Original Research

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Assessment of management of acute coronary syndrome in the emergency department Suez Canal university hospital

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ABSTRACT

Background: Acute coronary syndrome (ACS) is largely manifested as ST-segment elevation myocardial infarction, non-STEMI and unstable angina are a life-threatening condition. ACS can be successfully managed byadherence to established clinical guidelines. This study aimed to improve the quality of management process of patients presenting with acute coronary syndrome in the Emergency Department of Suez Canal University Hospital. **Methods:** The present study was observational, cross sectional study conducted in Emergency Department of Suez Canal University Hospital for 6 months (from December 2014 to June 2015) as a total of 94 patients matching inclusion criteria were enrolled in this study, data was collected in pre-organized data sheet by the researcher, as every management step of ACLS-2011 guideline for ACS was checked whether it is done or not for every patient included in the study, Disease management/outcome data was collected at admission and during the 1st 24 hrs of the in-hospital stay. The patients included in the study were divided into the following groups:STEMI with chest pain > 12 hrs, STEMI with chest pain < 12 hrs, NSTEMI, Unstable angina, normal or non diagnostic ECG group and the median percentage of adherence to ACLS-2011 guideline was estimated for each group separately then the median total percentage of adherence was estimated and the outcomes of all patients included in the study were assessed. **Results:** The present study revealed that the median percentage of adherence to (ACLS-2011) algorithm for ACS management in the Emergency Room of Suez Canal University Hospital was 45.3% and the percentage of adherence for each group included in the present study (STEMI with chest pain > 12 hrs, STEMI with chest pain < 12 hrs, NSTEMI, Unstable angina and the normal or non-diagnostic ECG group) was 44.87%, 45.8%, 50.9%, 51.14% and 28.9% respectively. **Conclusions:** The median percentage of adherence to ACLS-2011 guideline for ACS inthe Emergency Department of Suez Canal University Hospital was 45.3%, the median door to needle time was high (74.85±21) minutes and there is a need to close the gap between the guidelines and the ACS management in the Emergency Room of Suez Canal University Hospital.

KEY WORDS: ACS; Guideline; Reperfusion

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INTRODUCTION

Acute coronary syndrome (ACS) is any group of clinical symptoms compatible with recent myocardial ischemia and spectrum of clinical conditions ranging from unstable angina to non ST segment elevation myocardial infarction to ST segment elevation myocardial infarction [1].

The symptoms of ACS are due to obstruction of the coronary arteries producing the chest pain which is the most common symptom prompting the diagnosis of ACS, and it often radiates to the left arm or angle of the jaw, pressure like in character and associated with nausea and vomiting [2].

ACS is a common complication of coronary heart disease, is associated with more than 2.5 million hospitalizations worldwide each year [3]. The incidence of myocardial infarction (MI) happened every 34 seconds in the US, and also one person dies each minute from a major cardiac event [4].

The diagnosis and management of a patient with suspected ACS in the Emergency Department requires a detailed clinical assessment, recording of a 12 lead electrocardiogram and cardiac biomarkers measurements, the biomarker of choice for diagnosis and risk stratification of ACS is cardiac troponin [5, 6].

Clinical practice guidelines and protocols are developed to improve quality of care and life, to reduce human variation in practice and to ensure is actually used when appropriate [7]. Often, these instruments are developed and disseminated by international professional organizations [8].

Despite the present of guidelines and protocols, there is a gap between recommended care and clinical practice often exists [9].

A great number of guidelines in ACS management have been puplicated in recent years [10].

Advanced cardiac life support (ACLS) guidelines have developed over the past several years based on scientific evidence based medicine. The American Heart Association (AHA) developed recent ACLS guidelines in 2010 using the methods of resuscitation literature performed by the International Liaison Committee on Resuscitation (ILCOR), and these also updated in 2015. Guidelines are reviewed continuously but are formally approved every five years, and published in the journals [11].

Advanced cardiovascular life support (ACLS) refers to life saving interventions for the emergency treatment of cardiac arrest, stroke and other life-threatening medical urgent conditions that are updated by the American Heart Association and the International Liaison Committee on Resuscitation regularly [12].

The ACLS-2011 guideline for management of ACS in brief [13].

a- Within the 1st 10 minutes of the patient admission.

1. Checking vital signs.
2. Evaluating oxygen saturation.
3. Establishing IV access.
4. Getting or reviewing a 12-lead ECG.
5. Looking for risk factors for ACS, cardiac history, signs and symptoms of heart failure by taking a brief, targeted history.
6. Performing a physical examination.
7. Obtaining initial cardiac marker levels.
8. Completing a fibrinolytic checklist and check contraindication.
9. Obtaining portable chest x-ray (>30 min) .

b- Initiation of the general treatment.

