NURSES' PERFORMANCE DURING GOLDEN HOUR OF MYOCARDIAL INFARCTION

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Abstract

Background: Myocardial infarction is the prototype of a real emergency, both efficacy and speed are necessary for effective management, it occurs as a result of pathological event in the setting of coronary artery with the marked cardiac insult and injury. there is a golden hour between life and death. it needed to be taken care of within the 1-hour time frame*. The aim* of this study was to assess nurses' performance during golden hour of myocardial infarction in emergency department and cardiac catheterization unit. *Design:* A descriptive exploratory design was utilized to achieve the aim of the study. *Setting:* the study was conducted at emergency department and cardiac catheterization unit at Al-Fayoum University hospital. *Sample:* A convenient sample of 60 nurses were included in the study. *Tools:* Tool I: Self-administered interview questionnaire: included two parts. Part I: demographic characteristics of nurses, Part II: Nurses' knowledge regarding golden hour during myocardial infarction. Tool II: Observational checklist of nurses' practices regarding care of patients during golden hour of myocardial infarction *Results*: the study findings showed that 36.7% of studied nurses had satisfactory total knowledge scores regarding definition of MI compared to 80% of them had unsatisfactory total knowledge scores regarding medical treatment of MI. also30% of the studied nurses had competent scores of practices during and immediate post intervention compared to 85% of them had incompetent scores of practices regarding activation of cardiac catheterization lab team. *Conclusion*: the majority of the studied nurses had unsatisfactory total level of knowledge regarding golden hour of myocardial infarction and most of them had incompetent total level of practices regarding care of patients during golden hour of myocardial infarction. *Recommendations*: continuous educational programs should be planned on regular basis to emergency nurses for enhancing their knowledge and practice to achieve high quality of care.

Key words: Golden hour, Myocardial infarction, Nurses' performance.

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Introduction

Myocardial infarction is the prototype of a real emergency, both efficacy and speed are necessary for effective management. The most frequent complication of myocardial infarction is sudden death occurs within the first hour after symptom onset. Thrombolytic therapy has been shown to reduce early and long term mortality about 20%. The mortality gain is dependent on the delay time of early reperfusion. The process of infarction may be completely aborted if reperfusion is initiated within 30 minutes after symptom onset. Current approaches designed to reduce the time delay between onset of symptoms and the initiation of thrombolytic treatment *(baloch, et al.,2020)*.

Myocardial infarction occurs as a result of pathological event in the setting of coronary artery with the marked cardiac insult and injury. The diagnosis is secured when there is a rise and/or fall of cardiac troponin levels along with supportive evidence in the form of typical symptoms, electrocardiographic changes, or imaging evidence of new loss of viable myocardium or new regional wall motion abnormality. The early rehabilitation is directed towards reinstatement of perfusion as soon as possible. This accomplished through medical or mechanical means, such as percutaneous coronary intervention, or coronary artery bypass graft surgery. The main targets of emergency department pharmacotherapy are rapid intravenous thrombolysis and/or rapid referral for percutaneous coronary intervention *(fathima .,2021)*.

Modifiable risk factors for myocardial infarction are smoking, blood pressure, psychological factors, loss of control, stress, financial stress, events including marital separation and job loss. Consumption of normal consumption of fruits or vegetables, daily consumption. Treatment for suspected acute myocardial infarction includes oxygen, aspirin, and sublingual glycerol trinitrate, Pain

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relief is also often given, classically morphine sulfate *(Ali, et al ,2022)*.

Acute myocardial infarction (AMI) is defined as a clinical syndrome that meets a certain set of criteria, usually a combination of symptoms, electrocardiographic changes and cardiac biomarkers. The symptoms of MI include chest pain, which travels from left arm to neck, shortness of breath, sweating, nausea, vomiting, abnormal heart beating, anxiety, fatigue, weakness and stress. Myocardial infarction may be "silent," and go undetected, or it could be a catastrophic event leading to hemodynamic deterioration and sudden death *(Sandoval, et al., 2020)*.

The concept of "golden hour" is derived from the French Military's World War. there is a golden hour between life and death. it needed to be taken care of within the 1-hour time frame. The "golden hour" is the term often used in trauma or emergency care to suggest that an injured or sick person must receive definitive treatment within the first 60 minutes from the time of injury or appearance of symptoms. It was believed that once this time has lapsed, the risk of death or long-term complications will significantly increase *(Uttekar&Allarakha ,2021)*.

When a patient arrives in the emergency department and reports chest pain, the nurse should perform an immediate assessment. Also should think of the 12-lead electrocardiograph as a sixth vital sign and obtain it within the first 10 minutes of arrival (at the first complaint of chest pain for in-patients). The 12-lead electrocardiograph should be repeated every 10 to 15 minutes when suspicion for myocardial infarction is high. Comparing each electrocardiograph with previous ones and noting changes are critical for cardiac-related chest pain identification. *(Anita, et al.,2021* **Significance of the study**

Cardiovascular diseases are a leading cause of mortality in humans, and nearly 20 million individuals worldwide die from acute cardiovascular events every year. Myocardial infarction (MI), also known as a heart attack, is a myocardial injury caused by myocardial ischemia. Myocardial infarction is one of the leading causes of death in the developed world, approximately 1.5 million individuals in the United States suffer from MI every year. *(Wu, et al, 2021)*

Coronary artery disease (CAD) is the leading cause of mortality, affecting approximately 1.72% of the global population, resulting in 9 million deaths per year. The total CAD prevalence for adults was estimated to be 7.1% in the U.S. from 2017 to 2020 and 5.11% in 2019 in Europe, its incidence is expected to rise. In the emergency department, acute chest pain is commonly misdiagnosed in specific patient populations, resulting in fatal outcomes. In more than 50% of fatal myocardial infarctions, patients die outside the hospital without receiving acute in-hospital treatment. *(Kodeboina, et al,2023)*

Myocardial infarction is a major global health care burden, with an estimated 7.29 million myocardial infarctions and 110.55 million prevalent cases of ischemic heart disease annually. There are an estimated 8.92 million deaths due to ischemic heart disease annually, making ischemic heart disease the leading cause of death worldwide. Approximately 15 million patients per year in the united states and Europe are admitted to the emergency department with chest pain or other symptoms suggestive of myocardial infarction. Any delays in treating patients with MI affect mortality and increase the risk of death, which is highest within the first hours from chest pain onset *(Cho Y., et al., 2020)*

myocardial infarction (MI) affecting more than 7 million individuals worldwide each year causing more than a third of deaths in developed countries annually. The incidence of MI in young population is universally low and varies according to location. In young Japanese patients, < 40 years, it ranges from 1.6%. The incidence is nearly 4% in Singapore, 5.8% in USA (between 25 and 44 years), 1.3% in Poland (< 40 years), 37.6% in England and Wales (between 18 and $<$ 65 years), and 23% in Egypt (< 55 years). *(Algowhary, 2021)*

Aim of the study:
The aim of this study was to assess nurses' performance during golden hour of myocardial infarction through the following objectives: -

1. Assess the level of nurses' knowledge regarding care of patients during golden hour of myocardial infarction
2. Assess the level of nurses' practices regarding care of patients during golden hour of myocardial infarction

Research question:
This study was answered the following questions:
1. What is the level of nurses' knowledge regarding care of patients during golden hour of myocardial infarction?
2. What is the level of nurses' practices regarding care of patients during golden hour of Myocardial infarction?

