National Heart Institute Acute Coronary Syndrome Registry

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Abstract

Objective: Acute coronary syndromes (ACS) represent the acute life threatening phase of coronary artery disease [1], registries and surveys have the potential to define the 'gaps' between evidence and practice as well as implementation of guidelines [2].

Aim of the Work: To assess the application of a newly designed registry among Egyptian patients with ACS and to compare the results with those of other international registries.

Methods: The study included 401 patients having acute coronary syndrome admitted to the National Heart Institute CCU over 6 months from January 2007 to June 2007 that were subjected to full history & clinical examination, 12 leads, ECG, and echocardiography. Patients were classified according to the ECG at presentation into ACS with ST elevation, ACS without ST Elevation, and ACS with undetermined ECG changes. Patients were managed according to the ACC/AHA guidelines 2004 for STEMI & update 2002 for unstable angina and NSTEMI, In hospital MACE; death, re-infarction, target vessel revascularization and rhytmias were assessed.

Results: ACS with ST elevation was the most common presentation (59.1 %), age of our study population ranges from 18 to 88 years old (54.5 ± 11.9 years). Most of patients were males (79%), smoking was the most significant risk factor (61 %) followed by Hypertension (55%). The main presenting symptom was typical anginal chest pain (91.5%).

Coronary angiography was performed in 40% of our study population with higher incidence among patients who had ACS with undetermined ECG changes (44.12%), however reperfusion by PCI was undertaken in a higher percentage of patients with ACS with ST elevation (30.38%).

In patients diagnosed as STEMI (267 patients), 65.5% of the patients received thrombolysis “Streptokinase”, while 12.4% were referred for primary PCI.

Heart failure was the most prevalent in hospital complication, Atrial fibrillation was the most common occurring arrhythmia.

Conclusions: Smoking & hypertension are significant risk factors among Egyptian patients. The use of invasive strategy was restricted to the most critical patients; this was because of financial causes.

Key Words: Acute coronary syndrome – ACS – ACS Registry – Registry.

Introduction

ACUTE coronary syndromes (ACS) represent the acute life threatening phase of coronary artery disease [1]. Current knowledge regarding the characteristics, treatments and outcomes of patients diagnosed with the complete spectrum of acute coronary syndromes is limited to data derived from clinical trials and/or from national registries [2].

Acute coronary syndrome patients enrolled in randomized, clinical trials are a highly selected, lower-risk subgroup. Hence, unless the trial is very
large and heterogeneous, it tends to reflect an 'ideal' study set rather than the diversity of clinical practice [3]. In contrast, registries and surveys have the potential to define the “gaps” between evidence and practice as well as implementation of guidelines [2].

Our objective was to assess the application of a newly designed registry among Egyptian patients with ACS and to compare the results with those of other international registries.

**Material and Methods**

This study was approved by our Local Institutional Human Research Committee & subjects gave written informed consent.

**Patient selection:**

The study included 401 patients having acute coronary syndrome admitted to the National Heart Institute CCU over 6 months from January 2007 to June 2007.

Methods:

*All patients' data included:*  

1. **Full history taking:**

   Targeted history was taken in the ER to evaluate the risk profile of the patient “Sex, age, HTN, DM, dyslipidaemia, current smoking, and positive family history for ischemia heart disease”, patients’ complaint focused on chest discomfort, associated symptoms, history of prior episodes of myocardial ischemia such as stable or unstable angina, MI, CABG, or PCI.

Definitions: [4-5]

**A- Myocardial infarction:** Chest pain with cardiac enzyme elevation (CK or CK MB isoenzyme) at least twice the upper limit of the reference range within 12 hours of admission or positive troponin & new ECG changes.

**B- Invasive strategy:** The performance of invasive procedures (catheterization and/or revascularization) less than 48h from hospital admission.

**C- Reinfarction:** New onset of pain, new ECG changes (ST elevation of 1mm or more in contiguous leads, new Q waves), or cardiac enzymes re-elevation.

**D- Unstable angina:** Chest pain that is prolonged “>20min”, rest pain, New onset severe angina, or recent unstabilization of previously stable angina with at least CCS III.

Patients were classified according to their initial ECG into:

- ACS with ST segment elevation.
- ACS without ST segment elevation.
- ACS with undetermined ECG changes “RBBB, pacing, or severe LVH without typical ST changes”.

