# Acute Coronary Syndrome Registry

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**Abstract: Background:** There is sparse Egyptian data in the modern era of acute coronary syndrome (ACS) care, we attempted at obtaining a registry of ACS patients for one year at Egypt's National Heart Institute, the country's largest public cardiology hospital, the aim of the study was to evaluate both contemporary Egyptian ACS patient's demographics and current management practices and patient outcomes. **Patients and methods:** Valid data for 886 patients admitted as in patients in the period from 1/6/2011 till 31/12/2012, 656 (74%) males and 230 (26%) females. 482 (54.4%) were admitted with STEMI, and 404 (45.6%) other ACS (NSTEMI and UA). Of the 482 STEMI patients, 373 (42%) were males and 109 (12%) were females. Of the other ACS patients, 283 (31%) were males and 121 (13.6%) were females, the mean age of the entire group was 54.7 (range 24-92)). there were 484 (54.6%) current smokers; diabetes mellitus was present in 375 patients (42.3%); hypertension in 348 patients (39.3%); dyslipidemia was reported by 31% of patients on admission but routine, in-hospital lipid sampling showed that in reality 540 patients (60.9%) were dyslipidemic; 267 patients (30.1%) were obese (BMI above or equal to 30). **Results:** Thrombolytic therapy was used in 264 out of 482 STEMI patients (54.7%), Coronary angiography and PPCI was used in 180 of 482 STEMI patients (37%) and 46 out of 404 other ACS patients (11%). There were also 39 rescue PCI (14.7%) of the 264 patients who initially received thrombolytic therapy, 38 STEMI patients did not receive neither thrombolytic nor PCI (7.8%) due to either late presentation and stable condition in 16 patients and inconclusive ECGs in 22 patients, 867 out 886 patients survived to hospital discharge (97.9%) and 19 patients died in hospital (2.1%). **Conclusion:** Patients are younger than international registries, there is underutilization of PPCI even in hospitalized patients who arrive on time, Streptokinase thrombolysis remains the dominant revascularization strategy, NSTEMI patients rarely receive early invasive therapy during the index hospitalization, and only for the most hemodynamically unstable. The revascularization numbers have improved compared to older studies, with an in hospital mortality of 2.1% for the entire patient cohort and 4.5% in hospital mortality for the PCI group (PPCI, PCI for NSTEMI and rescue PCI).

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## Introduction

The NHI is the largest cardiology hospital in Egypt. It was established by the government in 1966 as a cardiac surgery hospital and evolved over the years to reach its current size and state. In size, it's a moving target with continuous development and upgrading.

It now comprises 400 beds, and sees over 70,000 patients per year, it has seven cath labs and performs about 9000 invasive procedures yearly. It's also the largest cardiac surgery hospital in Egypt with five operating rooms performing about 2500 cardiac surgeries yearly (data on file 2011). After the recent renovations currently being undertaken in 2016 the numbers are expected to multiply.

The NHI provides acute cardiac care for all comers, for all cardio vascular emergencies, for free.

Due to the enormity of the patient care tasks facing the NHI, all of its budget and its staff time were mostly directed to direct patient care, its record keeping, its data analysis and statistics were neglected for years, and are now a work in progress.

Due to the recent progress in care for acute coronary syndrome (ACS) patients and the considerable human and material cost involved and with the NHI providing primary PCI (PPCI) 24/7 the need for good data to improve the quality of patient care and to provide data for quality control became more important and urgent than ever, It became obvious that high quality care cannot be presented without high quality registry data, and that the criteria

for good registries are rigorous, and as recently pointed out by Widimsky (1)most registries are based on voluntary participation of only selected (and usually better) hospitals thus not providing true picture and that all hospitals in a given region should be included, we still went ahead at NHI and decided to perform this single center registry, hoping it was a step towards more ideal registries in the future.

NHI approached Astra Zeneca (AZ) for sponsorship of an all-comers ACS registry which was approved in December 2010, started enrolling patients on 1/6/2011 and closed for statistical analysis on 30/12/2012.