1. Starting oxygen at 4 L/min and maintain oxygen saturation > 94%.
2. Giving aspirin (160 to 325 mg) .
3. Administering nitroglycerin, sublingual, spray, or IV.
4. Giving the patient morphine (IV) if discomfort not relieved with nitroglycerine.

c- ECG interpretation & diagnosis.

1. ST-segment elevation or newly developed LBBB.
2. NSTEMI or high-risk unstable angina.
3. Normal or non-diagnostic changes in ST segment or T wave.

(1) ECG shows ST-segment elevation or newly developed LBBB.

Confirm how much time has passed since the onset of symptoms.

a - If less than 12 hours has elapsed since the patient's symptoms.

1. Developing a reperfusion strategy based on the patient's and the hospital's criteria (PCI, fibrinolysis).
2. Continue adjunctive therapies. Beta-adrenergic receptor blocker, Clopidogrel and Heparin (UFH or LMWH), ACE inhibitor and statin therapy.

b - If more than 12 hours has passed since the patient's onset of symptoms.

1. Troponin level & consider early invasive strategy for high risk patients.
2. Admitting the patient to the hospital.
3. Assessment of the risk status.
4. Continue adjunctive therapy as aspirin, heparin and others as indicated.

(2) ECG shows ST depression or dynamic T-wave inversion.

1. Troponin level & consider early invasive strategy for high risk patients.
2. Admitting the patient to the hospital.
3. Assessment of the risk status.
4. Continue adjunctive therapy as aspirin, heparin and others as indicated.

(3) ECG shows normal ECG or nonspecific ST-T wave changes.

1. Considering admitting the patient to hospital or to a monitored bed.
2. Monitoring ECG continually for changes in ST-T.
3. Obtaining serial cardiac markers, including troponin.
4. Considering stress test.

Currently, in Emergency Department of Suez Canal University Hospital, there is no unified policy adopted for management of ACS. In this study, we seek for evidence based management as ACLS guidelines.

The goal of this study is to improve the quality of management of ACS in the Emergency Department of Suez Canal University Hospital by using (ACLS-2011) guideline.

RESULTS

The present study was observational, cross sectional study conducted in Emergency Department of Suez Canal University Hospital for 6 months (from December 2014 to June 2015) to evaluate the management of patients withACS by comparing it to the Advanced Cardiac Life Support 2011 guidelines.

The aim was to improve the quality of management of ACS in Emergency Department of Suez Canal University Hospital.

A total of 94 patients matching inclusion criteria were enrolled in this study, data was collected in pre-organized data sheet by the researcher, as every management step of

ACLS-2011 guideline for ACS was checked whether it is done or not for every patient included in the study in the Emergency Department of Suez Canal University Hospital.

The patients included in the study were divided into the following groups:

STEMI with chest pain > 12 hrs., STEMI with chest pain < 12 hrs., NSTEMI, Unstable angina, normal or non-diagnostic ECG group and the median percentage of adherence to ACLS-2011 guideline was estimated for each group separately then the median total percentage of adherence was estimated and the outcomes of all patients included in the study were assessed.

The mean age among all patients was 56.04±10.8 years and males were affected by ACS more than females by a percentage 70.2%, 29.8% respectively.

Every patient had at least one risk factor for ACS. Hypertension, Smoking and D.M were the most common risk factors among patients enrolled in the study.

Hypertension and D.M were the highest among STEMI< 12 hrs patients by a percentage of 59% and 51.3% respectively, while smoking was the highest among STEMI < 12 hrs patients by a percentage of 66.7%. (Figure 1)

The mediantime to the initial ECG from admission was

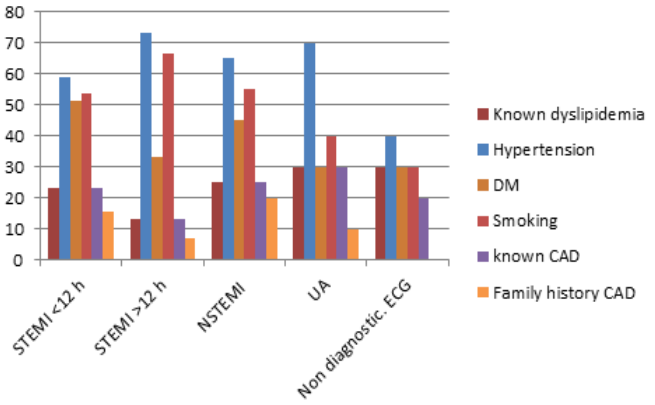

Figure 1. Risk factors of ACS in relation to groups of the study

prolonged more than 10 minutes and giving aspirin and analyzing the cardiac markers were fulfilled by a percentage 93.6%, 89.4% respectively. (Table 1)

