge and practices regarding the management of thrombolytic therapy, contributes to the improvement of overall nursing care for AMI patients who are eligible for thrombolysis. And could exert a positive influence on the outcome of patient care. Few research studies were conducted nationally to assess the coronary care nurses knowledge and practice regarding management of thrombolytic therapy. Eventually, this research might generate attention and motivation for further research in this area.

Operational definition

Acute Myocardial infarction: a patient who is admitted to the coronary care unit CCU within the first 48 hours, Presenting by acute ischemic chest discomfort, elevation of ST segments on the 12-lead electrocardiogram (ECG), elevations of serum cardiac enzymes, caused by reduction of blood flow in a coronary artery due to occlusion by an thrombi.

Thrombolytic therapy: is the most common medical management adopted in cases of AMI, and that given within the first 6 hours after the onset of symptoms, to break up or to dissolve blood clots. This drug provides maximum benefits if given within the first three hours after the onset of symptoms, but if

the minimal benefits is realized, thrombolytic therapy is given more than 12 hours after the onset of symptoms.

Research hypothesis:

H1: Nurses' knowledge regarding thrombolytic therapy management among patients with acute myocardial infarction who receive educational guidelines would be improved post-educational guidelines implementation than pre-educational guidelines implementation.

H2: Nurses' practice regarding thrombolytic therapy management among patients with acute myocardial infarction who receive educational guidelines would be improved after the guidelines were implemented rather than before.

Subject and Methods

Research design:

To accomplish the study's goal, a quasi-experimental research methodology was used.

Subject

A sample of convenience of 50 nurses working in a coronary care unit, who provide direct care for acute myocardial infarction (AMI) patients receiving thrombolytic therapy, and who desire to participate in this study. Nurses with less than one year of experience were excluded.

Study setting:

This study was applied in a coronary care unit affiliated with Sohag University Hospital.

Tools for Data Collection

Three tools were utilized to collect data pertinent to the current study. They were developed by the researcher through a literature review (Albarran, 2024, Pickar, 2022). The designed tools included the following:

1- Personal data

It included data related to nurses' age, gender, level of education, and years of experience.

2-Thrombolytic knowledge questionnaire was developed by the researcher through a literature review. It consisted of 25 questions that covered the knowledge about the following items;

- Name of drug (questions 2, 3, and 12).

- Action of drug (questions 1, 4, 16, 21, 22, and 25).
- Doses of thrombolytic therapy (questions 18).
- Indications of thrombolytic therapy (questions 5).
- Adverse effects of drug (questions 9, and 10).
- Contraindications of thrombolytic therapy (questions 6, and 7)
- Complications of thrombolytic therapy (questions 8, and 24).
- Nursing care (questions 11, 13, 14, 15, 17, 19, 20, and 23).

Scoring system:

There are twenty-five questions and twenty-five grades total. Every accurate response received one grade, while every incorrect or unknown response received a zero. The following is a classification of the scoring system:

- Less than 18.75 (less than 75%) was considered an inadequate score.
- Scores of at least 18.75 ($\geq 75\%$) were considered good.

3- Thrombolytic management observational checklist

Through a review of the literature, the researcher created it to evaluate nurses' procedures for administering thrombolytic therapy to patients who had suffered an acute myocardial infarction. There were 45 steps in the tool that was designed. As follows, it was separated into three domains:

Pre-administration phase (Steps 1 to 22)

- Does the nurse confirm signs and symptoms of recent MI recommended for thrombolytic therapy? (Steps a1 to a7).
- Do the nurses confirm the following contraindications to thrombolytic therapy (Steps b1 to b7)?
 - Measure vital signs (Steps 15).
 - Perform physical assessment (Steps 16).
 - Connect the patient to monitor (Steps 17).
 - Check intravenous access device (Steps 18)
 - Obtain 12 lead ECG (Steps 19)

- Collect blood samples for coagulation and cardiac enzymes (Step 20)
- Check 5 rights of medication administration (Steps 21).
- Explain the procedure to the patient and obtain consent (Step 22).

During administration phase (Steps 23 to 30).

Post-administration phase (Steps 31 to 45).

Scoring system:

The total score of the checklist was 90 grades. Each step that was checked as "done complete" took 2 grades, "done incomplete" took one grade, and "not done" took zero grade.

