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ASSESSMENT OF NURSING STAFF's KNOWLEDGE AND PRACTICE REGARDING STREPTOKINASE ADMINISTRATION FOR MYOCARDIAL INFRACTION PATIENTS IN CORONARY CARE UNITS IN PUBLIC HOSPITALS

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ABSTRACT
Background: Myocardial Infarction (M.I) is a life threatening condition characterized by the formation of localized necrotic areas within the myocardium, usually follows the sudden occlusion of a coronary artery and abrupt cessation of blood and oxygen flow of the heart muscle.[1] Streptokinase is thrombolytic agent; it dissolves vascular thrombosis, this agent derived from the beta hemolytic streptococci bacteria. It is mainly used in the treatment of myocardial infarction for re-establish blood flow in coronary vessels by dissolving thrombus.[2] **Objective:** To assess nursing staff'sknowledge and practice regarding streptokinase administration for myocardial infarction patients in CCU in public hospitals in Sudan. **Methodology:** This is prospective observational complete coverage hospital based study carried to evaluate the level of nurse's knowledge and practice in different aspect of care for patient need administration of streptokinase in most of public hospitals. The study population all nurses working in CCU, the sample size was 60 nurses total coverage, all this number covered in level of knowledge but only 15 covered in practical observation. **Result:** All nurses participating in this study have knowledge about route of administration of streptokinase because every nurse in CCU had administered streptokinase several times. 100% know the recent surgery is contraindications, more than 90% know the uncontrolled hypertension is one of contraindication to use the streptokinase. 85% of nurse's population in CCU public hospitals has good knowledge about place patient in supine position to treated hypotension. 100% of nurses take base line vital signs, more than 90% of nurses do ECG before administration streptokinase, and more than 90% prepared the drug properly. **Conclusion** when dealing with procedure of administration of streptokinase to MI patient all nurses in CCU in public hospitals have good level of knowledge regarding rout of administration, dissolved streptokinase, and continues monitoring vital signs, cardiac rhythm. All study population in CCU in public hospitals has good knowledge about complication of streptokinase and how to treated hypotension as one of more common complications, they also have moderate knowledge about observation and prevention of internal and external hemorrhage caused by streptokinase. The study populations in CCU in public hospitals have lack knowledge about reperfusion arrhythmias, monitoring lab test, and early CPK peak as successful outcomes of streptokinase. Generally the nurses in CCU in public hospitals in practical administration of streptokinase they administered streptokinase properly in phase of during procedure more than pre and after administration of streptokinase that when compared from standard of procedure. **Recommendation:** Continuous training program need to be provided for nurses working in CCU units to upgrade their knowledge and practice regarding administration of streptokinase for treatment of Myocardial Infarction.

KEYWORDS: Knowledge, Practice nursing, Streptokinase, myocardial infarction, Sudan.

INTRODUCTION

The streptokinase era dates back to 1933, when Dr. William Smith Tillett discovered the agent through sheer serendipity. He observed that streptococci agglutinated in test tubes that contained human plasma but not in those that contained human serum. While most people would have dismissed this as trivial, Tillett considered it significant. He inferred that the agglutination of streptococci is caused by a component of plasma that is deficient in serum. The prime candidate for this agglutinating activity was fibrinogen. Tillett further hypothesized that fibrinogen is adsorbed onto the surface of streptococci, rendering the plasma devoid of free fibrinogen. He then inferred that any plasma containing streptococci would not clot, because it would lack free fibrinogen (a key clotting factor).[3]

Until 1950, the available treatments for MI were mostly palliative, rather than curative. Although the introduction of coronary care units brought down the early mortality rate significantly, a more effective method to treat MI, directed at its very cause, was required.[4] In 1958, Sherry and others started using streptokinase in patients with acute myocardial infarction and changed the focus of treatment from palliation to "cure." Initial trials that used streptokinase infusion produced conflicting results. Subsequently, larger trials of intracoronary infusion achieved reperfusion rates ranging from 70% to 90%. The need for a meticulously planned and systematically executed randomized multicenter trial was fulfilled by the Gruppo Italiano per la Sperimentazione della Streptochinasi nell'Infarto Miocardico (GISSI) trial in 1986, which not only validated streptokinase as an effective therapeutic method but also established a fixed protocol for its use in acute myocardial infarction. Currently, despite the wide use of tissue plasminogen activator in developed nations, streptokinase remains essential to the management of acute myocardial infarction in developing nations.[5]

Mechanism of action
Streptokinase is a polypeptide derived from beta-hemolytic streptococci of Lancefield group C bacteria. It forms a complex with plasminogen, which then converts to the proteolytic enzyme plasmin. This process results in a cascade that ultimately leads to the lysis of fibrin clots. Streptokinase causes a systemic thrombolytic state that usually resolves within 48 hours of administration. The half-life of streptokinase is between 23 and 29 minutes; however, in some instances, it has been reported as high as 89 minutes.[6]