The thrombolytic therapy (streptokinase) is the treatment of STEMI patients with chest pain <12 hrs. andThe thrombolytic drugs was given to 84.6 % of patients while 15.4% of patients did not receive it without absolute contraindications, no primary PCI was done in the Emergency Department of Suez Canal University Hospital for any patient.

Thrombolytic therapy was given to 53.5% of STEMI patients despite the chest pain was >12 hrs. in duration and not done primary PCI for anypatients (primary PCI not available in hospital) .

One NSTEMI patient received thrombolytic therapy due to persistent chest pain, no primary PCI was done and all the patients received aspirin, clopidogrel and statin.

Table 1. Management of ACS compared to ACLS- 2011 guideline – (initial management within 10 minutes for all studied patients) .

	No.	%
Total number of patients	94	100%
Perform targeted brief history	73	77.7%
Perform clinical examination	40	42.6%
Checking the vital signs	75	79.8%
Evaluation of 02 saturation	30	31.9%
Appropriate 02 usage	34	36.2%
I.V access	44	46.8%
Initial ECG within 10 minutes of admission	8	8.5%
Initial cardiac markers	84	89.4%
Giving aspirin if no contraindications	88	93.6%
Nitroglycerine if no contraindications	29	30.9%
Morphine I.V	18	19.1%
Portable x ray (> 30 min)	8	8.5%
Checking fibrinolytic checklist	8	8.5%

Median time to initial ECG = 34.15±10.8 minutes

Aspirin and clopidogrel were prescribed for all patients with unstable angina.

No ECG stress test was done for any suspected ACS patient with normal or non-diagnostic ECG changes and only (30%) of patients enrolled in this group were admitted to ED bed.

The median total adherence percentage to ACLS-2011 guideline for ACS management in the Emergency Department of Suez Canal University Hospital was **45.30** %. (Figure 2)

The complicated patients were (14.9%) and the mortality

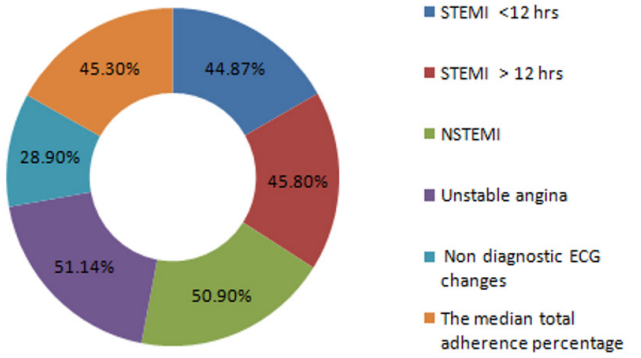

Figure 2. The median percentage of adherence of ACS management to ACLS-2011 guideline in the Emergency Department of Suez Canal University Hospital.

rate during the 1st 24 hrs of management was (2.1%) . (Table 2)

Table 2. Outcome of all patients enrolled in the study.

	No.	%
Total number of patients	94	100%
Number of uncomplicated patients	80	85.1%
Number of complicated patients	14	14.9%
Types of complications		
Cardiac arrest	2	2.1 %
Cardiogenic shock	1	1.1%
Ventricular tachycardia	1	1.1%
Ventricular fibrillation	1	1.1%
Acute heart failure	1	1.1%
Atrial fibrillation	3	3.2%
Failed thrombolysis	2	2.1%
Sinus bradycardia	1	1.1%
Death	2	2.1%

Table 3. Adherence to the guideline, complications, mortality rate of Kou-Gi Shyu., 2011 study compared to our study.

	Kou-Gi Shyu., 2011	Our study
Cerebrovascular stroke	0.4%	0
Acute renal failure	2.0%	0
Cardiogenic shock	4.0%	1.1%
Ventricular arrhythmia	4.7%	2.2
Atrial fibrillation	2.8%	3.2%
Cardiac arrest	0	2.1%
Acute heart failure	0	1.1%
Sinus bradycardia	0	1.1%
Failed thrombolysis	0	2.1%
Mortality rate	1.8%	2.1%
Adherence percentage to the guideline	74%	45.3%

DISCUSSION

The present study was a cross sectional observational study that has been conducted for 6 months (from December 2014 to June 2015) in Emergency Department OF Suez Canal University Hospital toevaluate the management of acute coronary syndrome bycomparing it to ACLS-2011 algorithm for ACS.