II- **Clinical Examination:**

   - Heart rate: Regular, irregular, ABP measurement according to JNC VII, 2004 [6]. Additional heart sounds namely: S3, S4, Systolic murmurs: MR “Transient or persistent”, Ischemic VSD, or TR.

   - Killip class: (I) Absence of rales over the lung fields and absence of S3, (II) Rales over 50% or less of the lung fields or the presence of an S3, (III) Rales over more than 50% of the lung fields “pulmonary edema”, (IV) Cardiogenic shock [7].

III- **Electrocardiogram:**

   A 12-lead ECG was performed at ER arrival for all patients with chest discomfort or other symptoms suggestive of ACS. In patients with inferior STEMI, right-sided ECG leads were obtained for possible ST elevation, suggestive of right ventricular (RV) infarction.

   ECG High risk criteria in included: New, or presumably new, transient ST-segment deviation (0.05mV), T-wave inversion (0.2mV), new or presumed new LBBB.

IV- **Echocardiography:**

   Transthoracic Echocardiography was done for every patient with the use of (HP) sonos 5500 echocardiographic machine with a transducer Frequency 3.5 MHZ with assessment of LVEDD, LVESD, FS% as calculated by: LVEDD-LVESD/LVEDD x 100, EF was calculated by modified Simpson's method, EF=EDV-ESV/EDVx100%, the presence & severity of MR, TR, assessment of segmental wall motion abnormalities “16 segments” according to the American Society of Echocardiography [8].

V- **Management:**

   The protocol for management was done according to the recommendations of on ACC/AHA guidelines 2004 for STEMI & update 2002 for unstable angina and NSTEMI:

1- **STEMI:** [4]

   Reperfusion was done by thrombolysis “Streptokinase” or Primary PCI in cases of in cardiogenic shock or Killip class greater than or
equal to 3. Rescue PCI was performed in cases of post infarction angina, haemodynamic instability, or reinfarction. Contraindications to thrombolysis were increased risk of bleeding or intracranial hemorrhage.

2- UA & NSTEMI: [5]

Invasive strategy was used in patients with recurrent ischemia at rest despite intensive anti-ischemic therapy, new or presumably new ST-segment depression, CHF symptoms, S3 gallop and/or pulmonary edema, hemodynamic instability, life threatening arrhythmias, prior PCI or CABG.

3- Adjunctive medical treatment:

Oral Aspirin: 300mg was given to all patients as an initial dose followed by a maintenance dose of 150mg/day except for patients with true aspirin allergy or active gastrointestinal bleeding. Oral Clopidogrel: 300mg was given initially, in high risk STEMI and in NSTE-ACS, unless primary PCI was planned 600mg was given initially followed by maintenance dose 75-mg/day in conjunction with, or as a substitute, of aspirin in case of known hypersensitivity.

Subcutaneous LMWH was used in all patients except those with renal dysfunction, (serum creatinine greater than 2.5mg/dL in men or 2.0mg/dL in women), and patients over 75 years of age received Unfractionated heparin. Intravenous Glycoprotein IIb/IIIa antagonist, namely Tirofiban, was used in STEMI cases undergoing primary or rescue PCI and in high risk unstable angina and NSTEMI patients either upstream or just prior to PCI in a loading dose of 0.4 $\mu$g/kg/min. followed by a maintenance dose of 0.1 $\mu$g/kg/min. for a duration of 12 up to 48 hours.

Oral and/or I.V. B-blockers were used in all patients starting within the first 24 hours except for those with contra-indications: As symptomatic bradycardia, systolic arterial blood pressure <100mmHg, second or third degree A-V block, cardiogenic shock and severe COPD. Oral ACE inhibitors were used in patients either hypertensive and/or with an LVEF $\leq$40%, with either symptomatic heart failure or DM unless contraindicated. ARB’s were used as an alternative in patients intolerant to ACE inhibitors.

Oral Statins were started early after admission and was continued through in hospital course and prescribed on discharge. Nitrates were used either sublingual initially as needed for chest pain or intravenous infusion for CHF, hypertension, or persistent ischemia unless contraindicated as in cases of RV STEMI and then continued in the oral form.

4- Coronary angiography:

was done according to risk stratification based on ACC/AHA guidelines 2004 for STEMI & update 2002 for unstable angina and NSTEMI.

VI- In hospital MACE:

Death, Re-infarction, Target vessel revascularization, Arrhythmias.