- Scores equal to or more than 67, 5 ($\geq 75\%$) were considered satisfactory.
- Scores less than 67, and 5 ($< 75\%$) were considered unsatisfactory.

Validity and Reliability

The tools of the study were reviewed by a panel of three experts in the Medical-Surgical Nursing field, critical care medicine, and critical care nursing specialties to determine whether the included items are comprehensive, understandable, applicable, clear, and suitable to achieve the aim of the study. No needed modifications were made, and the content validity index was more than 0.95. The designed knowledge questionnaire related to thrombolytic therapy was reliable utilizing Inter-rater reliability with a kappa coefficient = 0.95. The test, reliability of the observational checklist was tested for reliability by test with Pearson correlation = 0.90.

Ethical consideration

The hospital directors and ethical committee formally approved the proposed study's conduct. To get written consent, each potential participant was educated about the study's objective, process, benefits, and nature. They were also advised that they might withdraw from the study at any moment without providing a reason. Participation in this study was optional. The subjects were told that their information would not be used in any future studies without their approval. By coding all data, each subject's confidentiality and identity

were guaranteed, and any information collected was safeguarded and had no bearing on their yearly evaluation.

Pilot Study

To make sure the study tools were feasible and clear, a pilot study was conducted on 10% of the study population, which included five nurses. The investigator gained expertise working with the included individuals and the data collection methods by conducting the pilot research. Pilot study participants were incorporated into the main study sample after necessary adjustments and no changes to sentence patterns were made in response to the pilot study's findings.

Fieldwork:

From November 2023 until the end of April 2024, data was gathered for the current study. Data collection was accomplished by means of a pre-test to establish a baseline assessment of nurses' knowledge and practice, a post-test one month after the guidelines were put into effect, and a pre-test. After the pre-guidelines were implemented, the tools were filled out once, and then again a month later after the guidelines were implementation.

Procedure

The current study was conducted through four phases: preparation, planning, implementation, and evaluation phases.

1- Preparation phase:

- Following initial approval by the Sohag University Faculty of Nursing's ethical committee to carry out the current investigation, the hospital director granted formal consent for data collection. The researcher then got in touch with and conducted one-on-one interviews with the nurses who consented to take part in order to explain the study's nature and goal. Ultimately, they provided their signed consent.
- Three days a week, during the morning and afternoon long-day shifts, data was gathered. Nurses completed a self-administered questionnaire (Tool I) to gauge their level of

expertise. The questionnaire took between 15 and 30 minutes to complete.

The researcher used (Tool II) to observe the nurses' performance abilities during the preparation of the nurses to administer thrombolytic therapy to the patient's heart, during the administration of thrombolytic therapy, and the monitoring of the patient following the administration of thrombolytic therapy. In patients with acute myocardial infarction, it was noted before, during, and after the administration of thrombolytic treatment. The baseline evaluation required ten to fifteen minutes to complete the checklist.

2- Planning phase:

The researcher created the rules based on the needs of the nurses. Written in Arabic, it underwent validity checks and supervisor approval.

To help cover theoretical and performance knowledge, teaching materials such as discussions, demonstrations, videos, pictures, and booklets were developed.

3- Implementation phase:

There were fifty nurses in all, split up into ten groups for the study. There were five nurses in each group for each session. Each group had four sessions with the investigator: two for theory and two for practice. Each session lasted 15 to 20 minutes, including the discussion portion.

Session one: (Introductory session) It provided an overview of acute myocardial infarction, and explained the rationale behind and significance of instructional guidelines.

Session two: It contained a description of thrombolytic treatment.

Session three: It addresses the best time to provide thrombolytic therapy, its dosage, its route of administration, its start time, and safety measures to take during the planning stage.

Session four: It includes measures before and after administering thrombolytic treatment.

Evaluation phase:

After the guidelines were implemented, a post-test was conducted one month later using the same instruments as the pretest to assess the

impact of the guidelines' implementation. The post-test used a self-administered questionnaire (Tool I) and practice through an observational checklist (Tool II) to assess the impact of the guidelines' implementation on nurses' performance regarding the management of thrombolytic therapy among patients with acute myocardial infarction.

