

## **Impact of Revascularization on Outcomes in Patients with Non-ST-Elevation Acute Coronary Syndrome and Congestive Heart Failure. The Global Registry of Acute Coronary Events (GRACE)**

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**Background:** Congestive heart failure (CHF) is a common and severe complication of Non-ST-Elevation (NSTEMI) acute coronary syndromes (ACS). It is associated with a major increase in short and long term mortality. Yet, patients with ACS and CHF are less likely to undergo coronary angiography or revascularization than ACS patients without CHF.

**Aim:** The aim of this study is to analyze the impact of early revascularization on outcomes.

**Methods and Results:** Of the 29 844 patients with NSTEMI-ACS enrolled in the Global Registry of Acute Coronary Events between April 1999 and June 2007, 4953 had CHF at presentation. One-fifth of the patients with CHF underwent in-hospital revascularization vs 35% in those without ( $P<0.001$ ). Revascularized patients with CHF were younger (72 vs 76 years) and more likely to be male (65% vs 55%) than nonrevascularized CHF patients. They also had lower heart rate (81 vs 88 beats/min), higher ejection fraction (49% vs 40%), and less frequent history of stroke (11% vs 16%) or CHF (24% vs 42%) (all  $P<0.001$ ). Patients who underwent revascularization were more likely to receive evidence-based cardiac medications during hospitalization (aspirin, beta-blockers, angiotensin-converting enzyme inhibitors, thienopyridines, statins, and glycoprotein IIb/IIIa inhibitors) compared to patients who did not undergo revascularization. Patients with CHF had higher mortality rates in hospital (8.9% vs 0.9%) and from discharge to 6 months (9.6% vs 2.9%). After adjustment in a Cox model, patients who were revascularized had a lower risk of post-discharge to 6-month mortality (hazard ratio 0.64; 95% confidence interval 0.45–0.93).

**Conclusions:** Data from this large, multinational, contemporary observational study suggest that in patients with NSTEMI-ACS complicated by CHF, use of revascularization during the index hospitalization is associated with a significantly improved survival 6 months after discharge. These observations support current guidelines, which recommend early revascularization in high-risk NSTEMI-ACS patients and suggest substantial underuse of revascularization in this high-risk population.

## The Obesity Paradox in Acute Coronary Syndrome Patients in Israel

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**Background:** While obesity is a coronary disease risk factor, its effect on acute coronary syndrome outcome (ACS) is inconsistent.

**Methods:** To explore the impact of body mass index (BMI) on short (30-day) and long (1-year) term clinical outcome, we retrospectively analyzed data of 5,751 patients [4,400 (77%) males, 2,754 (48%) with and 2,994 (52%) without ST-segment elevation ACS] from the Acute Coronary Syndrome Israel Survey (AC SIS), comprising data from ACS patients hospitalized in 2002, 2004 and 2006 during 2 months period in all coronary care units in Israel.

**Results:** Patients were divided into National Institutes of Health BMI-based 4 categories (Table). Mean BMI increased significantly during 2002, 2004 and 2006 ( $27.0 \pm 4.0$ ,  $27.2 \pm 4.3$  and  $27.7 \pm 4.5$  kg/m<sup>2</sup>,  $p < 0.0001$ ; respectively). Time from chest pain onset to hospitalization and invasive procedure, Killip class on admission, left ventricular ejection fraction, creatinine clearance and in-hospital therapy were the same in all 4 groups.

	<b>Underweight BMI&lt;18.5 (n=43)</b>	<b>Normal 18.5-24.9 (n=1709)</b>	<b>Overweight 25.0-29.9 (n=2700)</b>	<b>Obese BMI≥30 (n=1299)</b>
Age (yrs)	69.9±17.7	65.3±13.7	63.3±12.6*	61.4±12.4*
30-d mortality	9.3%	5.6%	3.3%	4.7%
OR <sup>†</sup> (95% C.I.)	0.91 (0.24-2.69)	1.0	0.50 (0.38-0.67)	0.88 (0.62-1.22)
1-year mortality	20.7%	12.3%	8.2%	9.4%
OR <sup>†</sup> (95% C.I.)	1.0 (0.34-2.96)	1.0	0.63 (0.49-0.80)	0.78 (0.57-1.06)

Values are expressed as mean±SD; \* $p$  for trend<0.0001; <sup>†</sup>OR=odds ratio adjusted for age, sex, hypertension, past angina, past myocardial infarction, smoking, hyperlipidemia, renal failure, stroke, peripheral vascular disease, > Killip 2, previous procedures (coronary artery bypass grafting operation, percutaneous coronary intervention), ST-segment elevation; BMI= kg/m<sup>2</sup>.