Full time dedicated temporary staff was employed for data entry; dedicated software and hardware was provided by a specialized firm (Health Insights Egypt). In spite of employing dedicated staff it was challenging and sometime difficult to obtain real time adequate data 24 hours a day in this busy, sometimes chaotic environment. The data was obtained in paper case report forms (CRF) and soon afterwards and soon afterwards in electronic case report forms (eCRF); only those who were admitted as in-patients were enrolled, those diagnosed as ACS and referred elsewhere were not enrolled (including patients managed briefly in the emergency room (ER).

**Methods:**

All patients signed the hospital standard consent form which allows data collection for study and statistical purposes. The local ethics review board (ERB) did not require a separate consent form for this registry.

The patients were admitted with a working admission diagnosis (e.g. STEMI, unstable angina etc.). Their status at discharge - alive vs. dead - was documented. The patient journey inside the hospital, their medications at discharge and their diagnosis at discharge were also documented; some patients' diagnosis changed between admission and discharge but the statistical analysis was mostly done based on the admission diagnosis.

We managed to obtain valid data for 886 patients admitted as in patients in the period from 1/6/2011 till 31/12/2012. All were diagnosed as ACS, we believe this makes this one of the larger and more comprehensive recent ACS registries coming out of NHI and out of Egypt. (2,3,4).

Patient demographics (Table 1.) There were 656 (74%) males and 230 (26%) females, 482 (54.4%) were admitted with a working diagnosis of acute STEMI, and 404 (45.6%) were admitted with a working diagnosis of other ACS (NSTEMI and UA), mean age for entire group was 54.7, range 24-92 years) for STEMI was the mean age was 54.7 years, mean age of other ACS was 54.6years.

It is worth mentioning that this STEMI vs other ACS ratio is only reflective of the admission patterns at the NHI where, due to lack of beds and large volumes of ER patients, only the sickest of patients are admitted. STEMI gets top priority, almost all other admitted ACS patients have severe chest pain or severe ECG changes or hemodynamic instability on admission. Stable patients with uncertain diagnosis are unfortunately rarely admitted to the NHI and usually referred to other hospitals.

Table 1 shows the demographic data of 886 patients: 656 (74%) males and 230 (26%) females. 482 (54.4%) were admitted with a working diagnosis of acute STEMI, and 404 (45.6%) were admitted with a working diagnosis of other ACS (NSTEMI and UA). Of the 482 STEMI patients, 373 (42%) were males and 109 (12%) were females. Of the other ACS patients, 283 (31%) were males and 121 (13.6%) were females, the mean age of the entire group was 54.7 (range 29-97), the mean age was similar in STEMI 54.7 and other ACS 54.6, it is worth mentioning that an older smaller registry from the NHI showed quite similar demographic figures (2).

Of the entire study population, there were 484 (54.6%) current smokers; diabetes mellitus was present in 375 patients (42.3%); hypertension in 348 patients (39.3%); dyslipidemia was reported by 31% of patients on admission but routine, in-hospital lipid sampling showed that in reality 540 patients (60.9%) were dyslipidemic; 267 patients (30.1%) were obese (BMI above or equal to 30).

**Table 1 Demographics/ patient characteristics**

| | All (886) | Males | Females | Age | STEMI | Other ACS |
|---|---|---|---|---|---|---|
| Number | 866 | 656 (74%) | 230 (26%) | mean54.7(range24-92years) | | |
| STEMI<br>Other ACS | 482 (54.4%)<br>404 (45.6%) | 373 (42%)<br>283 (31%) | 109 (12%)<br>121 (13.6%) | 54.7<br>54.6 | | |
| DM | 375 (42.3%) | | | | 378/482 (57.6%) | 97/404 (24%) |
| Smoking | 484 (54.6%) | | | | 372/482 (77%) | 112/404 (27%) |
| HPN | 348 (39.3%) | | | | 242/482 (50.2%) | 106/404 (26.2%) |
| Dyslipidemia | 375/540 (31%/60.4%)* | | | | 386/482 (80%) | 154/404 (38.1%) |
| Obesity | 267 (30.1%) | | | | 193/482 (40%) | 74/404 (18.3%) |
| Family History | 230 (26%) | | | | | |

*31% of patients reported high cholesterol on admission history, upon testing high LDL was found in 60.4% of patients

From the Whole Patients, 230 patients (26%) gave a family history of coronary artery disease, again this was showing very close figures to other recent smaller single center registries from other Egyptian centers ( 3,4).