Statistical analysis

The number and percentage distributions were used to arrange, classify, tabulate, and evaluate the gathered data. The Microsoft Excel Program and Statistical Package for Social Science (SPSS) version 25 computer program was used to perform the statistical analysis of the data. For quantitative data, the arithmetic mean (\bar{X}) and standard deviation (SD) were used, whereas for categorical data, frequencies and percentages were used as descriptive statistics. The chi-square test (χ^2) was used to compare qualitative variables. Pairwise t-tests were used to evaluate the differences between the groups throughout the two visits. Additionally, the R-test was used to assess the level of correlation between the variables being studied.

The following levels of significance were taken into account for the results:

- Not significant (NS) P-value > 0.05
- Significant P-value ≤ 0.05 (S)
- P-value < 0.01 indicates high significance (HS).

Results:

According to **Table 1**, the majority of nurses (76%) were female, and more than three-quarters (48%) were from Technical Institutes. The majority of the nurses in the study were between the ages of 26 and 31 (mean age: 26.53 ± 6.05 years). Additionally, nurses who had between one and five years of experience (72%) had an average of 5.83 ± 6.19 years.

As **Figure 1** illustrated that 90% of the nurses in the study had not taken any courses in thrombolytic therapy.

The data presented in **Table 2** indicates that there were statistically significant differences in the knowledge of the nurses in the study before and after the guidelines were implemented. The P value was less than 0.001, and the knowledge mean scores of the nurses were significantly higher after the implementation of the guidelines than before. The total mean scores were 23.22 and 14.37, respectively.

Figure (2) shows that 88% of the nurses in the study had satisfactory levels of knowledge about the administration of thrombolytic therapy after one month of the guidelines' implementation, whereas 96% of them had unsatisfactory levels with regard to such administration prior to the guidelines.

Table 3 shows that the nurses' practices regarding thrombolytic therapy were statistically different before and after implementation (P value = < 0.001), and that their mean scores for total practice increased significantly after implementation and at follow-up (total mean = 37.55 versus pre-implementation = 24.04).

According to **Figure (2)**, 90% of the nurses in the study had unsatisfactory practice toward the administration of thrombolytic therapy before the implementation of the guidelines, whereas 88% of them had satisfactory practice after one month.

Table 4 shows that there was a highly statistically significant correlation between total knowledge and total practice before and after a month of implementing the guidelines at $p < 0.001$.

Table (1): Personal data of the Studied nurses (N=50).

Personal data	Study sample N= 50	
	No	%
Sex		
Male	12	24
Female	38	76
Education Level		
Bachelor of Nursing	11	22
Technical Institute Diploma nursing	24	48
Nursing Diploma	15	30.0
Age		
<20	12	24
20-25	12	24
26-31	18	36
>32	8	16
Mean ± SD 26.53± 6.05		
Years of experience in nursing		
1-5	35	70.0
6-10	4	8
11-15	8	16
16 -20	2	4
>20	1	2
Mean ± SD 5.83± 6.19		

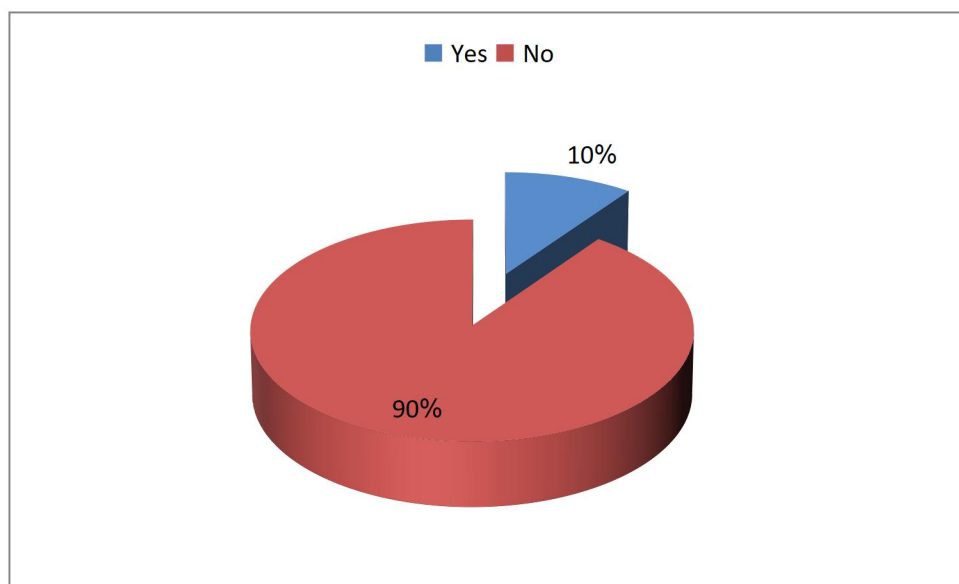


Figure 1. Nurses distribution according to attendance course about thrombolytic therapy (n=50)