VII- Statistical analysis:

All results were collected in a specially designed database, tabulated and statistical analysis was performed using IBM compatible personal computer and by means of statistical software package namely statistical package for social science (SPSS). The results were analyzed by the suitable statistical methods which include Analysis of variance (ANOVA) tests. According to the computer program SPSS for windows, ANOVA test was used for comparison among different times in the same group in quantitative data and if ANOVA was significant we used Tukey’s test between all groups. $p>0.05$ Non significant difference, $p<0.05$ significant difference, $p<0.01$ highly significant difference.

Results

The study included 401 patients diagnosed as having acute coronary syndrome admitted to the National Heart Institute CCU over 6 months from January 2007 till June 2007.

Initial diagnosis:

242 patients (59.1%) had an initial diagnosis of ACS with ST elevation, 130 patients (32.4%) ACS without ST elevation while 34 patients (8.5%) ACS with undetermined ECG changes “right bundle branch block (RBBB), pacing, or severe left ventricular hypertrophy (LVH) without typical ST changes”.

Age:

The ages of patients enrolled in our study ranged from 18 to 88 years old (M $\pm$ SD = 54.5$\pm$11.9 years). Patients who presented with ACS with ST elevation were relatively younger in comparison with patients presenting with ACS without ST elevation, however there was no significant P-value concerning age between patients presenting with undetermined ECG changes & those with either ACS with ST elevation or ACS without ST elevation.
Sex:
More than 79% of our studied population (319 patients) were males showing a highly significant $p$-value for male gender as an important risk factor for patients presenting with any type of ACS (<0.001). Females represented a higher percentage (29.4%) among patients having ACS with undetermined ECG changes & (26.5%) among patients with ACS without ST elevation in comparison with ACS with ST elevation where they represented (16%) only.

Risk factors: Table (1)
Smoking was the most significant risk factor among our patients ($p$-value 0.000). More than 70% of patients with ACS with ST elevation were smokers. Smokers represented (>61%) of the whole studied group. Hypertension was also a significant risk factor as it represented (55%) of our patients ($p$=0.044). DM was found in 151 patients (37.7%)

Diabetic patients presented the highest percentage among patients with undetermined ECG changes. Younger patients were more likely to be smokers with positive family history while older patients more likely had diabetes, hypertension, previous angina and/or previous CABG.

Main presentation:
Generally, the main presenting symptom was typical anginal chest pain (91.5%) whatever the initial diagnosis was. Heart failure was the presentation in 2.24% of the whole population, 5.9% of patients with undetermined ECG changes, in 2.3% of patients with ACS without ST elevation but only in 1.7% in patients with ACS with ST elevation.

Other presentations included arrhythmia in 0.75%, atypical chest pain in 1.75%, Syncope in 0.5% and cardiac arrest in 2.24%, with no significant relation between these presentations and initial diagnosis on admission.

Table (1): Risk factors for acute Coronary syndrome according to the initial diagnosis; smoking, and HTN were the most significant risk factors for ACS, DM was found in the highest percentage among patients with undetermined ECG).

<table>
<thead>
<tr>
<th></th>
<th>ACS with ST elevation</th>
<th>ACS with no ST elevation</th>
<th>ACS with Undetermined ECG</th>
<th>Total</th>
<th>Chi-square X²</th>
<th>p-value</th>
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<tbody>
<tr>
<td>Smoker</td>
<td>N 168</td>
<td>65</td>
<td>15</td>
<td>248</td>
<td>147.25</td>
<td>0.000*</td>
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<tr>
<td></td>
<td>% 70.89</td>
<td>50.00</td>
<td></td>
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<tr>
<td>HTN</td>
<td>N 119</td>
<td>82</td>
<td>21</td>
<td>222</td>
<td>66.189</td>
<td>0.044*</td>
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<td></td>
<td>% 50.21</td>
<td>63.08</td>
<td></td>
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<tr>
<td>DM</td>
<td>N 82</td>
<td>54</td>
<td>15</td>
<td>151</td>
<td>44.993</td>
<td>0.307</td>
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<tr>
<td></td>
<td>% 34.60</td>
<td>41.54</td>
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<tr>
<td>Hyperlipidema</td>
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<td>18</td>
<td>4</td>
<td>48</td>
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<tr>
<td></td>
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<td>13.85</td>
<td></td>
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<tr>
<td>Family history</td>
<td>N 17</td>
<td>7</td>
<td>2</td>
<td>26</td>
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<td>Previous Angina</td>
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<td>7</td>
<td>107</td>
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<td></td>
<td>% 24.47</td>
<td>32.31</td>
<td></td>
<td></td>
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<tr>
<td>Previous MI</td>
<td>N 34</td>
<td>22</td>
<td>5</td>
<td>61</td>
<td>20.885</td>
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<td>16.92</td>
<td></td>
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<td>8</td>
<td>2</td>
<td>21</td>
<td>6.000</td>
<td>0.811</td>
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<tr>
<td></td>
<td>% 4.64</td>
<td>6.15</td>
<td></td>
<td></td>
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<tr>
<td>Previous CABG</td>
<td>N 4</td>
<td>5</td>
<td>2</td>
<td>11</td>
<td>1.273</td>
<td>0.242</td>
</tr>
</tbody>
</table>

