

1
2 **ACC Key Elements and Data Definitions for Measuring the**
3 **Clinical Management and Outcomes of Patients with**
4 **Acute Coronary Syndromes**

5
6 **A Report of the American College of Cardiology Task Force on Clinical Data**
7 **Standards (Acute Coronary Syndromes Writing Committee)**

8
9 [Link to response form](#)

10
11 **ACC Writing Committee for**
12 **Acute Coronary Syndromes Clinical Data Standards**

13 Christopher P. Cannon, MD, FACC, Chair

14
Alexander Battler, MD, FACC
Ralph G. Brindis, MD, MPH, FACC
Jafna L. Cox, MD, FACC
Stephen G. Ellis, MD, FACC
Nathan R. Every, MD, FACC
John T. Flaherty, MD, FACC

Robert A. Harrington, MD, FACC
Harlan M. Krumholz, MD, FACC
Maarten L. Simoons, MD, FACC
Frans J. J. Van de Werf, MD, FACC
William S. Weintraub, MD, FACC

12
13 **ACC Staff:** Kristi R. Mitchell, MPH

14
15
16
17 **ACC Task Force on Clinical Data Standards**

18 Ralph G. Brindis, MD, MPH, FACC, Chair

19
H. Vernon Anderson, MD, FACC
David S. Cannom, MD, FACC, *ex officio*
W. Randolph Chitwood, Jr., MD, FACC, *ex officio*
Ruth L. Collins-Nakai, MD, FACC
Stephen G. Ellis, MD, FACC
Raymond J. Gibbons, MD, FACC, *ex officio*
Bijoy K. Khandheria, MBBS, FACC
Suzanne B. Knoebel, MD, MACC
Harlan L. Krumholz, MD, FACC
Daniel B. Mark, MD, FACC

Charles R. McKay, MD, FACC
Eugene R. Passamani, MD, FACC
Martha J. Radford, MD, FACC, *ex officio*
Ronald N. Riner, MD, FACC
Janice B. Schwartz, MD, FACC, *ex officio*
Richard J. Shemin, MD, FACC, *ex officio*
Douglas B. Van Fossen, MD, FACC
Edward D. Verrier, MD, FACC
Matthew W. Watkins, MD, FACC

17
18 **ACC Staff:** Dawn R. Phoubandith, MSW
19 Tori Furnelli, MA

20
21
22

This document is protected under the terms and conditions of using the ACC Web site (see Legal Information About Our Site).

TABLE OF CONTENTS

1		
2		
3	I. Introduction	3
4	A. Organization of Writing Committee and Methods for Developing the ACS Clinical Data	
5	Standards.....	3
6	B. Purpose of the ACS Clinical Data Standards	6
7	C. General Considerations of the ACS Clinical Data Standards	8
8	1. Data Elements	8
9	2. Medication Use	9
10	3. Risk Adjustment and Outcomes.....	9
11	II. Definitions	11
12	II. ACS Clinical Data Standards Reference Guide	34
13	A. National ACS Registries Column	35
14	B. Reference Column.....	37
15	C. Use.....	39
16	D. Reference Guide.....	40
17	References.....	124

I. Introduction

In the field of cardiology, large-scale clinical trials and registries have provided a wealth of data in hundreds of thousands of patients. This is especially true in the field of acute coronary syndromes (ACS), which ranges from ST-segment elevation myocardial infarction (STEMI) to non-ST elevation MI (NSTEMI) to unstable angina (UA). These data have been used to define new therapies and to guide clinical care, by evaluating both the process and quality of care as well as outcomes for patients with ACSs.

The American College of Cardiology (ACC) recognizes the importance of using clinical data and, to that end, established a dataset and launched the National Cardiovascular Data Registry (NCDR™), a national, voluntary registry of cardiac catheterization and percutaneous coronary intervention (PCI) procedures. Several national and international registries have adopted many of the elements and definitions contained in the ACC-NCDR™ Cath Lab Module Version 1.1 (1), thus allowing the potential for more reliable comparisons across registries. Given the College's recognition of the importance of standardizing a common lexicon for describing the clinical management and outcomes of patients with variety of conditions, the ACC has expanded its role into developing clinical data standards.