**Conclusion:** Overweight and obese BMI-based categories were associated with younger age and better survival than normal and underweight ACS patients. Our observation of a U-shaped relationship between increasing BMI and mortality in ACS patients warrants careful prospective evaluation.

## Bypassing the Emergency Room to Reduce Door-to-Balloon Time in Primary PCI Improves Clinical Outcome – Experience from the Acute Coronary Syndrome Israeli Survey (AC SIS)

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**Background** – Primary PCI (PPCI) is the reperfusion strategy of choice for patients (pts) with ST Elevation Myocardial Infarction (STEMI). *Door-to-balloon time* is a strong predictor of myocardial salvage and clinical outcome. Only 35% of STEMI pts meet the recommended goal of the 2004 ACC/AHA Guidelines of  $\leq 90$  minutes. The objective of this work is to assess the strategy of direct referral of STEMI pts to the CCU for PPCI as observed from the national ACSIS 2004 and 2006.

**Methods and Results** – Data were collected from the ACSIS 2004&2006. We examined the effect of admission pattern [*Emergency room(ER), Direct to CCU (CCU)*]; on the time line and clinical outcome in the STEMI pts who underwent PPCI. Out of 4171 pts with ACS, a total of 1924 (46%) presented with STEMI, of them 793 (41%) underwent PPCI [583 pts (73.5%) arrived to ER, 193 pts (24.3%) arrived directly to CCU, (for 17 pts (2.1%) full data were missing)].

		ER	CCU	Pvalue
<b>Door-to-balloon time</b> (median, min)		79	45	0.018
<b>Adherence to Guidelines</b> ( $\leq 90$ min)		59.2 %	88.8 %	<0.0001
<b>Mortality (%)</b>	<b>30 days</b>	5.3	6.2	NS
	<b>1 year</b>	7.3	6.1	NS
<b>30-d MACE (%)</b>		30	22.3	<0.038

### **Conclusions** –

In the ACSIS; direct referral to the CCU for Primary PCI, by bypassing the ER, significantly reduces the Door-to-Balloon time, increases the rate of adherence to guidelines, and improves the clinical outcome. A national system for bypassing the ER in STEMI patients should be encouraged.

## **Optimal Timing of Percutaneous Coronary Intervention after Successful Thrombolysis – Analysis of Data from ACSIS 2002-2006**

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**Introduction:** Clinical guidelines recommend routine angiography and percutaneous coronary intervention (PCI) after successful thrombolysis. However, the optimal timing of PCI has not been determined yet.

**Methods:** We analyzed data of the Acute Coronary Syndrome Israeli Survey (AC SIS) from 2002 to 2006. We excluded patients with failed thrombolysis. Patients with successful thrombolysis were divided to 3 groups: Group A - patients (age 61.6±13.6) who did not undergo PCI (n=150), of whom 30.7% did undergo angiography; Group B (age 57.8±12.4) – underwent PCI within 48 hours from admission (n=34); Group C (age 58.3±10.6) – underwent PCI >48 hours after admission. Major adverse cardiac events (MACE) were defined as death and re-infarction at 7 & 30 days.

**Results:** Patient in group A were significantly older (p=0.01). Most patients (86.5%) underwent PCI >48 hours after admission. MACE at 30 days occurred in 17.4% in group C, lower than groups B (35.3%) and A (26.7%) (p=0.019). Mortality at 7 days was higher in group A versus groups B & C, respectively (4.7%, 2.9%, 0.9%, p=0.006). Post infarction angina occurred more in group B than A & C, respectively (11.8%, 2%, 7.3%, p=0.027). Killip II on admission was highest in group A vs. groups B & C, respectively (12.7%, 8.8%, 6.0%, p=0.001).

**Conclusions:** Patients who did not undergo PCI after successful thrombolysis had worse outcome at 7 & 30 days. Patients who underwent PCI >48 hours after admission had the best outcome. Heart failure and post infarction angina were significantly more frequent in those who underwent early PCI.