Time to presentation:
43.89% of our population presented within 6 hours from the onset of symptoms, 19.7% presented within 6-12 hours, 23.44% presented within 12-24 hours, and 12.97% presented after 24 hours from symptom onset.

Among patients with STEMI who received thrombolysis, 54.66% presented within the first 3 hours from onset of symptoms, only 11.18% presented within the golden hour, 43.48% presented between the first and third hours. 33.54% presented between the third and sixth hours. The median time to presentation was 165 (20-780) minutes.

Killip class at presentation:
Among our studied population, 85.54% presented with Killip class I, 8% Killip II, 2.49% with Killip III, and 3.9% presented with Killip class IV (16 patients). No significant relation was found between age & presentation with Killip class ($p$=0.29).
75% of the patients who presented with Killip IV (12 patients) had coronary angiography done. Reperfusion by PCI was done to 58% (7 patients), the rest of the patients either had severe form of multivessel disease in addition to left main disease or was referred for CABG. However PCI was successful to decrease in hospital mortality as only 2 patients out of 7 (28.6%) died in the group who had PCI done while 4 patients out of 9 (44.4%) in whom PCI was not done died showing the importance of reperfusion in patients presenting with cardiogenic shock.

Use of invasive diagnostic and therapeutic procedures:

Coronary angiography was performed in 40% of our study population (164 patients) with higher incidence among patients who had ACS with undetermined ECG changes (44.12%) & ACS without ST elevation (41.54%) than patients presenting with ST elevation (40.08%). However reperfusion by PCI was undertaken in a higher percentage of patients with ACS with ST elevation (30.38%) and in patients with undetermined ECG changes (26.5%) in comparison with patients presenting with ACS without ST elevation (18.46%).

IABP was used in 3 of our patients who were suffering either from mechanical complications namely ventricular septal rupture (1 patient) or Left main disease (2 patients). CABG was done on emergency basis for 6 of our patients, 3 of them had left main disease; two had unsuccessful PCI for severe form of multivessel disease and one of them for post infarction ventricular septal rupture.

Normal coronary angiography was found in 3 patients (1.82%) of the referred for the cath. Lab. They were younger with a mean age (48.3 ±7.6) years. Single vessel disease was the most common finding in coronary angiography, (58%) while two vessel disease & multivessel disease had almost the same incidence (21%). Yet on showing the distribution of coronary angiography findings in relation to the presentation, single vessel disease had the highest percentage among patients presenting with ST elevation (68.42%) followed by patients presenting with undetermined ECG changes (53.33%), while multi vessel disease had the highest percentage among patients presenting without ST elevation (35.19%).

Management of STEMI:

In patients diagnosed as STEMI (267 patients) reperfusion was the aim, 65.5% of the patients received thrombolysis “Streptokinase”, while 12.4% were referred to the cath lab. for primary PCI and 14.6% had rescue PCI done for either failed thrombolysis, post infarction angina or reinfarction. 7.5% of patients presenting with ST elevation (20 patients) received no primary reperfusion therapy due to late presentation absence of chest pain at presentation, ST segment resolution with no complications (12 patients), contraindications to thrombolysis or refusal of cath by the patient and/or his relatives.

Time to reperfusion:

In patients with STEMI who received thrombolytic therapy the mean door to lysis time was 20.16±8.78 minutes with a range (15-30) minutes, while in patients who were referred for Primary PCI, the mean door to balloon time was 102 ±10.9 minutes with a range (20-110) minutes.