A total of 94 patients matching inclusion criteria were enrolled in this study.

The present study revealed that the median percentage of adherence to (ACLS-2011) algorithm for ACS management in the Emergency Department of Suez Canal University Hospital was **45.3%** and the percentage of adherence for each group included in the present study (STEMI with chest pain > 12 hrs, STEMI with chest pain < 12 hrs, NSTEMI, Unstable angina and the normal or non-diagnostic ECG group) was **44.87%**, **45.8%**, **50.9%**, **51.14%** and **28.9%** respectively.

The present study suffered some limitations, 1) some patients refused to be enrolled in this study, 2) Some ER physicians were aware of this study, 3) This study was conducted in one center (Emergency Department of Suez Canal University Hospital, 4) some ACS patients shifted between more than one doctor in the ER department.

(Andrew R Chapman., 2012) was observational study conducted toall admissions with chest pain during the period of September-October 2010 and the patients were identified retrospectively (n = 599) . They investigated the management of chest pain suspected to be due to ACS compared to NICE guideline among the patients in the Emergency Department in Tauranga Hospital (New Zealand) [14].

(Andrew R Chapman., 2012) revealed that the utilization of aspirin in the acute stage of treatment of ACS was (78.7%), ECG was done for (99.2%) of patients, appropriate O_2 usage was done for (54.4%) patients and the cardiac markers were tested for (97.5%) of patients [15].

Similar to the present study, aspirin was given by a near percentage (93.6%), ECG was done for (100%) of the patients while appropriate O_2 usage and the cardiac markers were tested for (36.2%), (89.4%) of the patients enrolled in the study respectively and this is because most emergency doctors were aware of the important role of aspirin, ECG and testing the cardiac markers for patients with ACS.

(Kou-Gi Shyu., 2011) wasa prospective observational study conducted in 39 centers in Taiwan with 3183 patients were included in the study, investigated the clinical conditions, management and it`s outcomes of ACS patients [15].

(Kou-Gi Shyu., 2011) revealed that, cardiac enzymes were measured for (97.7%) of the patients and the medications such as aspirin and clopidogrel were given to the patients during the acute phase of treatment by a percentage (91.8%), (94.1%) respectively, while B blocker, ACE inhibitor and heparin were given to the patients by a percentage (53.4%), (44.2%) and (90.6%) respectively [15].

Similar to the present study the cardiac enzymes were measured for (89.4%) patients, aspirin and clopidogrel, were given to the patients enrolled in the study by a percentage (93.6%), (88.2%) respectively as most emergency doctors were aware of the importance of testing the cardiac enzymes, antiplatelets therapy for patients with ACS, while B blocker, ACE inhibitor and heparin were given by a percentage (19.1%), (19.1%) and (40.4%) respectively because there was no specific guideline for management of ACS in the Emergency Department of Suez Canal University Hospital.

In (Kou-Gi Shyu., 2011) study, ECG was performed within 10 minutes of ED admission for (50.3%) patients, reperfusion therapy was done in (82.2%) of STEMI patients at the time of ED admission, most commonly as primary PCI (95.4%), Fibrinolysis was administered in only (3.3%) of the patient with a median door-to-needle time of (65) minutes, with only (12.8%) of these patients received fibrinolytic agents within 30 minutes of admission [15].

In contrast to the present studyECG within 10 minutes of ED admission was done only for (8.5%) of the patients due to high flow rate of patients in the Emergency Department and the reperfusion therapy was done for (44.6%) of patients as fibrinolysis with a median door to needle time of (74.8) minutes because sometimes there was no available CCU beds for the patients and giving the fibrinolytic therapy in ER was taking a long time. No patients received the fibrinolytic therapy within 30 minutes of ED admission and no primary PCI was done for any eligible patient because of the unavailability of the primary PCI in the Emergency Department of Suez Canal University Hospital.

In (Andrew R Chapman., 2012) study, applying the pulse oximetry was done for (98.3%) of patients, taking a cardiovascular history was done for (98.3%) of patients, while doing a full clinical examination was considered for (100%) of patients [14].

In contrast to the present study, the pulse oximetry was applied only for (31.9%) of all patients, the cardiovascular history was taken for (77.7%) of all patients enrolled in the study while a complete clinical examination was performed only for (42.6%) of all patients and this is due to the large number of patients whom were treated in the Emergency Department.