Clinical indications
The activation of the coagulation cascade is multifactorial. Clot formation can occur due to venous stasis, hypercoagulable states such as malignancy, or endothelial injury. These conditions activate the coagulation cascade, which ultimately leads to the development of a fibrin clot. Streptokinase is FDA approved in the treatment of acute ST-segment elevation myocardial infarction, arterial thrombosis or embolism, deep vein thrombosis, pulmonary embolism, and arteriovenous cannula occlusion. It is also on the WHO Model List of Essential Medicines (EML).[7]. Streptokinase was the first thrombolytic agent brought to the market to treat acute myocardial infarction. The ISIS-2 trial with more than 30000 patients demonstrated streptokinase's ability to reduce mortality when compared to the standard treatment. The research showed that streptokinase could lyse over 50% of a thrombus in 5 to 10 minutes.[8]

Administration
It given intravenously as soon as possible after onset of heart attack (MI) to dissolve clots in the arteries of the heart wall. This reduces the amount of damage to the heart muscle. Streptokinase is a bacterial product so the body will build up immunity to it. It is recommended that this medication should not be used again after four days from the first administration, as it may not be as effective and also cause an allergic reaction. For this reason it is usually given only for person's first heart attack.[9] Thrombolytic therapy should be initiated as soon as the symptoms are present and no later than 6 hours. The recommended dose for streptokinase in the setting of acute ST-segment elevation myocardial infarction is 1.5 million units intravenously over 30 to 60 minutes.[10] From side of nurse streptokinase is importance drugs use for patient of acute myocardial infarction to reperfusion the coronary arteries of the heart by dissolving the clots .it needs special preparation and close monitoring during and post administration to prevent complications.

Contraindications
Streptokinase is contraindicated in patients with active internal bleeding, as it can worsen bleeding in some patients. It is also contraindicated in patients with severe uncontrolled hypertension, intracranial neoplasms, surgery within two months, recent stroke, and intraspinal surgery. Streptokinase administered with extreme caution to those who have experienced recent trauma, coagulopathies or hematologic diseases, gastrointestinal bleeding, infective endocarditis, obstetric deliveries, diabetic hemorrhagic retinopathy, organ biopsies, or previous puncture of a non-compressible vessel. Streptokinase is a pregnancy Category C medication. The effects of streptokinase on a fetus are unknown, and patients who are pregnant should only receive streptokinase to prevent life-threatening injury.[10]

Streptokinase is a thrombolytic agent that is highly effective in its ability to lyse fibrin clots and restore blood flow to ischemic tissue. The healthcare provider team requires education on dosing, administration, and potential complications of this thrombolytic. This team may consist of paramedics, emergency room physicians, emergency room nurses, cardiologists, pharmacists, and other nurses. Due to streptokinase's need to be administered over 30 to 60 minutes, providers need to have staff on hand who can allocate time and resources to ensure the medication is administered safely. This staffing includes nursing who will administer and monitor the drug, to pharmacists who will have involvement in dosing and help decide if it is the appropriate therapeutic choice. Clinicians need to be able to confidently deliver the appropriate dose for each of the clinical indications noted. Percutaneous coronary intervention and other minimally invasive clot-busting techniques are generally preferable to thrombolytic therapy. Intravenous thrombolytic therapy still plays a crucial role in rural areas and developing countries where procedures such as percutaneous coronary intervention are not readily available. Overall, streptokinase is a safe and efficacious means to lysing fibrin clots and may restore blood flow to vital organs to prevent end-organ damage due to ischemia.[11]

Problem Statement
Coronary heart disease (CHD) is the major cause of death in most developed countries and in many developing countries, and can affect all aspects of physical, mental, and social health.[12] Some studies have indicated that coronary heart disease in developing countries, rates are predicted to increase by 120% in women and 137% in men from 1990 to 2020.[13] The pharmacologic therapy for treatment of MI is standard includes streptokinase because of a lower cost alternative thrombolytic agent, is widely available in developing countries where it is utilized to treat patients with acute coronary syndromes.[14]

Justifications
Streptokinase is effective drug for treating patients with acute myocardial infarction. It needs special percussions in preparation, administration, and monitoring of complication. Administration of streptokinase properly makes the drug more effective and efficient. Coronary care units nursing staff are responsible for administration and monitoring streptokinase. The researcher would like to highlight level of knowledge and practice off CCU nursing staff in high rate admission hospitals in Sudan - Elshaab teaching hospital and military hospital.

OBJECTIVES
General objectives
To assess nursing staff's knowledge and practice regarding streptokinase administration for myocardial infarction patients in CCU in Military hospital and Elshaab teaching hospital.

Specific Objective
1. To assess nurse's Knowledge about dose of streptokinase, importance of assessment the vital signs and monitoring ECG, investigation must be done (pre-during and post) administration streptokinase, complications of streptokinase and
2. To assess nurse's practice about: preparation of drug, route of administration, equipment needed, management the complication of streptokinase, proper assessment of vital signs and ECG, successfulness of streptokinase
3. To assess relationship between duration services and knowledge.
4. To assess relationship between duration services and practice.