Adjunctive medical treatment:

Evidence based therapies were used extensively in our studied patients unless contraindicated.

385 patients (96%) received Aspirin, 348 patients (86.8%) received Beta blocker, 356 patients (88.8%) received ACE-Inhibitors, 387 patients (96.5%) received LMWH, 298 patients (74.3%) received Clopidogrel and 321 patients (80%) received statins.

Aspirin was used in all patients except in 3.9% due to contraindications; major bleeding or known sensitivity to aspirin.

Beta-blockers were less used in older patients without ST elevation & ACS with undetermined ECG changes. Generally B-blockers were used unless contraindications existed e.g. severe COPD or bronchial asthma not tolerating B-blockers (38 patients) (71.7%), heart failure (11 patients) (20.7%), high grade AV block (2 patients) (3.8%), symptomatic bradycardia (2 patients) (3.8%).

GpIIb/IIIa antagonists namely Tirofiban was used in (12.7%) of our patients. That was due to the cost. The rule was to give Clopidogrel to all patients, however only (74.3%) recieved Clopidogrel & that was due to financial causes, except for (5 patients) (1.25%) because of major bleeding.

In hospital complications: Fig. (1)

136 patients (33.92%) had in hospital complications. Heart failure was the most prevalent in hospital complication and it occurred more with older patients. Old age had a significant correlation also with stroke, major bleeding and post infarction
angina. Atrial fibrillation (paroxysmal or persistent) was the most common occurring arrhythmia as it was documented in (6.74%) of the studied population.

No significant correlation was found between in hospital complications and risk factors & this may be due to the small number of complicated patients.

Patients with undetermined ECG changes had relatively the highest mortality (5.8%) followed by ACS without ST elevation patients (5.3%) while patients with ACS with ST elevation had the lowest mortality (3.3%).

**Discussion**

Acute coronary syndrome patients enrolled in randomized, clinical trials are a highly selected, lower-risk subgroup. Hence, unless the trial is very large and heterogeneous, it tends to reflect an 'ideal' study set rather than the diversity of clinical practice. In contrast, registries and surveys have the potential to define the 'gaps' between evidence and practice [3].

Many national and international registries concerning acute coronary syndromes were done. We mentioned some examples as ENACT, Euro Heart survey I &II, GRACE, CRACE & the Canadian registry for ACS.

However in Egypt, no registries were available till now despite the overwhelming increase in the number of ischemic heart disease patients and the change in the natural history of the disease affecting certain classes of patients' particularly young age and women in addition to the aggressive nature in many patients.

We will take the Second Euro Heart survey (EHS-ACS-II) [9] as an example for one of the national registries as it is the most recent and, in addition, EHS-ACS-II was performed 4 years after EHS-I [10] which allowed better assessment of temporal trends in the diagnosis, management, and outcomes of ACS by comparing between the two surveys among European patients and so it represents all what we said before about the values and benefits of registries. In addition, we will use the GRACE [11] in our comparisons as an example for an international registry carried out in Europe, North and South America, Australia and New Zealand.

**Initial presentation:**

The majority of our patients (59.1%) had an initial diagnosis of ACS with ST elevation, 32.4% were initially diagnosed as ACS without ST elevation while ACS with undetermined ECG changes was the initial diagnosis in 8.5%. On the other hand in EHS-ACS-II, ACS without ST elevation patients comprised 48% of the patients, 47% had an initial diagnosis of ACS with ST elevation whereas five percent of the patients presented with an undetermined ECG pattern.
Age:

Our patients were much younger with a mean age 54.5 years in comparison with EHS-ACS-II where the mean age of the patients 64.7 years & the GRACE in which the patients had a mean age of 65 years. This means that in Egypt, ischemic heart disease patients occurs during the working age causing a lot of economic burden on personal and public levels.

Sex:

Male gender was a significant risk factor in both studies as males represented 79.5% in NHI patients & 70.1% in EHS-ACS-II.

Risk factors:

Risk factors showed a great variation between our registry & EHS-ACS-II. In our population current smoking was the most significant risk factor present in 61.85% while it was present only in 36.5% in EHS-ACS-II patients. Hypertension was found to be a significant risk factor among patients in both studies representing 55% & 57% in our study & EHS-ACS-II respectively.

In addition, Hyperlipidaemia represented 47.55% in EHS-ACS-II but only 11.97% in our patients & this may be related to the older age & better primary prevention plus regular follow-up in Europe.