Subject and methods:
This study was portrayed under four main items as following:

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I.   **Technical item.**
II.   **Operational item.**
III. **Administrative item.**
IV.   **Statistical item.**
 I.   **Technical item:**

It includes the research design, setting, subjects and tools for data collection.

Research design:

A descriptive exploratory research design was utilized to achieve the aim of this study.

Descriptive exploratory design provides the least control over variables. The data collected either contribute to the development of theory or explain phenomena from the perspective of the persons being studied (**Zhang, Y., et al,2022).**

Setting:

This study was conducted at emergency department and cardiac catheterization lab at Fayoum university hospital. The hospital consists of four floors, where emergency department containing 40 beds that are usually occupied and cardiac catheterization unit in the first floor containing 5 beds.

Research subjects:

A convenient sample of sixty nurses (60) from both gender (40 nurses from emergency department and 20 nurses in cardiac catheterization unit) at the previously mentioned settings at time of data collection and agreed to participate in this study.

Tools for data collection:

Data were collected using the following tools:

Tool (I): Self-administered interview questionnaire:

This questionnaire consisted of two parts:

Part (I): Demographic and work related characteristics of nurses:

It included seven items as nurses' age, gender, marital status, educational level, years of experience, attending previous training program about caring of patients with myocardial infarction and department.

Part (II): Nurses' knowledge questionnaire:

This questionnaire was adapted from (**Mohammed, 2016**). It consisted of 41 multiple choice questions covering 9 domains: anatomy of the heart and coronary arteries (4 items), definition of myocardial infarction (4 items), common risk factors of MI (3 items), signs & symptoms of MI (6 items), complications of MI (3 items), medical treatment (4 items), cardiac catheterization (3 items), life style management of MI as diet (3 items), physical activity (4 items) and smoking

cessation (3 items) and golden hour of myocardial infarction (4 items).

- The investigator adapted the questionnaire by rewording statements of some questions and adding some questions to assess nurses' knowledge regarding cardiac catheterization and golden hour.

Scoring system of nurses' knowledge questionnaire:

Each knowledge item was scored as score one for the correct answer and score zero for the incorrect answer. The total score was calculated for each nurse by adding the score items of questionnaire. Total scores ranged from 0-41 and were categorized as:

- Satisfactory level of knowledge when the total score equal or above $\geq 80\%$

- Unsatisfactory knowledge if the total score below $<80\%$

Tool (II): Nurses' practices observational checklist:

It was adapted from (**Mohammed & ACC, 2016**). It was used to assess level of nurses' practices regarding care of patients during golden hour of myocardial infarction. It composed of 31 items which were divided as the following:

- **Practices during first patient's contact to STEMI confirmation** it included (2 items) If patient arrives at hospital in personal car and/or ambulance without ECG and other 5 items for all patients.

- **Practices for activation of cardiac catheterization lab team;** it included (3 items)

- **Practices after activation of cardiac catheterization lab team;** it included (8 items)

- **Practices of cardiac catheterization lab team before intervention;** it included (7 items).

- **Practices during and after immediate post intervention;** it included (6 items).

The investigator adapted the checklist by rewording statements and adding some practical skills for nurses according standard guidelines.

Scoring system of nurses' practices observational checklist:

Each step was given one point for done step and zero for not done step. The total scores of the practices was ranged from 0 to 31. A total score of $\geq 80\%$ and more was considered competent, while, a score below $<80\%$ was considered incompetent.

II.   **Operational item:**

The operational item for this study includes preparatory phase, content validity of the developed tool, pilot study and field work.

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A. Preparatory phase:

This phase was conducted through reviewing of related literature and theoretical knowledge of various aspects of the study using books, articles, internet, periodicals and magazines to develop tools for data collection.

A. Pilot study:

The pilot study was done on 10% (6 nurses) of the sample to examine the clarity of questions and time needed to complete the study tools. Based on the results, were also included in the main study subjects, because there were no modification in the tools.

Content validity and reliability:

Validity

Is the extent to which the instrument actually measures what it's designed to measure (**Mueller and Knapp, 2018**) Content validity was conducted to determine whether the tools covered the aim, test its appropriateness, comprehensiveness, accuracy, correction, clearance, and relevance through a jury of 5 experts (assistant professors and lecturers of medical surgical nursing) from the Faculty of Nursing- Helwan University. Their opinion was elicited regarding tools consistency, rephrasing for some statements, and scoring system. Ethics, values, culture, and beliefs were respected.

Reliability

Reliability refers to the stability of the measuring instrument used and its consistency over time. In other words, Reliability is the ability to measure instruments to give similar results when applied at different times. However, a strong positive correlation between the results of the measuring instrument is an indication of reliability (**Sürücü & Maslakçi,2020**). It was determined using alpha Cronbach's coefficient to assess the internal consistency of the tool and its value was (0.845) for nurses' knowledge questionnaire, (0.813) for nurses' practices observational checklist.

B. Field work:

Field work included the following:

• An approval was obtained from the scientific ethical committee of faculty of nursing-Helwan University and the study nurses to give an oral agreement to participate in the study.

• An official permission included the title and purpose of study submitted to the director of Fayoum university hospital to get approval for data collection to conduct the study.

• Data collection of the study was started and completed within 6 months from the beginning of November 2022 to the end of to April 2023.

• First, the investigator introduced himself to the studied nurses and gave a brief explanation about the study and its purpose before any data collection.

• Each nurse was interviewed individually to gather the necessary data of the study.

• The investigator was going to the hospital two days/week (on Sunday &Wednesday) in the morning shift 9.00 am to 12.00 pm and afternoon shifts.16.00 pm to 18.00 pm).

• The time needed for self- administered questionnaire was about 10-15 minutes for each nurse then assessing nurses' knowledge took 25-30 minutes.