**History and clinical presentation**

From886 patients, 726 (81.9%) presented with typical chest pain; 62 patients (7%) with atypical chest pain; 25 patients (2.8%) with dyspnea, fatigue or syncope. ECG rhythm on presentation 824 (93%) of 886 presented in normal sinus rhythm (NSR), while 46 (5.2%) presented in AF and 3 patients (0.3%) presented in complete heart block. Troponin testing was under-utilized; it was only tested in 229 out of 886 patients (27%) within 24 hours of admission due to logistical causes showing a defect in our system that must be remedied. Table 2.

**Table 2. History at presentation**

| | All patients (886) |
|---|---|
| Prior angina | 311 (35.1%) |
| Prior History of PCI | 142 (16% |
| prior CABG | 37 (4.2%) |
| Prior MI | 161 (18.3) |
| Prior CVA | 46 (5.2%) |
| PAD | 45 (5.1%) |
| CKD | 40 (4.5%) |

**STEMI versus other ACS**

Of 886 patients 484 (54.6%) were smokers; 372 out of 482 (77.1%) smokers with STEMI versus 112 out of 404 (21.7%) smokers in other ACS; there were more active smokers in the STEMI group and the difference was statistically significant p0.005. There were 375 out of 886 diabetic patients (42.3%), 278 out of 482 (57.6%) in STEMI patients, and 97 out of 404 (24%) in other ACS p0.004 again showing statistically significant higher incidence of diabetes in the STEMI group. There were 348 out 886 (39.3%) hypertensive patients, 242 out of 482 (50.2%) hypertensive patients with STEMI and 106 out of 404 (26.2%) hypertensive patients with other ACS. In spite of nearly double the incidence of hypertension between STEMI and other ACS using a cut-off point of 140/90mm Hg the difference between the two groups did not reach statistical significance.

Dyslipidemia was present in 540 of 886 patients (60.9%) diagnoses after blood testing, 386 out of 482 STEMI patients (80%) and 154 out of 404 other ACS patients (38.1%). The difference was statistically significant $p<0.05$.

Obesity BMI of more than 30% was present in 267 out of 886 patients (30.1%); it was present in 193 out of 482 STEMI patients (40%) and 74 of 404 other ACS patients (18.3%) showing a statistically significant difference $p<0.05$.

**Past history**

311 out of 886 patients (35.1%) gave a previous history of angina pectoris; 142 (16%) gave a previous history of percutaneous coronary interventions (PCI); 37 patients (4.2%) gave a history of prior coronary artery bypass grafting (CABG); 46 patients (5.2%) gave a previous history of cerebro-vascular accidents (CVA); 45 patients (5.1%) gave a history of peripheral arterial disease (PAD); 40 patients (4.5%) gave a history of chronic kidney disease (CKD). (Table 2).

**In hospital management**

Thrombolytic therapy was used in 264 out of 482 STEMI patients (54.7%); Streptokinase in 260 patients t-PA was used in 4 patients; 1 out of 404 NSTEMI received Streptokinase, Table 3.

Of the 264 patients who received thrombolytic therapy, 238 received it on admission in the ER (as our Egyptian system does not allow pre-hospital thrombolysis); 26 patients received it in the CCU (the rest is missing data).

Coronary angiography and PPCI was used in 180 of 482 STEMI patients (37%) and 46 out of 404 other ACS patients (11%). There were also 39 rescue PCI (14.7%) of the 264 patients who initially received thrombolytic therapy.

It is worth mentioning that the lower numbers of NSTEMI and unstable angina patients receiving PCI during the index hospitalization as the hospital protocol only allows free PCI to STEMI patients and to only the sickest of the other ACS patients while all those who stabilize receive deferred diagnostic angiography and possible PCI after discharge and later readmission, due to the government's financial constraints.

**Table 3 Treatment and Mortality**

| | All (886) | STEMI (482) | Other ACS (404) | Rescue revascularization |
|---|---|---|---|---|
| Thrombolysis | 269/886 * | 268 | 1 | |
| PCI | 265/886 (29.9%) | 180 PPCI (37%) | 46 (11%) | 39 rescue |
| No revascularization | N/A | 38 (7.8%) ** | 88%*** | |
| Death | 19/886 (2.1%) | 14/482 (3.1%) | 5/404 (1.2%) | |

* Mostly in 483 STEMI cases. ** 22 inconclusive ECG and 16 late presenters

*** No revascularization during index hospitalization

Thirty eight STEMI patients did not receive neither thrombolytic nor PCI (7.8%) due to either late presentation and stable condition in 16 patients and inconclusive ECGs in 22 patients.