MATERIALS AND METHODS
Study design: Descriptive hospital based study to assess the knowledge and practice of nurses regarding administration of streptokinase.

Study area: This study was conducted in Sudan in the state of Khartoum and targeted public hospitals . Four hospitals were chosen for this study include Omdurman Military Hospital, Elshaab Teaching Hospital, Ahmed Gasim Hospital and Omdurman Military Hospital.

Study population: The qualified nursing staff whose university diploma, BSc, MSc and PhD holders in nursing, providing the patients nursing services in the emergency departments and coronary care units in the selected public hospitals during the study period were included in this study.

Inclusion criteria: Nurses who had bachelor, master and doctorate degrees. Actually working during the period of the study and agreed to participate in this study.

Sampling and sample size: Quota sample, was sixty of nurses (n=60) obtained as the total coverage for the all number of nurses who were available at the time of the study and those who met inclusion criteria.

Data collection tools
The required data have been collected to assess nurses during the study by using the data collection tools include a self-administered questionnaire for assessment of knowledge and an observational checklist to assess practice.

Data analysis
Data was entered and analyzed by an independent professional statistician, using Statistical Package for Social Sciences (SPSS) program version 16.

Validity and reliability
The tools were developed after carefull review to test the validity. The questionnare and checklist were revised by expert group in the field of the study who were specialized in cardiology, a group of experienced nurses in cardiac specialty and a number of our nursing teachers who have experience in scientific research. Accordingly, some modifications were made and additional modifications were made to the tools after the pilot survey.

A pilot study was carried on 10 nurses working in other hospital before starting the actual study. The results of the pilot survey for 10 participants showed that the mean time to fill the questionnaire is 20 minutes, the nurses understod the method used to fulfill each tool, and they indicated that some items needed to be modified. And then based on pilot results the modifications were done to ensure that each tool will achieve the aims of the study.

Reliability of the questionnaire and checklist determined by using the features of Statistical Packages for Social Sciences (SPSS), through the use of Alpha Cronbach's was (r = .76) for nurses level of knowleadge and (r = .87) for nurses'practices, which indicates statistical acceptable for the format.

RESULT
This chapter deals with the analysis and interpretation of data collected in order to assess the level of nurse's knowledge in different dimension of caring for patient

receiving streptokinase in coronary care units in the public's hospital. The collected data was coded, analyzed, and organized in the form of tables, graphs then interpreted findings according to the research objectives as following.

(A) Participants` characteristics

Figure 1: Represented distribution of nurses male and female in public's hospital.

Table 1: Years of experiences of nurse in coronary care unites in public's hospitable.

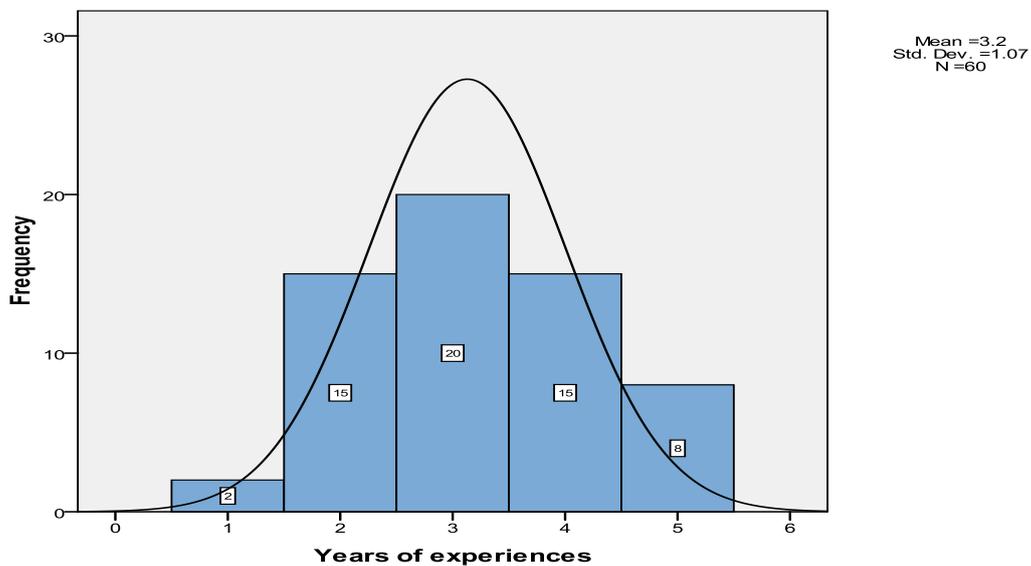| Statistics		
Years of experiences		
N	Valid	60
	Missing	0
Mean		3.20
Std. Deviation		1.070
Minimum		1
Maximum		5

Figure 2: Years of experiences of nurses in coronary care unites in public's hospitable.