The prevalence of smoking in addition to the relatively young age of Egyptian patients may suggest the importance of smoking cessation as a primary and secondary preventive measure of CHD.

Also, on comparison of risk factors in relation to age both registries showed that younger patients were more likely to be smokers with positive family history while older patients more likely had diabetes, hypertension previous angina and/or previous CABG.

Main presenting symptom:

In the two registries, typical anginal chest pain was the main presenting symptom representing 91.5% in our registry & 80.8% in EHS-ACS-II. Also, heart failure was the main presentation more in ACS with undetermined ECG changes in both registries.

Time from onset of symptoms to presentation:

In our patients presenting with STEMI, the median time from onset of symptoms to ER arrival was 165 (20-780) minutes which was the later than in EHS-ACS-II which was 145 (80-330) minutes. This shows the need for more public health education, the importance of early seeking medical help and the not well established EMS role currently.

Reperfusion in STEMI:

Among patients with ST-elevation in our study, 80.1% received primary reperfusion therapy: 65.5% received thrombolysis “Streptokinase”, 14.6% had rescue PCI done, while 12.4% were referred to the cath lab. for primary PCI. On the other hand 7.5% of those patients didn't receive primary reperfusion therapy and that was due to late arrival & absence of chest pain on arrival with no complications, contraindications to thrombolysis and/or refusal for cath by the patient himself and his relatives.

However reperfusion differed in EHS-ACS-II as only 63.9% of ST elevation patients received primary reperfusion, 51.8% of reperfused patients were treated with PCI, and 41.2% with fibrinolytic therapy.

The reasons stated were late arrival, uncertain diagnosis, early resolution of ST-elevation, and contraindications. Additional reasons given by the treating physician included advanced age, patient refusal, and lack of catheterization laboratory facilities.

We have to remember that the EHS-ACS-II included teaching and non teaching hospitals and patients enrolled were admitted in centers that treated ACS in both cardiology and internal medicine departments. On the other hand, National Heart Institute is a tertiary care centre that only serves cardiac cases.

Modalities of reperfusion:

In EHS-ACS-II primary PCI was used in a higher proportion of reperfused patients while in our registry the use of fibrinolytic therapy was higher. The difference in the method of reperfusion can be attributed to financial causes. Interventional procedures are expensive & equipments are limited so primary PCI cannot be done to all our patients so we reserve invasive interventions to the most critical patients who would benefit most from those interventions.

Time to reperfusion:

The door to needle time was actually within the recommended guidelines as the mean door to needle time in our registry was 20.16±8.78 minutes. On the contrary, the door to balloon time was 102±10.9 minutes and that was longer than the recommended 90 minutes. The delay was mainly due to administrative problems. The delay was less at daytime as all the working staff and nurses are ready in their places.
If we compare with EHS-ACS-II we will find that median door to lysis time was 37 minutes while the door to balloon time had a median time of 70 minutes & that was significantly earlier than the corresponding time in EHS-I which was 93 minutes showing the importance of registries in showing the improvement in clinical practice.

**Use of Interventional procedures:**

The use of coronary angiography was higher in EHS-ACS-II (82.3% in ACS with ST elevation & 72.1% in ACS without ST elevation) while in our study coronary angiography was done to 40.08% in ACS with ST elevation & 41.54% in ACS without ST elevation.

Moreover; patients undergoing PCI were also more in EHS-ACS-II either with ACS with ST elevation 69.9% or ACS without ST elevation 46.7% in comparison with our patients for whom PCI was done 30.38% of ACS with ST elevation patients & 18.46% of patients with ACS without ST elevation.

In addition, the use of Intra-Aortic Balloon pump was much lower in our study as it was used in 0.8% & 0.7% in patients with ST elevation and without ST elevation respectively while in EHS-ACS-II it was used in 2.6% of patients with ST elevation and in 1.2% of patients without ST elevation. This is mainly attributable to the availability of resources as mentioned above.

**Adjunctive medical treatment:**

Use of B-blockers, LMWH, ACEI and Clopidogrel had almost the same percentage in our registry & EHS-ACS-II, however the use of GP IIb/IIIa inhibitors was less, only in 12.71%, of our patients while in EHS-ACS-II it was used in 30.7%, 20.8% of patients with ACS with ST elevation and ACS without ST elevation respectively. This could be related to the cost.