**Discharge medications**

Out of 886 patients, 792 patients (89.3%) were discharged on aspirin and 794 patients (89.6%) were discharged on Clopidogrel, B blockers were prescribed to 785 (88%), ACEI/ARB to 813 patients (91%), nitrates to 527 (59%) of patients, statins to 856 out of 886 patients (96%).

It's worth mentioning that 2b3a inhibitors were only used in 53 patients (6%).

**Hospital outcome**

867 out 886 patients survived to hospital discharge (97.9%) and 19 patients died in hospital (2.1%). In hospital bleeding was reported in 6 out 886 patients (0.7%). In hospital stroke in 4/886 patients (0.5%), resuscitated in hospital cardiac arrest 22/886 (2.5%).

***Mechanical complications***

Ischemic Mitral valve regurgitation was reported in 14/886 patients (1.6%) and ventricular septal rupture in 1 patient (0.1%).

LV function was reported at discharge to be normal EF ≥ 50% in 422/886 (47.6%) and reduced less than 50% in 464/886 (52.4%). However severe LV dysfunction EF ≤30% was only reported in 40/886 patients (4.5%).

**Mortality analysis**

A total mortality was 19 from 886 (2.1%), 12 STEMI PCI patients (1.5%) and 2 STEMI thrombolytic patients (0.5%) and 5 other ACS patients (0.2%), Table 4.

It's worth mentioning that of the entire PCI cohort of 265 patients, the mortality was 12 patients (4.5%) which included PPCI (180), rescue PC (39) and PCI for severe NSTEMI (46).

Of the 19 cases of mortality, there were 12/482 with admission diagnosis of STEMI (2.4%) and 7/402 other ACS with admission diagnosis (1.7%). There was no statistically significant difference in mortality comparing admission diagnosis. In 656 males, there were 11 deaths (1.6%) while in 230 females, there were 8 deaths (3.4%) and there was no statistically significant difference in spite of more than double the numerical percentage of deaths, which may be attributed to the significantly fewer females in the study.

**Table 4: Mortality**

| | Males | Females | STEMI | Other | PCI | Thrombolysis |
|---|---|---|---|---|---|---|
| Death | 11/656 (1.6%) | 8/230 (3.4%) | 12/482 (2.4%) | 7/404 (1.7%) | 12/265 (4.5%) | 2 (0.75%) |

Of 484 smokers, there were 11 deaths, and of 402 smokers 8 deaths. There was no statistically significant difference. Of 375 diabetics there were 13 deaths while in 511 non-diabetic subjects there were 6 deaths $p<0.05$ with a significantly higher incidence of death in diabetics.

Obesity, previous history of angina, previous history of MI, previous history of PCI or CABG was statistically analyzed and not associated with and increased risk of death.

**Discussion**

In Egypt there is a real shortage of ACS registry data. We hope that sooner rather than later there will be a national registry of all comers for ACS. Until that day we rely on local hospital registries. It is worth mentioning also that there is a huge disparity between the level of care for ACS patients in large Cairo hospitals and small rural hospitals and clinics. By no way is this registry representative of the national standards which remain largely unknown, and most probably severely below the required standards.

The NHI does not have comprehensive EHR and it is a work in progress. Before this registry we also had some smaller Egyptian registries(2,3,4), or data about Egypt from multi-country registries (5).

This registry lasted over one year for all comers with ACS who were admitted as inpatients. It had dedicated personnel, dedicated software and hardware provided by a CRO (Health Insights Egypt).

Data suitable for analysis was obtained in 886 patients. All were admitted as inpatients. 74% were males, reflecting a higher incidents of ACS in males in Egypt and also possibly other factors, as fewer numbers of female getting hospitalized is worth studying. This is similar to incidences in older smaller registries in Egypt at NHI and other centers (2,3,4).

The mean age was 54.7 (range 24-92) which closely matches the younger age reported in older Egyptian registries (2,3,4) and in the UAE ACS registry ( 6 ) and about 10 years younger than other registries like the Taiwan ACS registry (7).