## Comparison of Recurrent to First Acute Myocardial Infarction Patients in Israel in 1998-2006

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Recurrent acute myocardial infarction (AMI) patients, who represent 14 to 30% of patients hospitalized for AMI, are at increased risk for complications and death following their acute coronary event

Objective: We compared the outcome of recurrent to first acute ST-elevation myocardial infarction (AMI) patients hospitalized in coronary care units in 1998-2006.

Methods: We performed biennial prospective nationwide AMI/ACS surveys, collecting data prospectively during January-February 1998, February-March 2000, February-March 2002, February-March 2004 and March-April 2006 from all patients hospitalized in all 25 operating CCUs in Israel

Results: Our cohort comprises of 4,511 STEMI patients, 3,651 First and 860 Recurrent MI. In-hospital complications occurred significantly less frequently in first AMI patients.

	1998	2000	2002	2004	2006	P trend
<b>First MI</b>	<b>N=662</b>	<b>N=758</b>	<b>N=759</b>	<b>N=759</b>	<b>N=713</b>	
Age (yrs)	63	62	62	62	61	0.04
Primary PCI	8	10	28	44	48	0.0001
Thrombolysis	54	50	35	22	15	0.0001
7-day mortality	5.1	7.7	4.4	4.3	3.2	0.005
30-day mortality	8.8	10.8	6.3	6.7	4.8	0.0001
<b>Recurrent MI</b>	<b>N=148</b>	<b>N=190</b>	<b>N=188</b>	<b>N=173</b>	<b>N=161</b>	
Age	66	66	65	65	64	0.58
Primary PCI	5	17	18	40	42	0.0001
Thrombolysis	49	44	30	19	14	0.0001
7-day mortality	8.8	7.4	8.0	5.8	7.5	0.53
30-day mortality	11.5	13.7	10.6	9.2	9.3	0.23

Conclusions: In spite of high rate of primary PCI in both first and recurrent STEMI patients, while mortality and hospital complication rates significantly declined in First MI patients, they remain high in Recurrent MI patients. Improved therapeutic approach is needed in these high risk cohort of patients.

## Trends in Management and Outcome of Elderly Patients with STEMI in Israel: Data from ACSIS 2000-2006

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**Background:** The management and outcome of AMI pts have recently undergone major changes, reflecting the implementation of new treatment guidelines.

**Aim:** To evaluate trends in management and their impact on early mortality of elderly ( $\geq 75$  yrs) pts with STEMI admitted to all 26 operating CCUs in Israel in 2000-2006.

**Methods:** The data were derived from biennial 2-monthly prospective nationwide ACS surveys (AC SIS 2000-2006).

**Results:** The age ( $81 \pm 5$  y), prevalence of women (41-49%), risk factors, and Killip-class  $\geq$  II on admission (33-38%), were comparable throughout the study period.

	<b>2000</b>	<b>2002</b>	<b>2004</b>	<b>2006</b>
	<b>(N=224)</b>	<b>(N=208)</b>	<b>(N=208)</b>	<b>(N=162)</b>
<b>Rx in-hospital♥:</b>	%	%	%	%
Aspirin	93	95	98	99
Clopidogrel	9	37	53	73
b-blockers	59	65	77	70
ACE-I/ARB	63	67	74	77
Statins	17	40	61	88
*SCORE(4)	8	21	43	53
Primary reperfusion	38	45	46	54
TLx/primary PCI	80/20	56/44	38/62	18/78
Angio	34	48	64	91
PCI in hospital	21	38	50	60
Stent	10	27	43	56
<b>30-day mortality</b>	26.8	18.3	17.3	16.0
Covariate adjusted OR (95% CI) <sup>†</sup>	1.0	0.45 (0.26-0.75)	0.42 (0.25-0.70)	0.37 (0.20-0.67)

♥ *p* for trend  $< 0.001$  for all comparisons.

\*SCORE(4)- management with 4 evidence-based medications (aspirin, b-blockers, ACE-I/ARB, statins).

<sup>†</sup> Adjusted for: age, sex, Killip (admission)  $\geq$  II, Anterior MI, heart-rate  $> 100$  bpm, SBP  $< 100$  mmHg, history of diabetes, hypertension, angina, renal failure, year performed.

**Conclusion:** In recent years the extent of both medical and interventional management of elderly STEMI pts changed substantially. The high degree of implementation and adherence to recommended guidelines was associated with a significant decline in early mortality.