Table (2): Total Mean Knowledge Score of the Studied nurses regarding Thrombolytic therapy pre and post-educational guidelines implementation (N=50):

Items	Total score	Pre		Post		t-test	P –value
		Mean	SD	Mean	SD		
Total Knowledge score.	25	14.37	2.24	23.22	2.13	18.56	<0.001

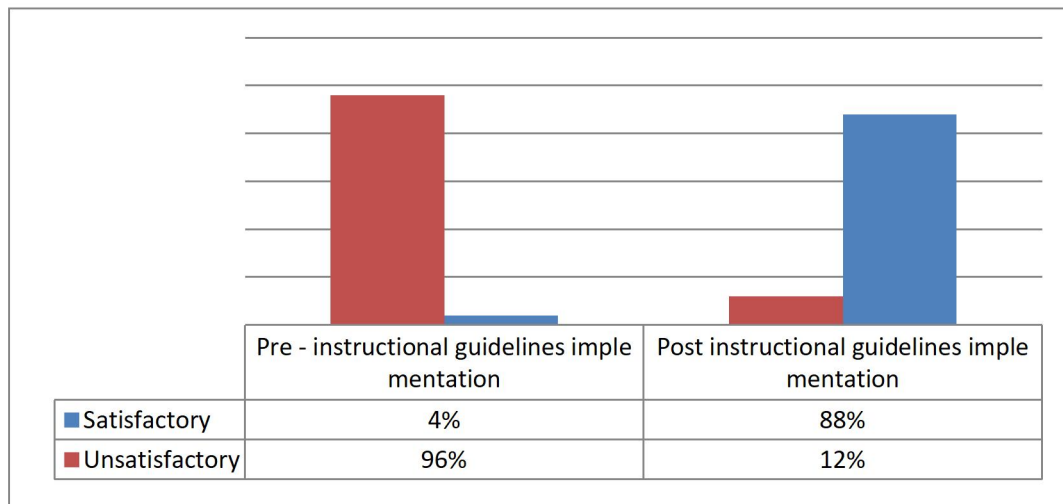


Figure (2): Nurses' total knowledge level regarding thrombolytic therapy pre and post-educational guidelines implementation (N=50):

Table (3): Total Mean Practice Score of the Studied nurses regarding Thrombolytic therapy pre and post-educational guidelines implementation (N=50)

Practice item	Pre-implementation		Post Implementation		t-test	P value
	Mean	SD	Mean	SD		
Total Score	24.04	4.07	37.55	1.88	56.20	<.001

t-test is paired sample t-test, P value is significant <.05.

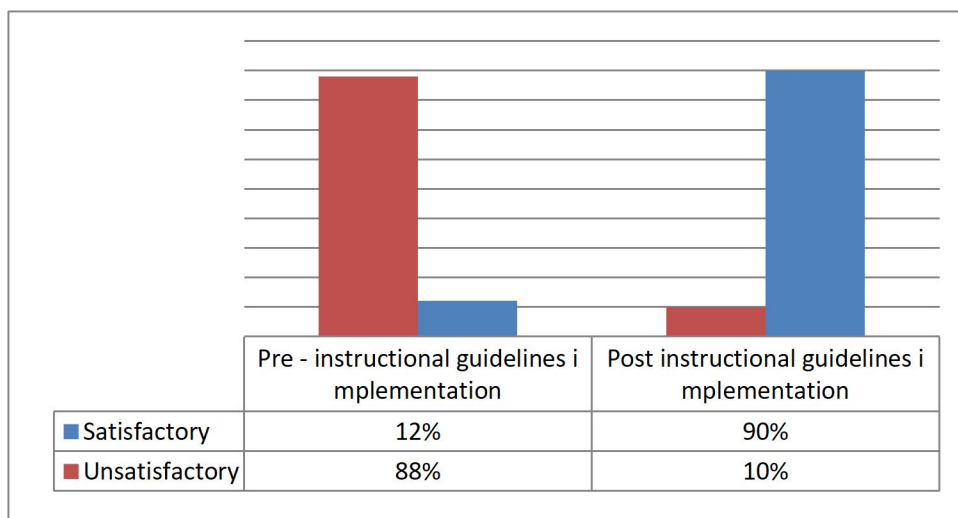


Figure (4): Nurses' total practice level regarding thrombolytic therapy pre and post-one month of guidelines implementation (n=50)