A. Organization of Writing Committee and Methods for Developing the ACS

Clinical Data Standards

The process undertaken in developing these clinical data standards began with the ACC Task Force on Clinical Data Standards which identified acute coronary syndromes as an important area for standardizing definitions and registries. A writing committee was formed that included a select group of 10 physicians who have been involved in large-scale ACS clinical trials and other registries and were recognized experts in the field. Additionally, the writing committee included members who had expertise in developing performance measures for

1 patients with acute myocardial infarction (AMI). Finally, this group included several
2 international members so as to ensure balance in the selection of data elements and the type of
3 practice worldwide that would be reflected by the data elements and definitions recommended in
4 these standards. Toward that end, an informal cross-collaboration with the European Society of
5 Cardiology (ESC) was established.

6 The subcommittee met several times over a period of 2 years to refine the data standards
7 to its present form. The overriding goals were to focus on important variables needed to assess
8 the characteristics of patients, their treatment with both medication and interventional therapies,
9 as well as their outcomes. In developing the list, the writing committee balanced completeness
10 with length, and thus tried to be as concise as possible, so as to facilitate use of these variables by
11 others in an actual registry or trial setting. For each variable, standardized definitions for the
12 variables are provided. For these, the writing committee again balanced greater specificity of
13 definitions with what information can readily and reliably be obtained from medical records in
14 order to make these definitions usable in the various real world settings that they may be utilized.
15 This list was balanced to be as concise as possible, so as to facilitate performance in an actual
16 registry.

17 Writing committee members compiled and reviewed case report forms, data elements,
18 and definitions from national and/or international ACS registries and previous or ongoing
19 clinical trials to develop an initial set of data elements. Examples of these data sources include
20 the ACC-NCDR™ (2), the National Registry of Myocardial Infarction (NRMI) (3), Global
21 Registry of Acute Coronary Events (GRACE) (4), as well as the Thrombolysis in Myocardial
22 Infarction (TIMI) (5-7) and Global Use of Streptokinase and Tissue Plasminogen Activator to
23 Open Occluded Arteries (GUSTO) trials (8-10).

24 The data elements reflected an ongoing review of the medical literature to focus on new
25 developments. Relying on current scientific evidence provided the basis for selecting and

1 defining appropriate data elements required to evaluate and manage patients with ACS. As such,
2 data elements and definitions were linked whenever possible to the evidence-based national
3 guidelines. For the purposes of these clinical data standards, the writing committee chose to
4 review and reference several ACC/ AHA guidelines, including but not limited to the ACC/AHA
5 Guidelines for the Management of Patients with Acute Myocardial Infarction (11) and the
6 ACC/AHA Guidelines for the Management of Patients with Unstable Angina/Non-ST-Segment
7 Elevation Myocardial Infarction (12). In addition, the writing committee adopted the definition
8 of myocardial infarction (MI) as recently published in ESC-ACC Consensus Conference –
9 Myocardial Infarction Redefined (13). On a few occasions, data elements and definitions were
10 linked to other national guidelines such as The National Cholesterol Education Program (NCEP
11 III) Guidelines (14).

12 Finally, the committee members reviewed the list of data elements with the intent of their
13 use in mind. For example, some data elements can be used for risk adjustment, others can be
14 used to construct performance measures, and several elements can be used for multiple purposes.
15 Additional uses include patient demographics, health services research, follow up, and outcomes
16 analysis.

17 The ACC Key Elements and Data Definitions for Measuring the Clinical Management
18 and Outcomes of Patients with Acute Coronary Syndromes was reviewed by four official
19 reviewers nominated by the ACC, the ACC/AHA Task Force on Performance Measures, the
20 NCDR Planning and Management Task Force, and 3 outside content reviewers. To increase its
21 applicability further, the document was posted on the ACC web site for a 30-day public comment
22 period. This document was approved for publication by the ACC governing body and was
23 formally endorsed by _____ . To determine whether
24 a revision is necessary, these clinical data standards will be reviewed one year after publication
25 and yearly thereafter by the ACC Task Force on Clinical Data Standards.

1 The document is presently divided into three sections:

- 2 • **Introduction:** A description of the methodology of developing the ACS Clinical Data
3 Standards and intended goals for its use
- 4 • **Data Elements and Definitions:** A listing of key data elements and definitions
- 5 • **Reference Guide:** A multi-purposed resource that maps common data fields between ACS
6 core data elements and other national/regional data registries, links ACS core data elements
7 to relevant ACC/AHA guidelines, and identifies potential uses for each core element.