Aspirin was used in all patients except in 3.9% due to contraindications; major bleeding, known sensitivity to aspirin or premature death. However in EHS-ACS-II for half of the patients who wasn't prescribed aspirin, the reason was not mentioned.

In our study, B-blockers were used unless contraindications existed e.g. severe COPD or bronchial asthma not tolerating B-blockers (38 patients) (71.7%), cardiogenic shock (11 patients) (20.7%), high grade AV block (2 patients) (3.8%), symptomatic bradycardia (2 patients) (3.8%). If we compare with EHS-ACS-II we will find that although use of B-blockers was similar as in our patients, however the reason for not receiving B-blockers was mentioned in only half of the cases.

The use of statins was significantly higher in our study and in EHS-ACS-II in comparison with GRACE where only 47% received statins in their therapy and that was mainly related to the fact that GRACE was held between 1999 and 2000 where the role of statins in acute coronary syndromes was still not well established while our study was held in 2007 and EHS-ACS-II in 2004 showing the importance of registries in better implementation of guidelines.

**In hospital complications:**

In hospital complications showed a great variation between the two registries as in our group of patients, ongoing ischemia/reinfarction (11.3%) had the highest incidence followed by heart failure (7.7%). Atrial fibrillation occurred in a higher percentage (6.7%) of patients. While in EHS-ACS-II, the most common complications during hospitalization were heart failure (12.4%), re-ischemia/ re-infarction (8.0%), and paroxysmal or persistent atrial fibrillation (AF) (3.3%).

**In hospital mortality:**

In hospital mortality, generally, was similar between the two registries as it represented 4.2% in our registry & 4% in EHS-ACS-II.

In addition, the highest mortality rate was among patients presenting with undetermined ECG changes in both registries, while the lowest mortality was observed for those with ST elevation in our patients and without ST-elevation in EHS-ACS-II.

Finally, this study is the first registry in Egypt performed on a large number of patients to show the demographics, characteristics & outcome in Egyptian patients. It also shows the current management strategies in one of the leading tertiary centers in Egypt. But this may not reflect the real practice in other general and non-teaching hospitals in our country. This would be an interesting area of further research i.e. for a subsequent Egyptian multi-center registry that would help to learn more and modify our own guidelines according to the characteristics of Egyptian patients.

**Conclusion:**

The current registry helped to show current management strategies and their adherence to guidelines, it also showed clearly the impact of other factors “financial and administrative” on clinical decision making.
The use of invasive strategy was restricted to the most critical patients and those who would gain much benefit from, although it showed to improve the chance of survival, and that was mainly due to the availability of resources and financial causes.

Smoking & hypertension are significant risk factors among Egyptian patients raising an alarming sign for primary and secondary prevention for coronary artery disease.

The delay in seeking medical help is related to unawareness of the public on what to do raising important questions about EMS role and public health education.

Evidence based therapies were widely used unless contra-indicated or if the cost was the cause as in the IIb/IIIa antagonists.

**Recommendations:**

To apply a uniform registry, according to well-defined parameters, for acute coronary syndrome patients among different cardiac centers in Egypt. Accordingly, Egyptian guidelines could be modified according to our real clinical practice knowing the demographics, characteristics of Egyptian patients and the availability of tertiary centers and cath. labs.

Primary and secondary prevention is mandatory for the well established risk factors for coronary artery disease as smoking, hypertension and diabetes.

Public Health education is essential to decrease the time from onset of symptoms to presentation.

In addition, the role of the emergency medical services has to be more established in order to decrease the delay from symptom onset to presentation.

**Limitations:**

The study included patients admitted to the National Heart Institute only and did not include patients from other cardiac centers or hospitals in Egypt. More cardiac and non cardiac hospitals should have been involved to really evaluate the current practice management all over Egypt.

No intermediate or long term follow-up was done in this study to show the impact of our practice on the outcome on long term basis.

Body mass index was not calculated for patients.

**References**

8. LANG R.M., BIERIG M., DEVEREUX R.B., et al.: Chamber Quantification Writing Group; American Society of Echocardiography's Guidelines and Standards Committee; European Association of Echocardiography: Recommendations for chamber quantification: A report from the American Society of Echocardiography Guidelines and Standards Committee and the Chamber Quantification Writing Group, developed in conjunction with the European Association of Echocardiography, a branch of the European Society of Cardiology. J. Am. Society of Echocardiography, 18: 1440, 2005.