(Eric D., 2006) was observational study done between the hospital process performance and outcomes of patients with acute ACS by evaluatingmedical care practices with the American College of Cardiology/American Heart Association (ACC/AHA) guideline recommendations between January 1, 2001, and September 30, 2003 and427 hospitals enrolled 77 760 patients with ACS [16].

Data were collected at each hospital using standardized definitions. Variables include demographic and clinical information, including clinical pictures, medical history, management administered, as well as associated major contraindications to thrombolytic therapy and it`s outcomes.

(Eric D., 2006) revealed that overall, care decisions were consistent with guideline recommendations in (74%) of total treatment opportunities (acute, discharge and 2ry preventive metrics), the highest median adherence score among the hospitals included in the study was (82%) while the lowest one was (63%) [16].

In contrast to the present study, the median total adherence percentage to ACLS-2011 guideline in management of ACS was (45.3%) and this difference may be due to 1) the present study was conducted at one center, 2) the sample size was smaller than that of (Eric D., 2006) study, 3) the patients enrolled in the present study were observed only during the acute stage in ER (1st 24 hrs), while the enrolled patients of (Eric D., 2006) were follow up during the acute stage in ER, CCU, discharge and the 2ry preventive state.

(Ahmad W A W., 2011) was observational study conducted from July 1, 2004 to April 30, 2005 on a total of 525 patients aged > 21 years who were diagnosed with UA or NSTEMI were selected from 17 sites in Malaysia, investigated evaluation of compliance with existing guidelines in patients with ACS in Malaysia [17].

(Ahmad W A W., 2011) revealed that most (96.8%) of the patients had more than one cardiovascular risk factor, Hypertension, diabetes mellitus, dyslipidemias and smoking contribute a higher risk to the majority of patients by a percentage (66.1%), (38.9%), (40.4%) and (21.7%) respectively [17].

In (Kou-Gi Shyu., 2011) study, hypertension and diabetes mellitus were the commonest risk factors for ACS by a percentage (64.0%) and (36.0%) respectively [15] (Table 3) .

Similar to the present study, hypertension, diabetes mellitus and smoking were the most common risk factors among the patients by a percentage (61.7%), (42.6%) and (49%) respectively as hypertension, diabetes mellitus and smoking are the most common risk factors for ACS around the world.

In (Kou-Gi Shyu., 2011) study, many complications developed as stroke was seen in 0.4% of patients and other significant outcomes such as acute renal failure, cardiogenic shock, ventricular arrhythmia and atrial fibrillation were seen in (2.0%), (4.0%), (4.7%), and (2.8%) of the patients respectively [15].

Similar to the present study, the complicated cases were (14.9%) and the main complications were cardiac arrest, cardiogenic shock, acute heart failure, sinus bradycardia, failed thrombolysis, AF, VF and VT with a percentage (2.1%), (1.1%), (1.1%), (1.1%), (2.1%), (3.2%), (1.1%) and (1.1%) respectively as the cardiac complications are the most common among patients with ACS.

In (Kou-Gi Shyu., 2011) study, the in-hospital mortality was 1.8% and mortality rate was higher in STEMI patients (2.3%) [15].

Similar to the present study, the mortality rate was 2.1% and this mortality rate was among STEMI and NSTEMI patients only and this is may be due to similar risk factors for ACS and the emergency doctors in both studies were aware of the common management steps for ACS.

In (Eric D., 2006) study, it wasobserved that mortality rates decreased from (6.31%) for the lowest adherence score to (4.15%) for the highest adherence score [16].

In contrast to the present study, the mortality rate was (2.1%) and this difference is due to, 1) the present study was conducted at one center, 2) the sample size was smaller than that of (Eric D., 2006) study, 3) the patients enrolled in the present study were observed only during the acute stage (1st 24 hrs), while the enrolled patients of (Eric D., 2006) were observed during the acute, discharge and the 2ry preventive state.

CONCLUSION

In ACS management in Emergency Department of Suez Canal University Hospital, the median percentage of adherence to ACLS-2011 guideline for ACS was 45.3%. and The median percentage of adherence to ACLS-2011 guideline in management of ACS for each group included in the study (STEMI> 12hrs, STEMI< 12hrs, NSTEMI, UA and non-diagnostic ECG group) was 44.87%, 45.8%, 50.9%, 51.14% and 28.9% respectively. In the present study, the uncomplicated patients were 85.1%, the complicated patients were 14.9% and the mortality rate was 2.1%.

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