Level of qualification
- BSc
- MSc
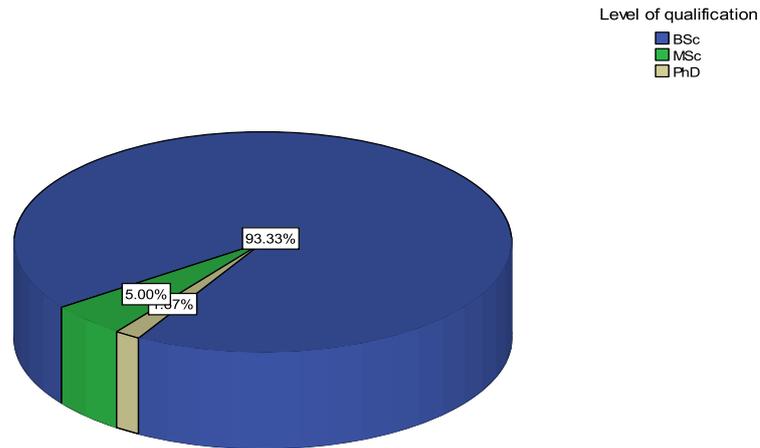- PhD

93.33%

5.00%
1.67%

Figure 3: represented the level of qualification of nurse in coronary care unites in public's hospitable.
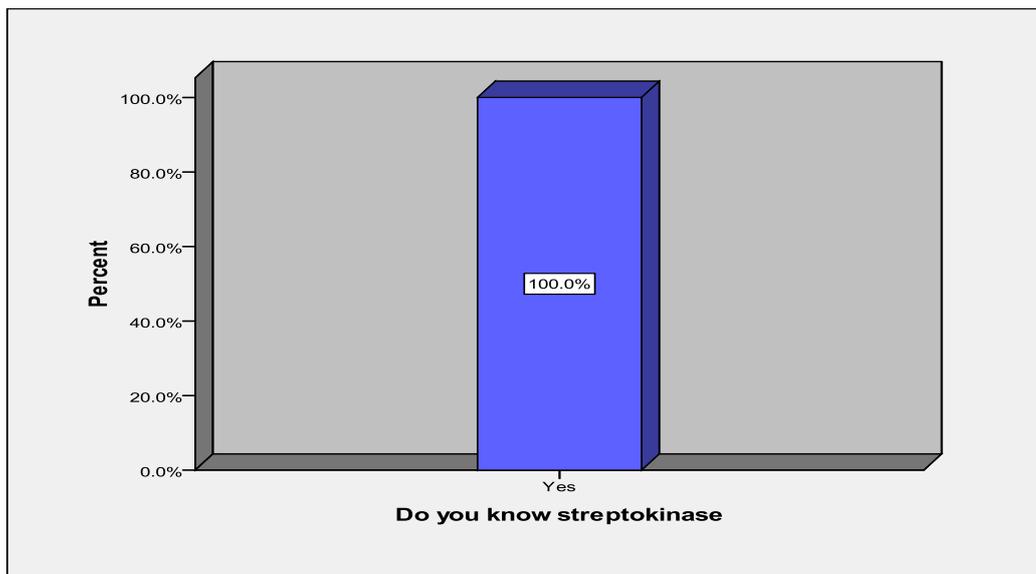
(B) Assessment of the participants' knowledge

Figure 4: described the general knowledge of nurses in coronary care unites in public's hospitable about streptokinase drugs.

Routes of adminstration
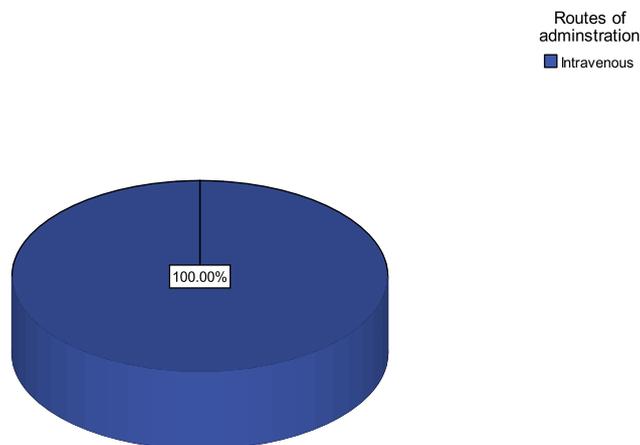- Intravenous

100.00%

Figure 5: knowledge of nurses about the routes of administration of streptokinase to patients of MI in public's hospitable.

Table 2: knowledge of nurses about contraindications of streptokinase for patients of MI in public's hospitable.