8 The **Introduction** and **Data Elements and Definitions** are published in the *Journal of American*
9 *College of Cardiology* (citation: _____). The **Reference Guide** is available online.

10 *B. Purpose of the ACS Clinical Data Standards*

11 There are many goals that this project hopes to fulfill by providing a list of key data
12 elements and standardized definitions in ACS (Table 1). First, it is hoped that the standardized
13 definitions will allow *better cross-comparison of results* and clinical outcomes between different
14 trials and registries. This would be particularly true for meta-analyses of trials, where
15 differences in how data are collected and in definitions have hampered the validity of these
16 analyses. Furthermore, the standardized definitions should also facilitate the research coming
17 from the trials and registries, since the key elements needed for assessment of efficacy and safety
18 and for appropriate risk adjustment would be included in the clinical data standards.

1 **Table 1:** Goals of the ACC Listing of ACS Data Elements and Standardized Definitions

1. Facilitate data management in future trials and registries
 2. Allow for more reliable comparisons of results between trials and registries
 3. Facilitate clinical research
 4. Allow for better quality-of-care assessment and improvement programs
 5. Allow for development of performance measures
 6. Facilitate possible transition to electronic medical records
-

2

3 Second, providing a list of the major variables, outcomes, and definitions should facilitate
4 the development and conduct of *future registries*, at both hospital and national levels. In fact, the
5 ACS Clinical Data Standards could be used in its entirety to develop a registry. For example, the
6 Global Registry of Acute Coronary Events (GRACE) includes nearly all (104 elements) of the
7 data elements included in this document (15). Alternatively, subsets of the data could be used if
8 a more focused or limited registry needed to be carried out, for example, one evaluating the use
9 of thrombolytic therapy for acute STEMI, such as the National Registry of Myocardial Infarction
10 (3). To a greater degree, if a given hospital wanted to carry out a quality improvement effort to
11 reduce door-to-drug time (16), the list might be restricted to only 10-20 variables.

12 Third, the use of standardized definitions and registry data should *facilitate quality*
13 *improvement*. By collecting data on these data elements as part of a quality improvement
14 program at a hospital, state, or national level, these definitions and data should provide the means
15 to assess quality of care, both the process of care and clinical outcomes, and thereby facilitate
16 improvements therein.

17 Fourth, these data elements and definitions can be used to *assess performance measures*
18 that could facilitate improvement of the quality of care on a population-wide basis by identifying
19 underutilization of therapies (17,18). They could be used to compare various subgroups of

1 patients on the various performance measures, and identify certain subgroups in whom
2 medications are underutilized, (e.g., women) (19).

3 Finally, the list of data elements could become the *basis for a standardized charting*
4 process with the anticipation that medical charting will progressively move toward an electronic
5 format.

6 *C. General Considerations of the ACS Clinical Data Standards*

7 **1. Data Elements**

8 The writing committee paid close attention to the level of detail of the information of
9 certain variables, such as timing of prior cardiovascular events, timing of procedures, exact drug
10 names vs. classes of drugs, or in types of insurance. For these or any of the data elements listed,
11 one can always decide to collect more or less information. For example, if a hospital association
12 were doing a registry on patient insurance status vs. cardiac procedures and outcomes, the group
13 might use more subcategorizations than listed here in this document. On the other hand, if
14 pharmaceutical company were doing a study evaluating a new drug in unstable angina, the type
15 of insurance may not matter and could be omitted. Thus, this listing of data elements and
16 definitions could be expanded or condensed to meet the needs of the study or project in which
17 they are being utilized.

18 Alternatively, these data elements could be expanded upon to include additional
19 information, such as all the detailed relative contraindications to aspirin, beta-blockers, etc., for
20 careful measurement of performance measures, as done in the Cooperative Cardiovascular
21 Project (17). Expansion of the variables collected would also be expected be done in the setting
22 of a randomized clinical trial of a new drug, where the additional information would be required
23 regarding additional study procedures and drug therapies. Thus, depending on the intended use

1 of the variables, one could restrict or expand the number of data elements utilized. In either case,
2 the definitions provided in this document should assist in standardizing the process.