• Each nurse was observed during caring of patients with myocardial infarction during golden hour (60 minutes) by assessing nurses' practices at the emergency department and catheterization lab. The investigator observed nurses' practical skills about studied procedures.

• The studied nurses were assured that the information collected would be treated confidentially and that it would be used only for the study purpose.

III. Administrative Item:

After explanation of the study aim and objectives, an official permission was obtained from the Dean of faculty of nursing and the director of El-Fayoum University hospital asking for cooperation and permission to conduct the study.

Ethical consideration:

An approval was obtained from scientific ethical committee of the faculty of nursing **-**Helwan University. The investigator clarified the objective and aim of the study to the nurses prior to any data collection. The investigator assured maintenance of anonymity and confidentiality of the nurses' data and the nurses have the right to withdraw from the study at any time. Ethics, values, culture, beliefs were respected.

IV. Statistical item:

Upon completion of data collection, data was computed and analyzed using Statistical Package for the Social Science (SPSS), version 24 for analysis. For quantitative data, numbers, percentage, mean and standard deviation (SD) were used to describe the results. For qualitative data, frequency and percentage distribution of each category were calculated.

Appropriate significance was adopted at $p \leq 0.05$ for interpretation of results. The observed differences were considered as not significant if $p > 0.05$ and significant if $p \leq$

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0.05. Appropriate inferential statistics such as   as   well.
chi-square and Pearson correlation were used

Results

Table (1): Frequency and percentage distribution of studied nurses according to their demographic and work related characteristics (n=60)

Items	N	%
Age		
20- 30	52	**86.7**
31- 40	6	10.0
41- 50	2	3.3
Mean ± SD	34.82 ± 5.41	
Gender		
Male	34	**56.7**
Female	26	43.3
Marital status		
Single	22	36.7
Married	36	**60.0**
Widow	2	3.3
Educational level		
Diploma	9	15.0
Technical nursing institute	37	**61.7**
Bachelor	9	15.0
Master	5	8.3
Years of experience		
<5 years	31	**51.6**
6- 10 years	22	36.7
11- 15 years	6	10.0
16- 20 years	1	**1.7**
Mean ± SD	8.67 ± 5.29	
Previous training program		
Yes	35	**58.3**
No	25	41.7
Department		
Emergency department	40	**66.7**
Cardiac catheterization lab	20	33.3

Table (1) shows that 86.7 % of the studied nurses were in the age group from 20 to less than 30 years with a mean age 34.82 ± 5.41, 56.7 of studied nurses were males and 60.0% of them were married. 61.7% of them had technical institute of nursing, 51.6% of them had experience of less than 5 years with mean years of experience 8.67 ± 5.29. 58.3% of studied nurses attended training program and 66.7% of studied nurses were working at emergency department.

Table (2): Frequency and percentage distribution of studied nurses according to their knowledge about anatomy of the heart and coronary arteries (n=60)

Items	Correct		Incorrect	
	N	%	N	%
The inner layer of the wall of the heart	17	**28.3**	43	71.7
The blood vessel bringing the deoxygenated blood from head and upper	11	18.3	49	**81.7**

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parts of the body into the heart				
The function of the coronary artery	18	**30.0**	42	70.0
The most common coronary artery involved in myocardial infarction	10	16.7	50	**83.3**

Table (2): reveals that (28.3% and 30%) of the studied nurses had correct knowledge about the inner layer of the wall of the heart and the function of the coronary artery respectively. However, (81.7% and 83.3%) of the studied nurses had incorrect knowledge about the blood vessel bringing deoxygenated blood from head and upper parts of the body into the heart and the most common coronary artery involved in myocardial infarction respectively.

Table (3): Frequency and percentage distribution of studied nurses according to their knowledge about definition and common risk factors of MI (n=60)

Items	Correct		Incorrect	
	N	%	N	%
Definition of MI				
Definition of myocardium is heart muscle	23	**38.3**	37	61.7
The myocardial infarction is known as heart attack	24	**40.0**	36	60.0
The heart attack occurs when there is blood clotting in coronary arteries	19	31.7	41	**68.3**
Inflammatory biomarkers are often elevated after an acute MI.	20	33.3	40	**66.7**
Common risk factors of MI				
The non-modifiable risk factors that increase the risk of MI	20	**33.3**	40	66.7
The modifiable risk factor associated with myocardial infarction	16	26.7	44	**73.3**
The most frequent time of myocardial infarction attack	17	28.3	43	**71.7**

Table (3): illustrates that (38.3% and 40%) of the studied nurses had correct knowledge about definition of myocardium and myocardial infarction respectively. However, (68.3 % and 66.7 %) of them had incorrect knowledge about the cause of heart attack and elevation of inflammatory biomarkers after an acute MI respectively.

Regarding their knowledge about common risk factors of MI, 33.3% of the studied nurses had correct knowledge about non modifiable risk factors that increase the risk of MI. Meanwhile, (73.3% and 71.7%) of them had incorrect knowledge about modifiable risk factor associated with myocardial infarction and the most frequent time of myocardial infarction attack respectively.

Table (4): Frequency and percentage distribution of studied nurses according to their knowledge about signs, symptoms and complications of MI (n=60)

Items	Correct		Incorrect	
	N	%	N	%
Signs and symptoms of MI				
The most common symptom of myocardial infarction	15	25.0	45	**75.0**
Assessment of chest pain of myocardial infarction				
Site of pain	22	**36.7**	38	63.3
Nature of pain	15	25.0	45	**75.0**
Onset of pain	18	30.0	42	70.0
Common aggravating factors of pain	20	**33.3**	40	66.7
Pain isn't relived by bed rest and nitroglycerin	15	25.0	45	**75.0**
Complications of MI				
Arrhythmia is the most common complication in the first 24 hours of MI	15	25.0	45	**75.0**
The time of having the greatest risk for ventricular arrhythmias after acute	16	26.7	44	**73.3**

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MI				
Angina pectoris isn't considered mechanical complication of MI	19	**31.7**	41	68.3

Table (4): demonstrates that (36.7% and 33.3%) of studied nurses had correct knowledge about the site and common aggravate factors for pain respectively. However, the same percentage of them (75%) had incorrect knowledge about the most common symptom of MI, nature of pain and pain isn't relived by bed rest respectively.