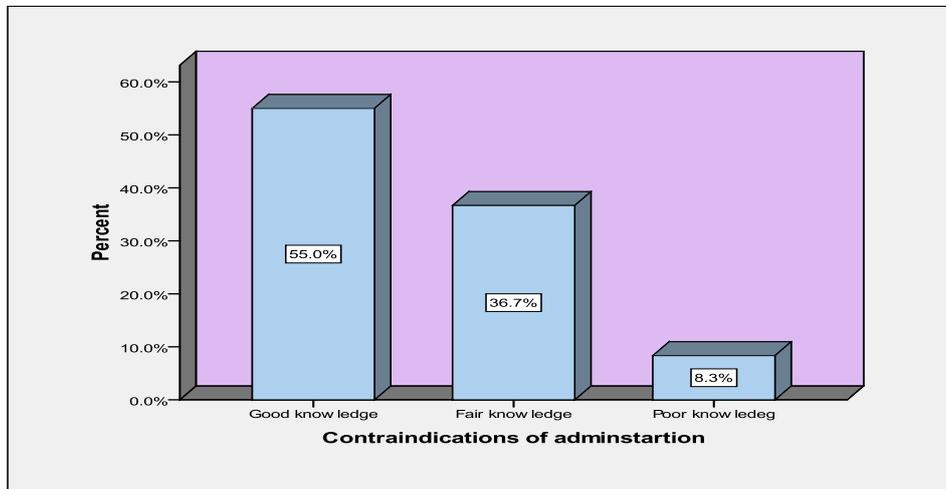|	Yes		No	
	Freq	**%**	**Freq**	**%**
Uncontrolled hypertension	56	93.3%	4	6.7%
Internal bleeding	58	96.7%	2	3.3%
Recent surgery	60	100.0%	00	00
Hypersensitivity for streptokinase	56	93.3%	4	6.7%
Arteriovenous malformation	32	53.3%	28	46.7%
Pregnancy	34	56.7%	26	43.3%
Blood disorders	33	55.0%	27	45.0

Figure 6: knowledge of nurses about contraindications of streptokinase for patients of MI in public's hospitable.

Table 3: knowledge of nurses about complications of streptokinase for patients of MI in public hospitals.

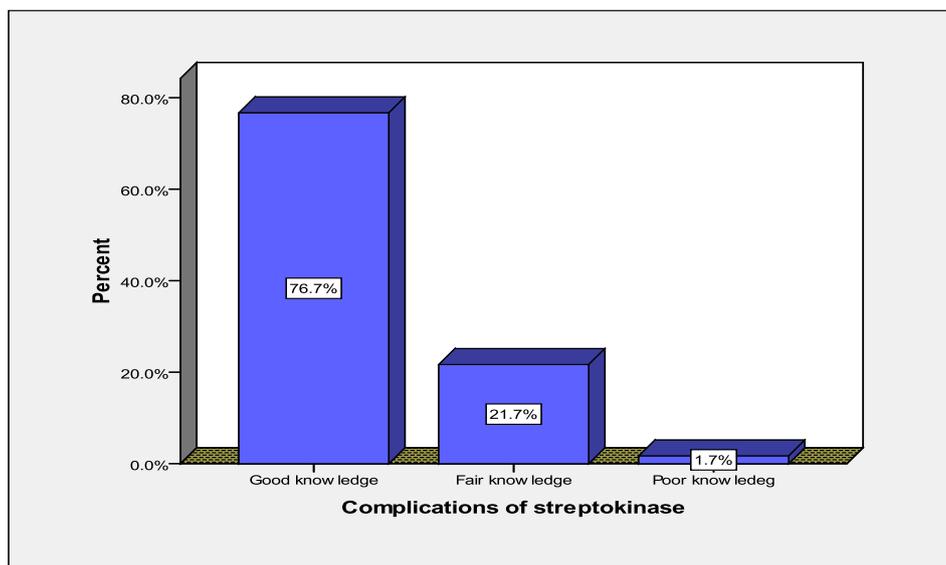|	Yes		No	
	Freq	**%**	**Freq**	**%**
Hypertension	60	100.0%	00	00
Allergic reaction	60	100.0%		
reperfusion arrhythmia	44	73.3%	16	26.7%
systematic embolism	38	63.3%	22	36.7%
Intracranial hemorrhage	57	95.0%	3	5.0%

Figure 7: knowledge of nurses about complications of streptokinase for patients of MI in public hospitals.

Table 4: knowledge of nurses about management of hypotension during streptokinase for patients of MI in public's hospitable.