3 **2. Medication Use**

4 Because medical therapies have such an important impact on the outcomes of patients
5 with ACS, the proposed data elements and definitions are relatively detailed in tracking
6 medication use. Specifically, it is proposed to collect the types of medications at a minimum of
7 three time points—therapy prior to the acute event, those utilized during the first 24 hours, and at
8 hospital discharge. In addition, antithrombotic therapies for percutaneous coronary intervention
9 (PCI) are included in this list. Furthermore, for some classes of drugs, where there may be
10 differences between drugs within a class, the exact brand is proposed to be collected. One
11 potential means of efficiently doing this in a registry is to use a coding system where the data
12 element, for example, for glycoprotein IIb/IIIa blockers is not a check-box of yes/no but rather a
13 field where a number (i.e., 0, 1, 2, or 3) is entered representing a specific drug. In this fashion,
14 space can be conserved on a registry form, but detailed information becomes available about the
15 exact type of drug utilized. In addition, when new drugs become approved for use they can
16 simply be added to the definition as an extra number on the list, but no change is necessary in the
17 data field itself on the registry form. Finally, as new classes of drugs become available, these
18 would need to be added to the proposed list of medications.

19 **3. Risk Adjustment and Outcomes**

20 The list of data elements includes the factors included in some of the major risk models,
21 notably those developed in the GUSTO-I trial (20), and that from TIMI (21,22), and others (23).
22 In this fashion, outcomes can be adjusted for differences in patient characteristics and allow
23 better comparisons across hospitals, treatment strategies, and subgroups of patients. However,
24 while we included the important data elements needed for risk adjustment, we did not include all

1 of the more minor aspects needed for very detailed risk assessment or patient subset assessment.
2 Notably, relative contraindications to some medications (for example, a history of retinal
3 bleeding for use of aspirin or with a prior history of liver dysfunction for the use of statins) were
4 not included in an effort to keep the list of elements as streamlined as possible.

5 Cost effectiveness of new (and old) therapies and treatment strategies is of growing
6 importance (24-28). This dataset includes items to allow estimation of resource utilization, which
7 will allow estimation of cardiovascular costs.

8 Finally, many outcomes are included in the list of data elements. These are important for
9 evaluating the clinical benefits and risks of medical and interventional therapies.

10 We should note that some of the data elements collected in this registry would need a
11 physician to review (for example, the final diagnosis of the admission event—unstable angina vs.
12 MI vs. non-cardiac chest pain—or the assessment of coronary flow at cardiac catheterization)
13 (29). However, the vast majority of data elements have simple definitions that the writing
14 committee believes can be extracted from a standard medical chart.

15 In conclusion, the writing committee hopes that the attached set of data elements and
16 definitions for patients with acute coronary syndromes will help facilitate research and
17 assessment of quality of care and thereby advance the practice of medicine.

II. Definitions

ELEMENT	DEFINITION
<i>Baseline Characteristics</i>	
Gender	Patient's Gender: Male or Female
Date of Birth	Day, month and year of the patient's birth
Race	<p>Patient's race:</p> <ol style="list-style-type: none"> 1. Caucasian 2. Black 3. Hispanic 4. Asian 5. Native American 6. Other race not listed <p>(Note: These categories could be used in a "check all that apply" format to identify mixed races.)</p>
Insurance	<p>Four broad types of insurance are defined as:</p> <ol style="list-style-type: none"> 1. <u>Government</u> insurance refers to patients who are covered by government-reimbursed care. In the U.S., this includes, Medicare, Medicaid, (including all state/federal Medicaid-type programs), and Veteran's Administration health plan. (Consider split Medicare/Medicaid.) 2. <u>Commercial</u> refers to all indemnity (fee-for-service) carriers and Preferred Provider Organizations (PPOs) (e.g., Blue Cross/Blue Shield) 3. <u>HMO</u> refers to a Health Maintenance organization characterized by coverage that provides health care services for members on a pre-paid "capitated" basis. 4. <u>None</u> refers to individuals with no or limited health insurance; thus, the individual is the payor regardless of ability to pay. Only mark "None" when "self" or "none" is denoted as the first insurance in the medical record. <p>(Note: More detailed subcategorization of these broad categories could be considered.)</p>
Prior Angina	<p>History of angina prior to the current admission. "Angina" refers to evidence or knowledge of symptoms prior to this acute event described as chest pain or pressure, jaw pain, arm pain, or other equivalent discomfort suggestive of cardiac ischemia.</p>