Regarding their knowledge about complications, (31.7%) of the studied nurses had correct knowledge about mechanical complication of MI. while, (75% and 73.3 %) of them had incorrect knowledge about the most common complication in the first 24 hours of MI and the time of having the greatest risk for ventricular arrhythmias after acute MI, respectively

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Table (5): Frequency and percentage distribution of studied nurses according to their knowledge about medical treatment of MI and cardiac catheterization (n=60)

Items	Correct		Incorrect	
	N	%	N	%
Medical treatment of MI				
The primary reason for administering morphine to a patient with MI	12	20.0	48	**80.0**
The action for which aspirin is administered to patient experiencing MI	14	**23.3**	46	76.7
The nursing action after administering continuous intravenous nitroglycerin infusion	10	16.7	50	**83.3**
Tissue plasminogen activator is a contraindication for treatment of MI patients with history of cerebral hemorrhage.	15	**25.0**	45	75.0
Cardiac catheterization				
The meaning of percutaneous coronary intervention	19	31.7	41	**68.3**
Nursing role for complications of radial compression device after cardiac catheterization	32	**53**	28	47
The symptoms during cardiac catheterization procedure that have the highest priority.	21	35	39	**65**

Table (5): demonstrates that 25% of the studied nurses had correct knowledge about tissue plasminogen activator is a contraindication for treatment of MI patients with history of cerebral hemorrhage. However, (80% and 83.3%) of them had incorrect knowledge about the primary reason for administering morphine to a patient with MI and the nursing action after administering continuous intravenous nitroglycerin infusion respectively.

Regarding their knowledge about cardiac catheterization, (53%) of the studied nurses had correct knowledge about nursing role for complications of radial compression device after cardiac catheterization. However, (68.3% and 65%) of them had incorrect knowledge about the meaning of percutaneous coronary intervention and the symptoms during cardiac catheterization procedure that have the highest priority respectively.

Table (6) Frequency and percentage distribution of studied nurses according to their knowledge about life style management of MI (n=60)

Items	Correct		Incorrect	
	N	%	N	%
Dietary management of MI				
Small, easily digested meals are recommended during acute phase of MI	20	33.3	40	**66.7**
Fruits and vegetables are considered healthy diet for patients with MI	24	**40.0**	36	60.0
The basic dietary guidelines for patients with MI	18	30.0	42	**70.0**
Physical activities				
The time of starting exercise for patients with MI	18	30.0	42	70.0
The type of exercise should be avoided after acute myocardial infarction	12	20.0	48	**80.0**

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The tips for physical activity for patients with MI	19	**31.7**	41	68.3
The guidelines for home based exercise for patients with MI	20	**33.3**	40	66.7
Smoking cessation				
Cigarette smoking exacerbate signs and symptoms of MI	15	25.0	45	75
Smoking is considered modifiable risk factor for MI	11	18.3	49	**81.7**
Smoking causes a state of hypercoagulability	17	**28.3**	43	71.7

Table (6) reveals that (40%) of studied nurses had correct knowledge about healthy diet for patients with MI as fruits and vegetables. Meanwhile, (66.7% and 70%) of them had incorrect knowledge regarding the meals that are recommended during acute phase of MI and the basic dietary guidelines for patients with MI respectively.

According to their knowledge about physical activities, (31.7% and 33.3%) of the studied nurses had correct knowledge about tips for physical activity and the guidelines for home based exercises for patients with MI respectively. (80%) of them had incorrect knowledge about the type of exercise should be avoided after acute MI.

Regarding their knowledge about smoking cessation, (28.3%) of the studied nurses had correct knowledge about smoking was found to produce a state of hypercoagulability. However, (81.7%) of them had incorrect knowledge about smoking as a modifiable risk factor for MI.

Table (7): Frequency and percentage distribution of studied nurses according to their knowledge about golden hour (n=60)

Items	Correct		Incorrect	
	N	%	N	%
The golden hour is the hour from onset of the pain	15	25.0	45	**75.0**
The golden hour is very important for patients with MI	17	**28.3**	43	71.7
The term golden hour suggests increased chance of recovery without adverse effects of heart attack	16	26.7	44	73.3
The objectives of golden hour management	12	20.0	48	**80.0**

Table (7): shows that (28.3%) of the studied nurses had correct knowledge about the importance of golden hour for patients with MI. However, (75% and 80%) of them had incorrect knowledge regarding definition of golden hour and the objectives of golden hour management respectively.

Table (8): Frequency and percentage distribution of studied nurses according to items of knowledge (n=60)

Items of knowledge	Satisfactory		Unsatisfactory		Chi-square	
	N	%	N	%	X^2	P-value
Anatomy of the heart and coronary arteries	14	23.3	46	76.7	34.133	<0.001*
Definition of MI	22	**36.7**	38	63.3	8.533	0.003*
Common risk factors	18	30.0	42	70.0	19.200	<0.001*
Signs and symptoms	15	25.0	45	75.0	30.000	<0.001*
Complications	17	28.3	43	71.7	22.533	<0.001*
Medical treatment of MI	12	20.0	48	**80.0**	43.200	<0.001*
Dietary management	21	35.0	39	65.0	10.800	<0.001*
Physical activities	17	28.3	43	71.7	22.533	<0.001*
Smoking cessation	14	23.3	46	76.7	34.133	<0.001*
Cardiac catheterization	19	31.7	41	68.3	16.133	<0.001*
Golden hour	15	25.0	45	75.0	30.000	<0.001*

*   Significant if P Value ≤0.05
** Highly significant if P Value ≤0.001
Table (8) shows that 36.7% of studied nurses had satisfactory total knowledge scores regarding definition of MI compared to 80% of them had unsatisfactory total knowledge scores regarding medical treatment of MI.

There were high statistically significant differences between satisfactory and unsatisfactory scores of knowledge with (p value= <0.001), except definition of MI, there was a statistically significant difference with (p value= 0.003)

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Figure (1): Frequency and percentage distribution of studied nurses according to total scores of knowledge (n=60)

■ Satisfactory ■ Unsatisfactory

Figure (1): illustrates that 28.3% of the studied nurses had satisfactory total knowledge regarding myocardial infarction and golden hour, while, (71.7%) of them had unsatisfactory total knowledge.