	Yes		No	
	Freq	**%**	**Freq**	**%**
Place pt in supine position	51	85.0%	9	15.0%
Reduce rate of infusion	49	81.7%	11	18.3%
stop infusion and restart when BP recover	60	100.0%	00	00%
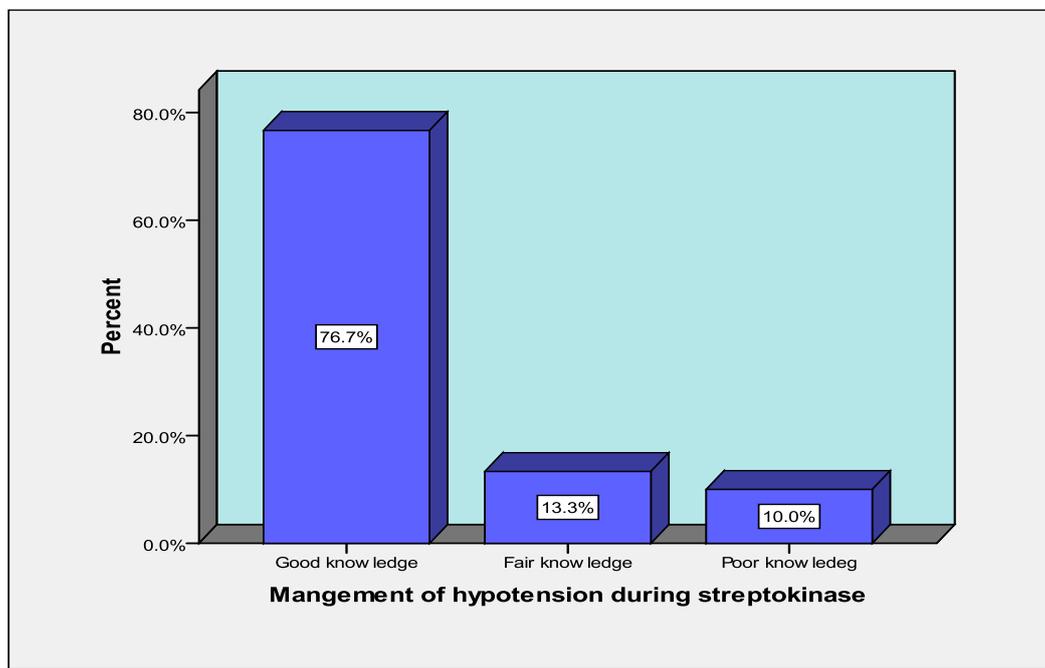
Figure 8: knowledge of nurses about management of hypotension during streptokinase for patients of MI in public's hospitable.

Table 5: knowledge of nurses about observation and prevention of internal and external hemorrhage for patients of MI in public's hospitable.

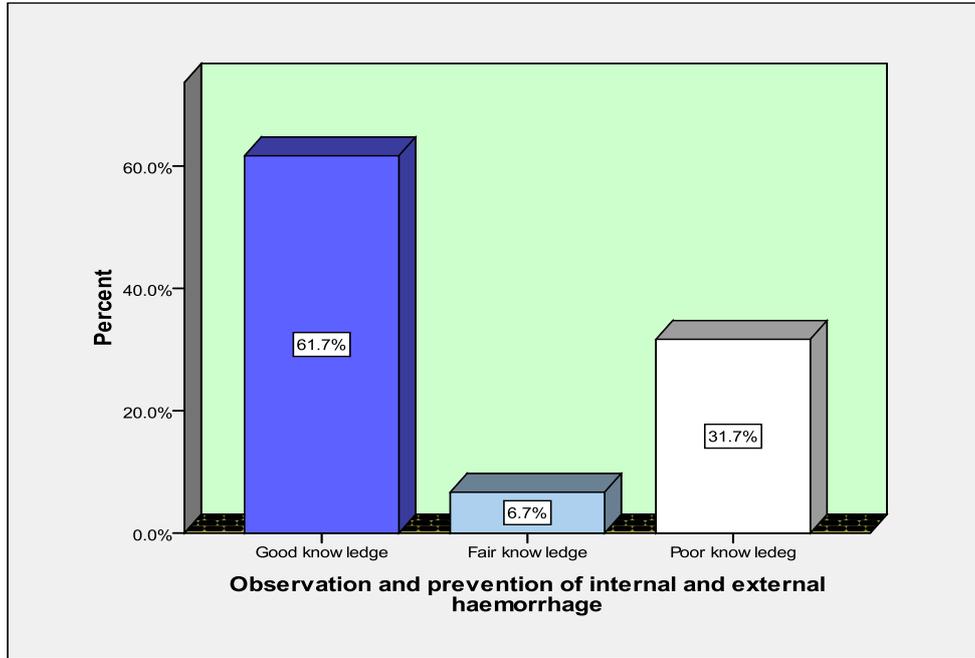|	Yes		No	
	Freq	**%**	**Freq**	**%**
Observation for abdominal pain or distension	44	73.3	16	26.7
Observation canulla side bleed	55	91.7	5	8.3
Observation for fecal blood	39	65.0	21	35.0
Observation neurological deficit	38	63.3	22	36.7
daily urine analysis for hematouria	40	66.7	20	33.3
vein puncture site compression at least 5 minutes	45	75.0	15	25.0

Figure 9: knowledge of nurses about observation and prevention of internal and external hemorrhage for patients of MI in public's hospitable.

Table 6: knowledge of nurses about successful of streptokinase for patients of MI in public's hospitable.