Table (4): Correlation between total knowledge and total practice among the studied nurses at pre and post-one month of guidelines implementation (n=50).

Items	Total practice			
	Pre-implementation		Post one month of implementation	
Total knowledge	R	p-value	R	p-value
		.375	.005**	.723

Discussion:

Emergency care is necessary for acute myocardial infarction, a leading cause of mortality and disability globally. ST-segment elevation MI and non-ST-segment elevation MI (NSTEMI) are the two types of acute myocardial infarction (Nascimento et al., 2019). Acute coronary artery thrombosis is the etiology of almost 90% of myocardial infarctions. Thrombolytic treatment is the mainstay of treatment for myocardial infarction (Li et al., et al., 2019).

Effective nursing care using thrombolytic therapy is thought to be crucial to the treatment of AMI and the preservation of the patient's life (Ahamed & Hassan, 2019). The procedure of administering medication is regarded as the fundamental nursing practice, and nurses are an essential and significant component of the healthcare system. Therefore, increasing nurses' understanding of thrombolytic therapy will guarantee the effectiveness of AMI treatment and directly affect the health progress of patients (Allawy et al., 2020).

The majority of the sample in this study was female, which may be explained by the fact that most Egyptian nurses are female. Naturally, this is because nursing has always been associated with women in Egypt. This result was consistent with the findings of Mustafa & Elfaki (2017), who found that most of the nurses had been female. I don't agree with Al-Ftlawy (2019), who discovered that the majority of nurses were men in his study.

Furthermore, the majority of the evaluated sample held a Technical Institute of Nursing diploma. Regarding age and years of

experience, the participants' mean age was 26.53 ± 6.05 years, and their mean years of experience were 5.83 ± 6.19 years. This result was in line with Hassan & Ahmed's (2022) findings, which showed that half of the nursing staff had a diploma and that 77.1% of the nursing staff were female. The study was conducted to evaluate nurses' perceptions about reporting drug administration. Furthermore, the results demonstrated that the majority of nurses were female, with an average age of 29 and 7.0 ± 6.0 years of work experience. This was in line with Allawy et al. (2020), who evaluated nurses' knowledge of high-alert drugs. Hajebi et al. (2020) conducted another study titled "All nurses were female, with an average age of 28.8 ± 5.4 years and an average working experience of 6.4 ± 5.1 years. This conclusion aligns with nurses' understanding of "thrombolytic therapy instrument development and validation." This supported the findings of Skal & Ahmed (2021), who found that most nurses have between one and five years of experience.

Contrary to this conclusion, a research by Bårdsgjerde et al. (2020) that examined "Nurses' perceptions of patient participation in the myocardial infarction pathway" discovered that the majority of nurses in the 42–50 age range provided cardiac care.

A study conducted by Allawy et al. (2020) assessed "the effect of guidelines regarding administering inotropic medications for critically ill patients on nurses' knowledge and practice," and found that most respondents were in the twenty- to thirty-year-old age range, with a mean age of about twenty-six plus or minus three weeks. Furthermore, the study found that more than half of the nurses have technical degrees. Furthermore, the survey found that more than two-thirds of the nurses

had one to six years of experience working in the critical care unit.

According to the current study's findings, the majority of the nurses involved had never undergone any thrombolytic therapy courses. These results were consistent with a study by **Hussien and Al-Ganmi (2023)** that evaluated "nurses' knowledge concerning cardiogenic shock for patients in cardiac care unit at Baghdad hospitals" and discovered that not many nurses were taking part in training programs. Furthermore, these results were consistent with a study by **Lamkhede (2024)** and **Rodrigues Júnior & Gasparino (2019)**, which found that most nurses lacked training on vasoactive medications that were relevant to their work in critical care.