ELEMENT	DEFINITION
Previous Myocardial Infarction (MI)	<p>The patient has had at least one documented previous ST or non ST MI 8 or more days prior to this admission. Documented evidence of an ST or Non ST MI is defined as:</p> <p>NON-ST ELEVATION MYOCARDIAL INFARCTION (NSTEMI). The patient was hospitalized for a myocardial infarction documented in the medical record.</p> <p>AT LEAST ONE OF THE FOLLOWING BIOCHEMICAL INDICATORS for detecting myocardial necrosis must be present (see below for a definition of Reference Control Limits):</p> <ol style="list-style-type: none"> 1. Troponin T or I: <ol style="list-style-type: none"> a. Maximal concentration of troponin T or I > the MI decision limit on at least one occasion during the first 24 hours after the index clinical event. 2. CK-MB: <ol style="list-style-type: none"> a. Maximal value of CK-MB > 2 x the upper limit of normal on one occasion during the first hours after the index clinical event. OR b. Maximal value of CK-MB, preferable CK-MB mass, > upper limit of normal on two successive samples. 3. Total CK: <ol style="list-style-type: none"> a. In the absence of availability of a troponin or CK-MB assay, total CK > 2 x the upper limit of normal, or the B fraction of CK may be employed, but these last two biomarkers are considerably less satisfactory than CK-MB. <p>AND ONE OF THE FOLLOWING:</p> <ol style="list-style-type: none"> 1. Either ST segment depression or T wave abnormalities; or 2. Ischemic symptoms in the presence or absence of chest discomfort. Ischemic symptoms may include: <ol style="list-style-type: none"> a. unexplained nausea and vomiting; or b. persistent shortness of breath secondary to left ventricular failure; or c. unexplained weakness, dizziness, lightheadedness, or syncope.

ELEMENT	DEFINITION
Previous Myocardial Infarction (MI) (continued)	<p>ST ELEVATION MYOCARDIAL INFARCTION (STEMI). Indicate whether the patient was hospitalized for an ST Elevation Myocardial Infarction (STEMI) documented in the medical record.</p> <p>AT LEAST ONE OF THE FOLLOWING BIOCHEMICAL INDICATORS for detecting myocardial necrosis must be present (see below for a definition of Reference Control Limits):</p> <ol style="list-style-type: none"> 1. Troponin T or I: <ol style="list-style-type: none"> a. Maximal concentration of troponin T or I > the MI decision limit on at least one occasion during the first 24 hours after the index clinical event. 2. CK-MB: <ol style="list-style-type: none"> a. Maximal value of CK-MB > 2 x the upper limit of normal on one occasion during the first hours after the index clinical event; OR b. Maximal value of CK-MB, preferable CK-MB mass, > upper limit of normal on two successive samples. 3. Total CK <ol style="list-style-type: none"> a. In the absence of availability of a troponin or CK-MB assay, total CK > 2 x the upper limit of normal, or the B fraction of CK may be employed, but these last two biomarkers are considerably less satisfactory than CK-MB. <p>AND ONE OF THE FOLLOWING ECG CHANGES:</p> <ol style="list-style-type: none"> 1. ST-segment elevation: New or presumed new ST segment elevation at the J point in two or more contiguous leads with the cut-off points ≥ 0.2 mV in leads V1, V2, or V3, or ≥ 0.1 mV in other leads; OR 2. Development of any Q wave in leads V1 through V3, or the development of a Q-wave > or = to 30 ms (0.03s) in leads I, II, aVL, aVF, V4, V5, or V6. (Q wave changes must be present in any two contiguous leads, and be ≥ 1 mm in depth.) <p>Defining Reference Control Values (MI Diagnostic Limit and Upper Limit of Normal): Reference values must be determined in each laboratory by studies using specific assays with appropriate quality control, as reported in peer-reviewed journals. Acceptable imprecision (coefficient of variation) at the 99th percentile for each assay should be defined as < or = to 10%. Each individual laboratory should confirm the range of reference values in their specific setting.</p> <p>Special Circumstances:</p> <ul style="list-style-type: none"> • For patients within 24 hours post PCI, the CK-MB (or CK if MB not available) must be $\geq 3x$ upper limit of normal. • For patients within 24 hours post CABG, the CK-MB (or CK if MB not available) must be $\geq 5x$ upper limit of normal, and new Q waves must be present as defined above.
Date of Most Recent MI	Previous MI prior to the current admission. Date of the most recent MI should be noted.
Prior Congestive Heart Failure (CHF)	History of congestive heart failure (CHF). "CHF" refers to evidence or knowledge of symptoms prior to this acute event described as dyspnea, fluid retention, low cardiac output secondary to cardiac dysfunction; or the description of rales, jugular venous distension (JVD), or pulmonary edema prior to the current admission.
Previous Percutaneous Coronary Intervention (PCI)	Previous percutaneous coronary intervention of any type (balloon angioplasty, atherectomy, stent or other), done prior to the current admission.
Previous PCI Date	Previous PCI of any type (balloon angioplasty, atherectomy, stent or other), done prior to the current admission. Date of the most recent PCI should be noted.