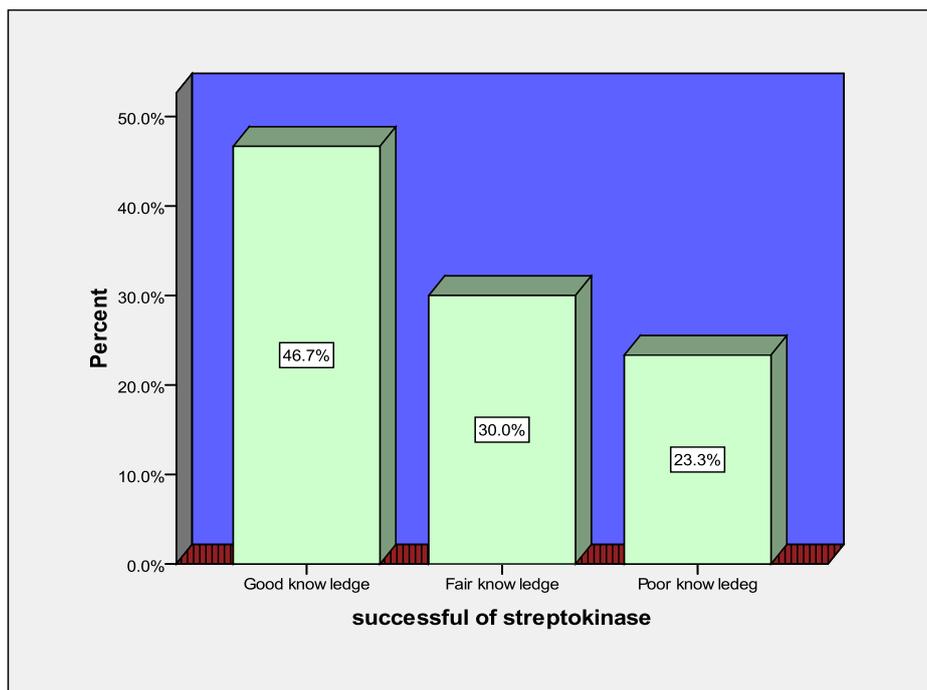|	Yes		No	
	Freq	**%**	**Freq**	**%**
Successful of streptokinase when pain relieved	41	68.3	19	31.7
successful of streptokinase when ST segment returned to normal	55	91.7	5	8.3
Successful of streptokinase when reperfusion arrhythmia	37	61.7	23	38.3
Successful of streptokinase when early CP-K peak	31	51.7	29	48.3

Figure 10: knowledge of nurses about successful of streptokinase for patients of MI in public's hospitable.

(C) Assessment of the participants' practice

Table(7) Observation Checklist to assess nurses' practice in public's hospital regarding streptokinase administration for patients of acute (MI)
Checklist from standard of nursing role

Nursing role before administration of streptokinase

	done		Not done	
	Freq.	%	Freq.	%
1-Consent and explanation	4	26.7%	11	73.3%
2- check Laboratory investigations	11	73.3%	4	26.7%
3-Asking about Allergic reaction	7	46.7%	8	53.3%
4. Emergency equipment beside bed	13	86.7%	2	13.3%
5. Base line Vital signs (Blood pressure both arms)	15	100.0%	00	00%
6. Continuous Oximetry O2monitoring	12	80.0%	3	20.0%
7. Base line ECG (If inferior MI, right sided)	14	93.3%	1	6.7%
8. Check Blood Typing & cross matching.	2	13.3%	13	86.7%
9. Rule out any contraindication	11	73.3%	4	26.7%
10. Apply pressure dressing to puncture sites	6	40.0%	9	60.0%
11. Dissolve1.5 million Units of Streptokinase with 5 ml of NS or D5W from a 100 ml Add Slowly	14	93.3%	1	6.7%
12. Roll and gently tilt the vials to mix. DO NOT SHAKE.	7	46.7%	8	53.3%
2-Nursing role during administration of streptokinase:				
1. Difficult of breathing	10	66.7%	5	33.3%
2. Vital signs	15	100.0%	00	00%
3. Bleeding (gum-eyes)	10	66.7%	5	33.3%
4. Slowly several drops to detect reaction	14	93.3%	1	6.7%
5. Allergic reaction.	14	93.3%	1	6.7%
6. Continues Monitor cardiac rhythm	15	100.0%		00%
7. Psychological support for patient	8	53.3%	7	46.7%
3- Nursing role practice after administration streptokinase:				
1. Check vital signs.	15	100.0%	00	00%
2. Continues Monitor cardiac rhythm	15	100.0%	00	00%
3. Sign of bleeding.	10	66.7%	5	33.3%
4. Avoid any invasive procedures	9	60.0%	6	40.0%
5. Allergic reaction (Report rash, difficulty breathing, dizziness, disorientation, Numbness, tingling).	13	86.7%	2	13.3%
6. Obtain 12 lead ECG 30 min post thrombolytic	1	6.7%	14	93.3%
7. Obtain 12 lead ECG 2 h post thrombolytic	15	100.0%	00	00%
8. Pressure dressing on any vein puncture site	10	66.7%	5	33.3%
9. Monitor all injection site	4	26.7%	11	73.3%
10. Test urine for blood	3	20.0%	12	80.0%
11. Document time thrombolytic administered	15	100.0%	00	00%
12. Teaching patient to take rest and inform staff when feel any abnormality signs	10	66.7%	5	33.3%
13. Document time chest pain resolved	8	53.3%	7	46.7%