Regarding nurses' total knowledge, the current study found that nurses' knowledge of acute myocardial infarction and thrombolytic therapy differed statistically significantly between before and after the guidelines were put into place, and that nurses' knowledge mean scores were significantly higher after the guidelines were put into place than they were before. These findings support the efficacy of the educational guidelines' implementation, demonstrating how well the guidelines work to increase nurses' knowledge.

This result is in line with the findings of **Al-Ftlawy's (2019)** study, it revealed that more than half of the study's nurses knew about acute myocardial infarction and had moderate to poor levels of education. A study by **Ali and Yousif (2019)** titled found that nurses possess a sufficient degree of knowledge about acute myocardial infarction. This finding contradicts their findings. The study's findings, however, are at odds with those of **Karadkar et al. (2018)**, who found that nurses' general level of knowledge of acute coronary syndrome more than half of the nurses had good knowledge and about one third had a very good level of knowledge.

The study "Assessment of Nurse's Knowledge Concerning Nursing Care of the patients receiving thrombolytic therapy with Acute Myocardial Infraction at Coronary Care Unit in Al-Diwaniya Teaching Hospital," conducted

by **Skal and Ahmed (2021)**, supports this conclusion. It discovered that nurses had a limited understanding of the main topics of the study, which included thrombolytic therapy, acute MI medications, and risk factors for bleeding in patients with acute MI receiving thrombolytic therapy. Furthermore, this outcome is in line with that of **Khalil et al. (2018)**, who discovered that CCU nurses' general knowledge of thrombolytic therapy was unsatisfactory. Additionally, this result aligned with a study by **Mustafa & Elfaki (2017)** named which found that the majority of nurses knew very little about thrombolytic agents particularly streptokinase's indications, contraindications, and complications—that are used to dissolve clots inside coronary arteries.

According to **Ismail et al. (2017)**, who carried out a study to evaluate "nurses' knowledge and practice regarding management of thrombolytic therapy among acute myocardial infarction patients," the majority of the participants had unsatisfactory knowledge, which is consistent with the findings of our study. In the same vein, **Sallam (2019)** demonstrated that over half of nurses possessed inadequate expertise. Additionally, **Allawy et al. (2020)** discovered that the majority of nurses have unsatisfactory knowledge regarding administering inotropic medications. They interpreted their findings as having to do with nursing implications, the extent of nursing's role in pharmacology, and the absence of a medication administration confirmation process in the nursing curriculum.

According to a study by **Hami & Atiyah (2020)**, nurses' knowledge regarding thrombolytic therapy has increased since the study group's educational program was implemented. These findings were in line with that study. In a similar vein, **D'Souza (2019)** looked at the knowledge and practices of nurses in the intensive care unit before and after planned teaching on how to care for patients on anticoagulant therapy. The study found that planned teaching is a good way to increase nurses' knowledge.

According to the current study's findings, most nurses had satisfactory levels of satisfaction

with administering thrombolytic therapy one month after the guidelines were put into effect, while nearly all of them had unsatisfactory levels before the guidelines were put into place. The results may be unsatisfactory because the nursing curriculum did not adequately address thrombolytic therapy and drug administration safety, and the students lacked the drug administration skills necessary to supervise the doctor during the medication administration process. At satisfactory levels, however, it validated the beneficial impact of implementing recommendations.

The results of this study indicate that most nurses' thrombolytic treatment practices were below pre-guideline performance levels. According to **Eweas et al., (2019)**, most nurses had unsatisfactory practice levels when it came to managing acute MI patients getting thrombolytic treatment prior to recommendations. This conclusion is consistent with their findings.

More than half of the nurses in the study performed at an unsatisfactory level when it came to administering thrombolytic therapy before the guidelines, whereas the majority performed satisfactorily both immediately after and one month after the guidelines were put into place. This finding further indicates the beneficial impact of the designed guidelines that were given to the nurses. This is consistent with a study by **Malk et al. (2018)** titled which showed that most of the nurses in the study performed poorly before the program began, but that their performance significantly improved right after the program ended, then decreased a little after three months of follow-up.