Table (9): Frequency and percentage distribution of studied nurses according to their practices during first patient's contact to STEMI confirmation (n=40)

Items	Done		Not done	
	N	%	N	%
If patient arrives at hospital in personal car and/or ambulance without ECG				
Triage nurse perform rapid assessment and brief history and obtain ECG for patients with typical complaints of chest pain.	33	**82.5**	7	17.5
Communicate ECG and physical assessment findings to emergency department physician to confirm myocardial infarction	32	80	8	20
For all patients				
Administer 2L oxygen per nasal cannula	8	20	32	**80**
Administer acetylsalicylic acid 81 mg x 4 tablets chewed	30	75	10	25
Administer morphine sulfate for pain	13	32.5	27	67.5
Start intravenous fluids.	12	30	28	**70**
Draw lab investigations: cardiac markers, CBC with platelets, INR, basic metabolic panel and lipid profile	33	**82.5**	7	17.5

ECG: Electrocardiogram; CBC: Complete Blood Count; INR: International Normalizing Ratio

Table (9) showed that 82.5% of the studied nurses performed rapid assessment, brief history, obtained ECG for patients and drew lab investigations as cardiac markers, CBC with platelets, INR, basic metabolic panel and lipid profile respectively. However, 80% and 70% of them didn't administer oxygen per nasal cannula and didn't start intravenous fluids respectively.

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Table (10) Frequency and percentage distribution of studied nurses according to their practices for activation of cardiac catheterization lab team (n=40)

Items	Done		Not done	
	N	%	N	%
Emergency department physician notify cardiologist and cardiac catheterization lab team	34	**85**	6	15
Interventional cardiologist respond to within 5 minutes	7	17.5	33	82.5
Cardiac catheterization lab team respond within 5 minutes	5	12.5	35	**87.5**

Table (10): revealed that emergency department physician notified cardiologist and cardiac catheterization lab team with a percentage of (85%). While 87.5% of the cardiac catheterization lab team didn't respond within 5 minutes.

Table (11): Frequency and percentage distribution of studied nurses according to their practices after activation of cardiac catheterization lab team (n=20)

Items	Done		Not done	
	N	%	N	%
Emergency nurse complete nursing hand-off in catheterization lab	13	65	7	35
Nurse explain diagnosis, coronary angiography and percutaneous coronary intervention to patient and family	8	40	12	60
Nurse obtain informed consent for diagnostic catheterization and PCI	16	**80**	4	20
Nurse collect data as vital signs, height and weight, pulmonary assessment, cardiac auscultation..etc.	12	60	8	40
Nurse administers heparin before the procedure	5	25	15	**75**
Nurse administers glycoprotein inhibitors	7	35	13	65
Nurse administers beta blockers unless contraindicated	5	25	15	**75**
Nurse prepares catheterization site.	16	**80**	4	20

PCI   Percutaneous Coronary Intervention

Table (11): demonstrates that 80% of the studied nurses obtained informed consent for diagnostic catheterization and PCI from patient and prepared catheterization site respectively. While, (75%) of them didn't administer heparin before the procedure and didn't administer beta blockers unless contraindicated, respectively.

Table (12) Frequency and percentage distribution of studied cardiac catheterization lab team according to their practices before intervention (n=20)

Items	Done		Not done	
	N	%	N	%
Interventional cardiologist confirms ready state within 30 minutes	8	40	12	**60**
Cardiac catheterization lab team confirm ready state within 30 minutes	8	40	12	**60**
Cardiac catheterization lab team are in a ready state for emergencies.	12	60	8	40
Nurse prepares pre-mixed medications.	13	65	7	35
Nurse calls patient's lab results to catheterization lab	14	70	6	30
Interventional cardiologist and nurses perform scrubbing, while, patient is positioned on table	17	**85**	3	15
Nurse connects patient to monitors, drapes patient and performs ongoing assessment of patient during procedure	15	**75**	5	25

Table (12) showed that (85%) of the studied nurses and cardiologist performed scrubbing, while, patient is positioned on table. (75%) of them connected patient to monitors, draped patient and performed ongoing assessment of patient during procedure. However, the same percentage (60%) of interventional cardiologist and cardiac catheterization lab team didn't confirm ready state within 30 minutes.

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Table (13): Frequency and percentage distribution of studied nurses according to their practices during and after immediate post intervention (n=20)

Items	Done		Not done	
	N	%	N	%
Nurse prepares guide catheter and interventional guidewire to proceed with PCI	15	**75**	5	25
Nurse prepares angioplasty balloon and/or coronary stents	13	65	7	35
Nurse administers heparin to keep activator clotting time	14	**70**	6	30
Nurse completes post-intervention documentation	12	60	8	40
Nurse notifies family about the procedure results	9	45	11	**55**
Nurse transports patient to appropriate unit and completes nursing hand-off	12	60	8	40

PCI Percutaneous Coronary Intervention
Table (13) showed (75% and 70%) of the studied nurses prepared guide catheter and interventional guidewire to proceed with PCI and administered heparin to keep activator clotting time respectively. while, (55%) of them didn't notify family about the procedure results.

Table (14) Frequency and percentage distribution of the studied nurses according to their practices during golden hour of MI (n=60).

Items	Competent		Incompetent		Chi-square	
	N	%	N	%	X^2	P-value
First patient's contact to STEMI confirmation.	15	25	45	75	30.00	<0.001*
Activation of cardiac catheterization lab team	9	15	51	**85**	58.80	<0.001*
After activation of cardiac catheterization lab team	5	25	15	75	10.00	0.002*
Cardiac catheterization lab team practices before intervention	4	20	16	80	14.40	<0.001*
During and immediate post intervention	6	**30**	14	70	6.400	0.011*

*   **Significant if P Value $\leq$0.05**
** **Highly significant if P Value $\leq$0.001**

Table (14): revealed 30% of the studied nurses had competent scores of practices during and immediate post intervention compared to 85% of them had incompetent scores of practices regarding activation of cardiac catheterization lab team.

There were high statistically significant differences between competent and incompetent scores of practices with (p value= <0.001), except practices after activation of cardiac catheterization lab team, during and immediate post intervention, there were statistically significant differences with (p value= 0.002 & 0.011)

Figure (2): Frequency and percentage distribution of the studied nurses according to total practices during golden hour of MI (n=60)
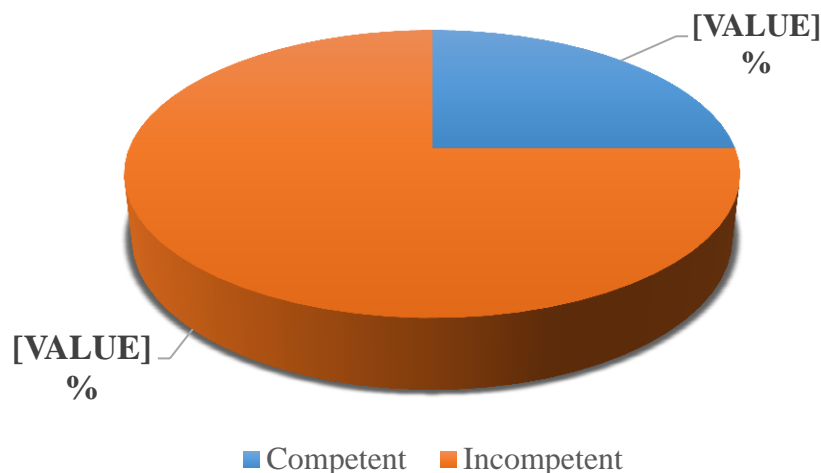
Figure (2): illustrated that (25%) of the studied nurses had competent scores of total practices during golden hour of MI and (75%) of them had incompetent scores of total practices.