ELEMENT	DEFINITION
Previous Coronary Artery Bypass Graft (CABG)	Previous coronary artery bypass graft prior to the current admission.
Previous CABG Date	Previous CABG, done prior to the current admission. Date of the CABG should be noted.
Prior Catheterization With Stenosis \geq 50%	Documented coronary artery disease at coronary angiography at any time prior to the current admission, with a least a 50% stenosis in a major coronary artery. If the patient had a cardiac catheterization prior to the index event that demonstrated a stenosis of 90%, that was successfully stented to a 0% residual, this should be coded as “yes” since a stenosis of \geq 50% was documented.
History of Stroke	Documented history of stroke or cerebrovascular accident (CVA). Typically, a patient has a history of stroke, i.e., loss of neurological function caused by an ischemic event with residual symptoms at least 24 hours after onset.
Year of Most Recent Stroke	Stroke prior to the current admission. Year of the most recent stroke should be noted.
Type of Stroke	<p>Type of stroke:</p> <ol style="list-style-type: none"> 1. <u>Hemorrhagic</u>: A stroke with documentation on imaging (e.g. CT scan or MRI of hemorrhage in the cerebral parenchyma, or a subdural or subarachnoid hemorrhage). 2. <u>Non-hemorrhagic stroke</u>: a focal neurologic deficit that results from a thrombus or embolus (and not due to hemorrhage) which appears and is still partially evident for more than 24 hours. 3. <u>Unknown type/No imaging performed</u>: the type of stroke could not be determined by imaging or other means (lumbar puncture, neurosurgery)
History of Transient Ischemic Attack (TIA)	History of a transient ischemic attack (TIA). A TIA is when the patient has a focal neurologic deficit (usually corresponding to the territory of a single vessel), that resolved spontaneously without evidence of residual symptoms at 24 hours.
Peripheral Vascular Disease	<p>Peripheral vascular disease can include:</p> <ol style="list-style-type: none"> 1. Claudication either with exertion or at rest. 2. Amputation for arterial vascular insufficiency. 3. Vascular reconstruction, bypass surgery, or percutaneous intervention to the extremities. 4. Documented aortic aneurysm. 5. Positive non-invasive test (e.g., ankle brachial index < 0.8).