DISCUSSION
This is observational complete coverage center –based study carried to evaluate nurse's knowledge and practice about different aspects of care for patients receiving streptokinase in CCU of public hospitals in Sudan.

The results of this study revealed that the majority of respondents (65%) were female, more than 93% of nurses in BSc degree as the level of qualification of nurse in coronary care unites in public hospitals this is acceptable when comparing to the years of experience and both are affects in the knowledge and practice. Likewise, years of experience generally is too little it is in range of 1 yea to 5 years as the maximum point, and this is causes of decrease knowledge in some area of questionnaire and applications of administering streptokinase. But despite that, the all nurses had good level of knowledge about the routes of administration of streptokinase, that because this drugs is specifically administered in CCU.

The majority of participants (76.7%) had good level of knowledge about complications, 21.6% have fair knowledge, and 1.7% had poor knowledge. While their knowledge about the contraindications of streptokinase for patients of MI in public hospital as following 55% of

nurses have good level of knowledge 36.7% had fair level of knowledge and 8.3% had poor level of knowledge.

The study also found 85% of nurses population in CCU public hospitals have good knowledge about place patient in supine position to treated hypotension where 49% of nurses have good knowledge about reduce rate of infusion to treated hypotension.

The present study confirmed that; about 91% of nurses have good level of knowledge about importance of observation cannula side bleed as prevention of internal and external hemorrhage for patients due to administration drug in public hospitals. And 68.3% of nurses have good level of knowledge about successfulness of streptokinase when pain relived for patients of MI in public's hospitable where 51.7% of them know the successful of streptokinase when early CP-K peak.

The application of nurses regarding administration of streptokinase for patient of MI in CCU in public hospitals observed in phases that from standard of procedure divided to three phases- pre, during, and after procedure.

Regarding pre- procedure of administration of streptokinase, the present study confirmed that; Only 26% of population of nurses don't give the patient explanation about streptokinase administration that is ethical and protection them self. Where 100% of nurses take base line vital signs, more than 90% of nurses do ECG, also more than 93% of them prepared the drug properly but they failed in mix of drug that presented as 46.7% shake the vial of streptokinase.

During administration of streptokinase 100% of nurses in CCU in public hospitals do vital signs and continue monitoring cardiac rhythm as proper role of nurses during administration, more than 90% slowly several drops to detect reaction and monitoring the patients to prevent allergic reaction. After administration of streptokinase 100% of nurses in CCU in public hospitals check vital signs, Obtain 12 lead ECG 2 h post thrombolytic, document time thrombolytic administered, and continues monitor cardiac rhythm. Where 6% only obtain 12 lead ECG 30 min post thrombolytic, and 20% do test urine for blood as standard of practice.

CONCLUSIONS
After the analysis of the study variables the researcher justify the findings and concluded that.
- The researcher believes that the lack of regular and continuous training in hospitals leads to a decrease in nursing care for patients with myocardial infarction, and on the contrary, continuous training will improve their performance in hospitals
- When dealing with procedure of administration of streptokinase to MI patient all nurses in CCU in

public hospitals have good level of knowledge regarding rout of administration, dissolved streptokinase, and continues monitoring vital signs, cardiac rhythm.
- All study population in CCU in public hospitals has good knowledge about complication of streptokinase and how to treated hypotension as one of more common complications, they also have moderate knowledge about observation and prevention of internal and external hemorrhage caused by streptokinase administration.
- The study populations in CCU in public hospitals have lack knowledge about reperfusion arrhythmias, monitoring lab test, and early CPK peak as successful outcomes of streptokinase. Generally the nurses in CCU in public hospitals in practical administration of streptokinase they administered streptokinase properly in phase of during procedure more than pre and after administration of streptokinase that when compared from standard of procedure.

Recommendations
Based on the results of the study, the following recommendations are proposed.
- Continuous and regular training courses about administration of streptokinase should be implemented for nurses
- It is recommended for the hospitals managers to provide continuous professional educational center for training regarding cardiac care.
- Some parts of the training program can be used as protocols to be placed on posters or illustrations as tools to help ensure proper application of evidence-based nursing practices in hospitals.
- The researcher hopes to adopt the standards procedure by the management of hospitals as a condition for the work of nurses, especially in emergency departments and coronary care units.

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