54% of the patients were admitted with STEMI, reflecting the admission patterns in NHI which due to shortages of beds give admissions priority to the sickest patients, this also was quite similar to the STEMI incidences reported in other larger recent registries (UAE, Taiwan and Portugalregistries. (6,7,8).

We had a disturbingly high incident of current smokers (54.6%), especially in the STEMI group (77%), reflecting the currently miserable status of

smoking in Egypt where little if any effort is done by the authorities to combat tobacco consumption. Showing no fall in smoking trends from older Egyptian data (2, 3, 4).

We had a high percentage of DM (42.3%) and of HPN (39.3%) reflecting the high risk patient population with ACS typically admitted as inpatients to the NHI, this showed a higher incidence of diabetes and a lower incidence of hypertension than that reported in the 12,000 patients of the ACCESS registry (5).

Only half of the dyslipidemic patients knew they were so on admission; 30% of the patients were obese.

The STEMI group had significantly higher incidents of diabetes and of current smokers than the other (NSTEMI) ACS. Both UA and NSTEMI were pooled for analysis purposes as other (Non STEMI) patients. Two points are worth mentioning, the first is an alarming incidence of low usage of Troponin testing which should be used for risk stratification; it is worth mentioning though that ACS patients without STEMI admitted to NHI are the sickest of patients with severe chest pain, with dynamic ECG ST changes and hemodynamic abnormalities. They are the sickest unstable angina patients and in all likelihood most of them would be Troponin +ve had it been used in all.

PPCI was used in 37% of STEMI patients while thrombolytic, namely streptokinase were used in 55.6%, so in spite of 24/7 Cath labs and full involvement in stent for life program, less than 40% of STEMI patients coming to NHI undergo PPCI, IV thrombolysis remains the strategy used in the majority of STEMI patients; this needs to be addressed, It is worth mentioning that only 7.8% of STEMI patients received no form of reperfusion therapy Compared to 39% in the ACCESS registry of 12,068 patients in 134 sites in 19 developing countries including Egypt (4), reflecting the higher level of care by NHI than the standard of this region, it is also worth noting an improvement of PPCI rate for STEMI which was 37% in our current study compared to 12.4% reported in the same hospital in 2007 (2).

Only 11% of non STEMI ACI patients admitted to NHI underwent emergency PCI during the index hospitalization. This is due to the reimbursement policies which only allow the sickest ACS patients who don't have STEMI to undergo immediate PCI. Most of them will undergo very near future PCI after discharge and readmission due to the system of both the MOH and the National Insurance Authority. Patients who are discharged without PCI but admitted for later PCI were only included in this study during the first admission; hence the low percentage of PCI in non-STEMI ACS patients.

Finally, it is worth noting the low mortality in the total study group (2.1%). However, the majority of deaths occurred in the STEMI group 3.12% (14 of 19 dead patients). The mortality of the other ACS patients was lower and was 1.2% (5 of 19 dead patients).

It is worth mentioning the PCI mortality was 4.5% compared to only 0.7% for STEMI patients who received thrombolytic therapy. This should be analyzed for reasons; does it reflect the fact that this is a teaching hospital with a learning curve for PCI with true morality of 4.5%, or does it reflect the fact that the sickest of patients are chosen for PCI compared to thrombolysis remains to be found out.

Similar PCI mortality figures were recently reported in a large registry from the region (9).

The mortality figures are similar to those reported in more advanced setting as the Taiwan ACS registry which comprised 39 centres in Taiwan, and as pointed out by Widimsky (1) reflects the figures of this possibly better Egyptian hospital and bigger registries involving all the hospitals in the region should be done to get realistic national or regional mortality data.

**Conclusion**:

This was as far as we could master the most recent and comprehensive study of all comers with ACS for over 1 year to the NHI reporting real life Egyptian data. The challenges in obtaining the data in spite of a generous budget and full time dedicated staff were overwhelming due to the absence of systematic routine data collection.

We are in extreme need of routine, accurate and complete data collection for all patients to know where we stand and to improve our patient care and correct any shortcomings, e.g. underutilization of Troponin.

Obtaining data routinely will also be cost effective in the long run, providing patient care without continuous high quality data recording is poor practice that should end, we also realize the shortcomings of single center registries which do not reflect the national real data.

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