Lessons from GRACE: the Global Registry of Acute Coronary Events

The forerunners of disease registries were the public health surveillance systems, which emerged in Western Europe after the 17th century. In the mid 19th century, epidemiological data on the influenza and cholera epidemics were being collected. The data on the cholera epidemic served as the basis for the hypothesis that cholera was an infectious agent that was transmitted by contaminated water.[1,2]

Coronary heart disease is the most frequent cause of death in the Western world. One of the first cardiovascular disease registries is the MONICA study, which was launched in the late 1970s. Since then, data on over 166,000 coronary events have been collected in men and women aged between 35 and 64 years.[3-5] Towards the end of the 20th century several other registries had been set up, including ACC-NCDR, NRMI, OASIS, PRAIS, and ENACT.[6-11] Data from these studies continue to emerge.

GRACE – collecting data across the spectrum of ACS

GRACE is the first cardiovascular disease registry to collect data on the spectrum of ACS, namely, STEMI, NSTEMI and UA. GRACE, which was launched in 1999, was designed as a multinational, observational, prospective, sequential, longitudinal study of the management and outcomes of ACS patients. A total of 94 hospitals in 14 countries across four continents are participating in the study. The objective is to collect data from patients that are representative of those seen in everyday clinical practice in contrast to the narrowly defined population of patients included in randomized clinical trials. The goals of GRACE are to:

- describe the diagnostic and treatment strategies for ACS patients seen in everyday practice
- describe in-hospital and long-term outcomes
- improve the quality of care for ACS patients
- develop hypotheses for future clinical research

Each of the 94 study sites enrols 10 consecutive patients aged at least 18 years and who meet the eligibility criteria for GRACE (Table 1), thus ensuring the representativeness of the population and minimizing selection bias. The annual mean number of admissions for ACS is 489, the mean number of hospital beds is 414, and 95% have a CCU, 86% an emergency department and two-thirds a cardiac catheterization department. To date, nearly 16,000 patients have been enrolled, 77% of whom have had long-term follow-up data collected.

Findings from GRACE – NSTEMI/UA

The 2000 guidelines from the ACC/AHA for the management of

Table 1. Criteria for inclusion or exclusion from GRACE

Inclusion criteria	Exclusion criteria
Age 18 years or older	UA or intermediate coronary syndromes who are hospitalized for <1 day and no ECG signs or new documentation of CAD
Alive at hospital presentation	Qualifying ACS precipitated or accompanied by significant comorbidity, trauma or surgery
ACS as a presumptive diagnosis	
One of the following: • electrocardiographic changes consistent with ACS • serial increases in serum biochemical markers of cardiac necrosis, and/or • documentation of CAD	

K. Eagle
University of Michigan
School of Medicine,
Ann Arbor, Michigan, USA
Eur Heart J 2002; 4 (Suppl E): E24–E31.

patients with UA/NSTEMI[12] advocate the following initial management strategy:

- anti-ischemic therapy (e.g., nitrates, beta-adrenergic blockers and oxygen)
- antiplatelet therapy (e.g., aspirin and a GP IIb/IIIa receptor antagonist)
- anticoagulation (e.g., LMWH, UFH)
- invasive reperfusion strategy (e.g., PCI, either immediate or within 24 hours)

In patients with NSTEMI/UA, 87% did not receive a GP IIb/IIIa receptor antagonist. Additionally, only 12% received a GP antagonist before, during or after PCI. The guidelines state that these agents are effective in reducing event rates in the acute phase of treatment and this effect is enhanced in the setting of a PCI.[12] The GRACE data indicate that the majority of NSTEMI/UA patients undergo an early conservative strategy, with just over one-fifth undergoing PCI. By contrast, antithrombotic agents were used frequently in NSTEMI/UA, with only 16% failing to receive either UFH or LMWH.

Findings from GRACE – STEMI

Patients who present with STEMI should receive oxygen, nitroglycerin and analgesia, along with aspirin and a beta-adrenergic blocking agent. In addition, they should be considered for thrombolytic therapy alone, primary PCI (with or without a stent), thrombolysis plus PCI, and emergency CABG.

Almost 30% of patients did not receive any form of reperfusion therapy. This may be because of contraindications to thrombolysis, no access to a catheterization laboratory, and difficulty with the diagnosis. Nevertheless, this finding indicates considerable room for improvement in the treatment of these patients. In this study, 31% of patients received thrombolytic therapy compared with 25% who underwent PCI. Fifteen percent received both a thrombolytic and underwent a PCI.

The majority of patients who had a PCI had a stent inserted (88%). Of those who underwent a primary PCI, 59% also received a GP IIb/IIIa antagonist, which dropped to 41% in patients who had a facilitated PCI. Antithrombotic therapy was given to 84% of patients undergoing a primary PCI, of whom 38% received UFH and only 15% LMWH. This finding is in spite of the advantages of enoxaparin over UFH.[13] Just over 30% of patients who had a PCI received both LMWH and UFH.

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