Table (15): Correlation between total knowledge and total practice scores of the studied nurses (n=60).

Items	Total knowledge	
	r	P-value
Total practices	0.923	<0.001**

** Highly significant if P Value ≤0.001

Table (15): shows that there was a high statistically significant positive correlation between total knowledge and total practices scores of the studied nurses with p-value <0.001*.

Table (16): Relations between demographic and work related characteristics of studied nurses and their knowledge (n=60).

Items	Total knowledge					
	Satisfactory		Unsatisfactory		Chi-square	
	N	%	N	%	X^2	P-value
Age						
20- 30 years	16	30.8	36	69.2	13.846	<0.001**
31- 40 years	6	100.0	0	0.0		
41- 50 years	2	100.0	0	0.0		
Gender						
Male	13	38.2	21	61.8	0.102	0.750
Female	11	42.3	15	57.7		
Marital status						
Single	9	40.9	13	59.1	3.234	0.198
Married	13	36.1	23	63.9		
Widow	2	100.0	0	0.0		
Educational level						
Diploma	3	33.3	6	66.7	28.018	<0.001**
Technical nursing institute	7	18.9	30	81.1		
Bachelor	9	100.0	0	0.0		
Master	5	100.0	0	0.0		
Years of experience						
<5 years	4	12.9	27	87.1	23.325	<0.001**
6- 10 yrs.	13	59.1	9	40.9		
11- 15 yrs.	6	100.0	0	0.0		
16- 20 yrs.	1	100.0	0	0.0		
Previous training program						
Yes	14	40.0	21	60.0	0.000	1.000
No	10	40.0	15	60.0		
Department						
Emergency department	7	17.5	33	82.5%	6.936	0.008*
Cardiac catheterization lab	10	50	10	50		

* Significant if P Value ≤ 0.05   **
Highly significant if P Value ≤ 0.001

Table (16): reveals that there were high statistically significant relations between total knowledge of the studied nurses and their age, educational level and years of experience with p-value ≤0.001. Also, there was statistically significant relation between total knowledge and department with p-value <0.008.

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Table (17): Relations between demographic and work related characteristics of studied nurses and their practices (n=60).

items	Total practices					
	Competent		Incompetent		Chi-square	
	N	%	N	%	X^2	P-value
Age						
20- 30 years	14	26.9	38	73.1	15.944	<0.001*
31- 40 years	6	100.0	0	0.0		
41- 50 years	2	100.0	0	0.0		
Gender						
Male	12	35.3	22	64.7	0.064	0.801
Female	10	38.5	16	61.5		
Marital status						
Single	9	40.9	13	59.1	4.204	0.122
Married	11	30.6	25	69.4		
Widow	2	100.0	0	0.0		
Educational level						
Diploma	3	33.3	6	66.7	25.912	<0.001*
Technical nursing institute	6	16.2	31	83.8		
Bachelor	8	88.9	1	11.1		
Master	5	100.0	0	0		
Years of experience						
<5 years	4	12.9	27	87.1	17.921	<0.001*
6- 10 yrs.	12	54.5	10	45.5		
11- 15 yrs.	5	83.3	1	16.7		
16- 20 yrs.	1	100.0	0	0.0		
Previous training program						
Yes	14	40.0	21	60.0	0.402	0.526
No	8	32.0	17	68.0		
Department						
Emergency department	6	15	34	85	6.400	0.011*
Cardiac catheterization lab	9	45	11	55		

*

Significant if P Value $\leq$ 0.05   ** Highly significant if P Value $\leq$ 0.001

Table (17): reveals that there were high statistically significant relations between total

practices of the studied nurses and their age, educational level and years of experience with p-value $\leq$0.001. Also, there was statistically significant relation between total knowledge and department with p-value <0.011

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Discussion

Myocardial infarction is now single biggest killer, it is also affects many people in their most productive time of life. Sudden death is first manifestation of MI in 20-30 percent of cases, two thirds of deaths from MI are sudden and take place before medical help can be reached. As many die within the first 24 Hours. Accurate and sudden action of the nurses can help in the survival of the patient. So the nurses need adequate knowledge and skill for providing competent care to the cardiac patients. **(Preetha and Smitha, 2019).**

The nurse tending to a patient who has suffer from myocardial infarction or who is at risk for one must comprehend the underlying causes of infarction and be able to spot both its subtle and more prominent symptoms. Recovery requires quick assessment and quick action. To handle such acute circumstances, nurses must be knowledgeable and skilled. By identifying errors in performance, concepts, and settings, monitoring and evaluating nurses' competence can help to ensure greater performance in the future. Therefore, it is crucial to understand the extent of nurses' myocardial infarction expertise to raise the standard of nursing care (**Yesmin et al., 2022**).

As regard to demographic and work related characteristics of studies nurses, the results of the present study revealed that majority of the studied nurses were in the age group from 20 to less than 30 years. This can be explained by the most of the nurses were newly graduated. This result is disagreement with **Jabbar et al. (2022),** who applied their study in Iraq to assess nurses'

interpretation", and found that the greater number of surveyed nurses seemed to have bachelor in nursing science. While this finding goes in the same line with **Ali et al. (2022),** who implemented their study to assess nurses' knowledge regarding myocardial infarction in Basrah Teaching Hospitals. and showed that half of the studied nurses had experience from 1- 5 years.

As regard to attending previous training programs, the present results showed that more than half of the studied nurses attend training program, This study is in disagreement with **Mohamed et al. (2021),** whose study assessed the factors affecting nurses' performance regarding thrombolytic therapy among patients with acute myocardial infarction and mentioned that about one third of the studied nurses attend training courses.

The current study results revealed that, two thirds of the studied nurses were working at emergency department. This result is

knowledge about coronary artery disease in Al-Nasiriyah city and showed that less than half of studied nurses were in the age group 20-29 years.

Considering gender, the present study clarified that more than half of studied nurses were males. This result is congruent with **Jaralnabi et al. (2017)**, who studied the impact of a nursing education program on nurses' knowledge, attitudes, and intentions towards MI prevention and treatment at King Abdul-Aziz University in Jaddah and mentioned that majority of studied nurses were males.