This conclusion was corroborated by **Fares et al.'s (2019)** study, which found a statistically significant difference between nurses' performance on the assessment of Acute Coronary Syndrome, showing good performance after the program and poor performance prior to the program. Given that over half of the nurses were graduates of technical institutions, the limited number of nursing personnel, and the absence of tight supervision, the study's findings may be

explained by the nurses' lack of relevant knowledge and prior training, which affected their performance. This outcome may be the consequence of the nurses' eagerness and desire to enhance their abilities, dedication to the educational program, and engagement throughout program sessions. According to **Toppo et al. (2019)**, who found that these results were consistent with their findings.

Similarly, **Sambu et al. (2018)** demonstrated that nurses' performance related to administering intravenous thrombolytic treatment and common cardiac operations during an AMI attack significantly improved from pre-test to post-test. Additionally, **D'Souza (2019)** discovered that, when it came to nursing practice in evaluating for heparin drug side effects such as bleeding gums, hematuria, and melena, post-test scores were higher than pre-test scores. **Zakria & Mohamed, (2019)** found a statistically significant difference between the pre-mean and post-mean in meditation practice, and these results corroborated their findings.

The results of the current study were in agreement with those of **Hessaen & Fadlalmola, (2020)**, a study that evaluated the importance of proper protocols and nurse experience in the delivery of intravenous thrombolytic treatment in hospitals. Knowledge and/or competence inadequacies were reflected in their findings, which indicated a major need to keep antidysrhythmic medications and the emergency cart close at hand for the treatment of severe Ventricular Dysrhythmias. It is further supported by **Mohammed et al. (2019)**, According to a study that assessed drug administration errors at a tertiary care hospital, the main human factor causing medication administration errors was performance deficit. According to this study, poor communication between nurses and doctors, frequent interruptions and diversions, inadequate training, and understaffing with relation to thrombolytic therapy were all contributing factors to unsatisfactory performance.

The current study's findings showed that, both before and after a month of following the guidelines, there was a highly statistically significant association between total

knowledge and total practice. These results partially conflict with the conclusions of the study "Patient Safety: Assessing Nurses' Compliance" by **Hassan & Ahmed (2022)**. The results of that study showed a statistically significant relationship between nurses' overall scores of adherence to safety procedures when administering thrombolytic therapy and their educational level and participation in programs.

In line with **Khaliel et al.'s (2022)** study which demonstrated that competent nursing performance increased as knowledge increased. However, the findings of **Fares et al.'s (2019)** study, contradict this finding. The authors found no statistically significant relationship between nurses' performance before and after the educational program was implemented and their knowledge scores.

This result partially aligns with the findings of **Hajebi et al. (2020)**, a study that examined nurses' knowledge, attitudes, and practices regarding pharmacovigilance at Tehran's Taleqani Medical Teaching and Treatment Center before and after an adverse drug reaction education program. The study found that nurses' knowledge was significantly lower before the seminar than it was following the seminar. The author suggested an ongoing education program about adverse drug reactions until nursing staff members took it upon themselves to voluntarily monitor adverse drug reactions.

Limitations of the study

- The results of this investigation were restricted to a small sample size of fifty nurses. It might not be representative of the entire nursing population as a result.
- The results of the investigation are less generalizable due to the fact that the sample was chosen from a single region of Egypt.
- Also, the study's scope is constrained. The study was limited to nurses who consented to participate.

Conclusion:

Based on the findings of the present study, it can be concluded that educational guidelines implementation has a positive effect on

improving nurses' performance regarding thrombolytic therapy management among patients with acute myocardial infarction.

Recommendations:

The following actions were suggested given the current study's findings:

Offering updating courses equipped with evidence-based recommendations depending on nurses' needs to raise their level of competency in administering thrombolytic therapy.

The guidelines for patients with acute myocardial infarction undergoing thrombolytic therapy should be updated, reviewed, and made available in both Arabic and English in the coronary care unit.

Nurses' understanding of thrombolytic therapy for patients with acute myocardial infarction must be continuously assessed to determine their needs in coronary units.

More research is required to help nurses prevent problems after administering thrombolytic treatment to patients who have had an acute myocardial infarction.

It is advised that nurses' practices regarding the delivery of thrombolytic treatment be monitored.

The provision of up-to-date learning resources (books, journals, and procedures) that are suggested for the CCU nurses to refresh their knowledge.

Replicate the current work with a larger sample from various regions.

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