This study results showed that more than half of studied nurses were married. This may be due to the age of the studied nurses ranged from 20 to 40years and usually by this age they are married according to the Egyptian society culture. This study matches with **Alwsaby etal.** *(2019),* who studied " effect of training program on nurses ' knowledge toward care of patients with myocardial infarction in Al-Thowrah hospital, Al-hodeida city, Yemen",and stated that more than half of studied nurses were married

Concerning qualification of the studied nurses, this study revealed that more than half of them were technical institute of nursing and had experience less than 5 years. This can be explained by the age of the majority of nurses was less than 30 years reflecting that they were newly graduated. This result is contrasting to **Tahboub and Yilmaz (2019),** who mentioned in study about" Nurses' knowledge and practices of electrocardiogram

incongruent with **Ali etal. (2022)**, who showed that fifth of the studied nurses were working at emergency department. Also, **Verma and Adhikary (2019),** whose study about "A study to assess the knowledge of staff nurses regarding first 24 hours care of patients with myocardial infarction at J.K. hospital of Bhopal with a view to develop self-instruction module", mentioned that about one third of the studied nurses were working in ward.

By assessing nurses' knowledge about anatomy of the heart and coronary arteries, less than one third of the studied nurses had knowledge about the inner layer of the wall of the heart and the function of the coronary artery. This finding is in agreement with study conducted by **Skal and Ahmed (2021)**, who studied the effectiveness of an educational program on nurses' knowledge about risk factors for bleeding of acute myocardial infarction in patient receiving thrombolytic therapy at coronary care unit in Al-Diwaniya

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teaching hospital, and found that less than one third of the studied nurses had knowledge about anatomy and function of the heart.

According to nurses' knowledge about definition of the myocardial infarction, the current study revealed that more than one third of studied nurses had knowledge regarding the definition of myocardium and myocardial infarction. This result agrees with **Mohamed et al. (2021),** who showed that about half of studied nurses had knowledge about the definition of the myocardial infarction.

As regards to nurses knowledge regarding common risk factors of MI, the results illustrated that one third of studied nurses had knowledge about non modifiable risk factors. This result disagrees **Alwsaby et al. (2019),** who showed that more than half of the of studied nurses had knowledge about causes and risk factors of myocardium infarction.

In the same context,, the present study finding mentioned that about one third of studied nurses had knowledge about the site and common aggravating factors of pain and mechanical complication of MI. This explained the fact that most of the nurses witnessed the major symptoms and complications of MI, as two thirds of them were working at emergency department this result is dissimilar to **Yesmin et al. (2022),** in a recent titled about "Knowledge regarding myocardial infarction among the nurses in Dhaka, Bangladesh" , and mentioned that majority of studied nurses had knowledge about chest pain and its characteristics, and also reported that more than half of studied nurses had knowledge about arrhythmia as the main MI complication.

Regarding nurses` knowledge about medical treatment of MI, one fourth of studied nurses had knowledge about tissue plasminogen activator is a contraindication for treatment of MI patients with history of cerebral hemorrhage. This result might be due to the nurses in emergency departement try to know the basic knowledge about medications for patient with MI. This result is congruent with **Skal and Ahmed (2021),** in a study tittle *"A*ssessment 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", and showed that the majority of nurses had unsatisfactory knowledge scores about thrombolytic therapy for patient with MI.

In the same context, the present study demonstrated that the majority of studied nurses hadn't knowledge about nursing action after administer of continuous intravenous nitroglycerin infusion. This result is incongruent with **Yesmin *et al. (2022),*** who reported that less than half of studied nurses had knowledge about nitroglycerin and aspirin are the drugs initially given to MI patients.

As regards to nurses' knowledge regarding cardiac catheterization, the results illustrated that about half of studied nurses had knowledge about nursing role for complications of radial compression device after cardiac catheterization. This could be connected to the fact that the majority of nurses were technical institute of nursing with a little years of experience. This result agrees **Elgazzar and Keshk (2018),** in their study about " Effect of a construction educational protocol on nurses' knowledge, performance and its effect on patient satisfaction undergoing cardiac catheterization", who showed that more than half of studied nurses had satisfaction level of knowledge after cardiac catheterization procedure. Meanwhile, this finding is contrasting to **Ali and Ali (2019),** who studied "Effect of designed teaching protocol regarding patients' safety after cardiac catheterization on nurses' performance and patients' incidence of vascular complications", and showed that majority of nurses had unsatisfactory level of knowledge about the complications of radial compression device after cardiac catheterization preprogram implementation.

Regarding life style management of MI, This study findings, illustrated that two fifths of studied nurses had knowledge about healthy diets for patient with MI as fruits and vegetables and about one third of them had knowledge about tips for physical activity and the guidelines for home based exercises for patients with MI. This is consistent with **Tesfamichael et al. (2021),** who carried out a study about " Initial management of myocardial infarction among nurses in the critical care units at Orotta & Halibet national referral hospitals, Asmara, Eritrea", and illustrated that two fifths of studied nurses had knowledge about low salt and fatty foods considered healthy diet for patient with MI, and less than half of them concluded that physical activity & life style should be part of patients counseling.

The study results illustrated that less than one third of studied nurses had knowledge about smoking causes a state of hypercoagulability and cigarette smoking exacerbate signs and symptoms of MI. This study result matches with **Preetha and Smitha (2019),** who conducted their study in India about "Knowledge regarding myocardial

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infarction among staff nurses", and mentioned that about one third of the studied nurses had knowledge about cigarette smoking effect on patients with MI by increasing its complications.

In relation to golden hour for MI, the current study showed that less than one third of studied nurses had knowledge about the importance of golden hour for patients with MI. From investigator's point of view, this can be explained by the lack of nurse's desire to increase their knowledge and deficit nurses needs to update knowledge about critical health problems for nurses working at emergency department. This result is congruent with **El Sayed et al. (2017**), who noticed in the study about factors affecting nurses' performance for patients with acute MI within the golden hours at National Heart Institute Hospital, that less than one third of studied nurses had satisfactory level of knowledge about the golden hour for patients with MI.

The current study revealed that, more than one third of studied nurses had satisfactory total knowledge scores regarding definition of MI compared to majority of them had unsatisfactory total knowledge scores regarding medical treatment of MI. From investigator's opinion, this level of knowledge is may related to level of qualification and years of experience which can result in less knowledge that could gained from cumulative experience. This result is incongruent with **Verma and Adhikary (2019)**, who reported that majority of the studied nurses have average level of knowledge regarding management of AMI.

Regarding total level of knowledge of the studied nurses, this study revealed that less than one third of the studied nurses had satisfactory total knowledge regarding myocardial infarction and golden hour. From investigator's point of view, this result may be due to that the majority of nurses were recently graduated and because of shortage in the nursing staff. Therefore, they have limited time to enhance their knowledge about golden hour of MI. This studied result is in accordance with **Ravindra et al. (2020)**, who reported in their study about examining the usability of ACS algorithm on nursing management of patient suffering from ACS in staff nurses of selected hospital Waghodia, that the majority of investigated nurses had inadequate level of total knowledge about MI. While this finding was disagree with **Al Hassan and Mohammed (2018)**, who found in a study entitled " Nurse's performance regarding immediate management of patients with acute

MI at Khartoum state" that most of nurses have satisfactory total knowledge level concerning management of acute MI.

Considering studied nurses' practices during first patient's contact to STEMI confirmation, the study results clarified that majority of studied nurses performed rapid assessment, brief history, obtained ECG for patients and drew lab investigations as cardiac markers, CBC with platelets, INR, basic metabolic panel and lipid profile. This study matches with ***Ghonem* etal. (2022),** who studied "Assessment of nurses' knowledge and practice regarding thrombolytic therapy among patients with acute myocardial infarction", and illustrated that the majority of studied nurses had monitor blood pressure to ensure that systolic blood pressure is more than 80mmhg & less than 180mmhg, and diastolic below 110 mmhg despite treatment, connect the patient to monitor, check intravenous access device, and obtain 12 lead ECG.

With respect to studied nurses' practices for activation of cardiac catheterization lab team, these study findings clarified that the majority of the studied nurse notify emergency department physician hospital operator to cardiologist and cardiac catheterization lab team. This might be due to good cooperation between multidisciplinary health team members. This result is incongruent with **Elgazzar and Keshk (2018),** who showed that less than half of the studied nurse had adequate practice pre and post cardiac catheterization .

Regarding the same perspective, this study results reported that the majority of the studied nurses obtained informed consent for diagnostic catheterization and PCI from patient and prepared catheterization site. This result agrees with ***Ghonem* et al. (2022),** who showed that about half of the studied nurses had practice about explain procedure to the patient and obtain consent. Also this study result is harmonized with **Jabr et al. (2022),** whose study titled ''Nurses' knowledge and practice regarding care for patients undergoing cardiac catheterization", and revealed that the majority of the studied nurses prepare catheterization site.

This study indicated that the majority of the studied nurses and cardiologist performed scrubbing, while, patient is positioned on table. This study is disagreement with **Abd Elawhabe etal. (2019),** who carried out a study about "Factors affecting of nurse's performance for patients undergoing cardiac catheterization", and showed that minority of the studied nurses had adequate practice during cardiac catheterization. In the same context,

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this finding is contrasting to **Ali and Ali (2019),** who found that all of the studied nurses had inadequate level of practice during cardiac catheterization preprogram implementation.

As regard to studied nurses' practices during and after immediate post intervention, these study findings clarified that more than two thirds of the studied nurses prepared guide catheter and interventional guidewire to proceed with PCI and administered heparin to keep activator clotting time. This result is harmonized with **Johan, (2017)**, who conducted a study about effect of early mobilization for patients undergoing coronary angiography and found that nursing role during cardiac catheterization procedure was satisfied. While, this finding is contrasting to **Abd Elawhabe etal. (2019),** who showed that all of the studied nurses had unsatisfactory level of practice regarding caring of patients during cardiac catheterization.

Regarding total practices of the studied nurses during golden hour of MI, this study revealed that less than one third of the studied nurses had competent scores of total practices during golden hour of MI and majority of them had incompetent scores of total practices. From researcher point of view, the reasons of low practice level in the current study may be related to lack of nurses' confidence, lack of nurses' knowledge and skills. In addition to increase in number of patients and workload. This result is harmonized with **Eweas et al. (2018)**, who reported in study about the coronary care nurses' knowledge and practice concerning of thrombolytic therapy in patients with acute MI at Cairo and revealed that the majority of the studied nurses had unsatisfactory level of practice. As well, this is supported by **Jabr et al. (2022),** who showed that one third of the studied nurses had competent level of total practices.

As regard to relations between demographic and work related characteristics of studied nurses and their knowledge, this study demonstrated there were high statistically significant relations between total knowledge of the studied nurses and their age, educational level and years of experience. While there was no significant relation between total knowledge of the studied nurses and their marital status. This result is similar to **Alwsaby et al. (2019),** whose study results revealed that no relation detected between nurses' marital status and their mean score of knowledge.

Considering relations between demographic and work related characteristics of studied nurses and their practices, this study revealed that there were high statistically significant relations between total practices of the studied nurses and their age, educational level and years of experience. The same result was mentioned by **Jabr et al. (2022)**, who reported that there was statistically significant relations between total practice and the studied nurses`age, marital status, educational level and years of experience

Regarding correlation between total knowledge and total practice scores of the studied nurses, there was a high statistically significant positive correlation between total knowledge and total practices scores of the studied nurses. This can be interpreted by nurses' practices are directly influenced by their knowledge. This finding goes in the same line with **Mohamed et al. (2021),** who mentioned that there was a high statistically significant positive correlation between total knowledge and total practice scores of the studied nurses.**Conclusion**

Based on the findings of the present study, it was concluded that:

The present study showed that majority of the studied nurses had unsatisfactory total level of knowledge regarding golden hour of myocardial infarction and most of them had incompetent total level of practices regarding care of patients during golden hour of myocardial infarction. Meanwhile there was statistically significant relations between studied nurses' total knowledge and their age, educational level, years of experience and department. And also there was statistically significant relations between studied nurses' total level of practices and their age, educational level and experience years. Also there was a statistically significant positive correlation between studied nurses' total level of knowledge scores and their total level of practices scores.**Recommendations**

In the light of the study findings, the following recommendations are suggested

- Providing well organized programs for emergency nurses are necessary to improve nurses' performance regarding golden hour of myocardial infarction.

- Educational program for cardiac catheterization unit nurses to improve knowledge about patient safety and avoid complication after cardiac catheterization.

- A simplified, comprehensive and clarified Arabic guided picture booklet about golden hour must be available in all critical units for each newly admitted patients diagnosed with MI

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Recommendations furthers studies

- Replication of the study on larger sample is needed to elaborate the effects of different variables on the knowledge of nursing.
- Increase the number of training session to nurse as general and special training session to nurse work in ER and cardiac Cath unit

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