ELEMENT	DEFINITION
Diabetes	<p>History of diabetes, regardless of duration of disease, need for antidiabetic agents, or medical therapy. If yes, the type of diabetic control should be noted (check at all that apply).</p> <ol style="list-style-type: none"> 1. None 2. Diet: Diet Treatment 3. Oral: Oral agent Treatment 4. Insulin: Insulin Treatment (includes any combination of insulin)
Hypertension	<p>Hypertension as documented by:</p> <ol style="list-style-type: none"> 1. History of hypertension diagnosed and treated with medication, diet and/or exercise 2. Blood pressure greater than 140 systolic or 90 diastolic on at least 2 occasions 3. Currently on antihypertensive pharmacologic therapy
Smoking	<p>History confirming cigarette smoking in the past. Choose from the following categories:</p> <ol style="list-style-type: none"> 1. <u>Current</u>: Smoking cigarettes within one month of this admission 2. <u>Former</u>: Stopped smoking cigarettes greater than one month prior to this admission 3. <u>Never</u>: Never used tobacco products
Hypercholesterolemia	<p>History of hypercholesterolemia diagnosed and/or treated by a physician. Traditional criteria can include documentation of:</p> <ol style="list-style-type: none"> 1. Total cholesterol (TC) greater than 200 2. Low density lipoprotein (LDL) greater than or equal to 130 3. High density lipoprotein (HDL) less than 35 <p>Treatment is initiated also if LDL is > 100 mg/dl in patients with known coronary artery disease, and this <i>would</i> qualify as hypercholesterolemia.</p>
Family History of Coronary Artery Disease (CAD)	<p>Any direct blood relatives (parents, siblings, children) who have had any of the following at age <55:</p> <ol style="list-style-type: none"> 1. Angina 2. MI 3. Sudden cardiac death without obvious cause
Chronic Lung Disease	<p>Documented history of chronic lung disease (i.e., chronic obstructive pulmonary disease) or currently being treated with pharmacologic therapy (e.g., inhalers, theophylline, minophylline or steroids) and/or has a FEV1 < 75%, RA pO2 < 60% or RA pCO2 > 50 (CE24).</p>
Contraindication to Thrombolysis Due to Bleeding Risk	<p>Any one of the following:</p> <ol style="list-style-type: none"> 1. Active or significant gastrointestinal bleed within the past year 2. Recent surgery/trauma (including head trauma) within 2 weeks 3. Active cancer (other than basal cell skin carcinoma) 4. Known intracranial tumor, malformation or surgery 5. Prolonged cardiopulmonary resuscitation (CPR) 6. Aortic dissection 7. Blood pressure > 180/100 mm/Hg on admission 8. Warfarin with therapeutic prothrombin time/international normalized ratio 9. Known bleeding disorder 10. Pregnancy 11. Recent stroke or intracranial hemorrhage

ELEMENT	DEFINITION
<i>Clinical Presentation</i>	
ACS Symptom Onset: Date and Time	<ul style="list-style-type: none"> • Date and time of onset of the onset of symptoms that prompted the patient to seek medical attention. • Symptom onset refers to the onset of cardiac ischemic symptoms related to this acute event. Commonly appearing as chest pain or pressure, arm or jaw pain, dyspnea, nausea/vomiting, syncope or cardiac arrest. • In the event of stuttering symptoms, ACS symptom onset is the time at which symptoms became constant in quality or intensity.
Presentation (to health care facility): Date and Time	Date and time the patient presented at hospital.
Type of Admission	<p>The categories of type of admission are:</p> <ol style="list-style-type: none"> 1. <u>Elective</u> (i.e., scheduled more than 24 hours prior to hospital arrival) 2. <u>Urgent</u> (i.e., through the emergency department, directly from a physician's office) 3. <u>Transferred</u> from another facility
Admission Location	<p>The categories of where the patient was admitted to the hospital or observation unit are:</p> <ol style="list-style-type: none"> 1. Coronary or Intensive Care Unit (CCU/ICU) 2. Stepdown unit/monitored bed/Cardiac Ward 3. Unmonitored hospital floor 4. Observation Unit/ Emergency Department Chest Pain Unit
Means of Transport	<p>The categories of the means by which the patient was transported to the facility are:</p> <ol style="list-style-type: none"> 1. Self/family 2. Ambulance 3. Mobile ICU 4. Air (helicopter) transfer from another facility 5. Ambulance transfer from another acute care facility
Killip Class	<p>Killip classes of the patient at the time of hospital admission are:</p> <ol style="list-style-type: none"> 1. <u>Class 1</u>: Absence of rales over the lung fields and absence of S3 2. <u>Class 2</u>: Rales over 50% or less of the lung fields or the presence of an S3 3. <u>Class 3</u>: Rales over more than 50% of the lung fields 4. <u>Class 4</u>: Shock
Heart Rate	Heart rate (beats per minute) should be the first recording that was done closest to the time of presentation to the health care facility.
Systolic and Diastolic Pressure	Supine systolic and diastolic blood pressure (mmHg) should be the first recording that was done closest to the time of presentation to the health care facility.
Height	Patient's height in centimeters or inches
Weight	Patient's weight in kilograms or pounds

ELEMENT	DEFINITION
Angina Type	<p>Category of patient's angina type if present (choose one):</p> <ol style="list-style-type: none"> I. Atypical Chest Pain: Pain, pressure or discomfort in the chest, neck or arms not clearly exertional or not otherwise consistent with pain or discomfort of myocardial ischemic origin. II. Stable Angina: Angina without a change in frequency or pattern for the six weeks prior to this procedure. Angina is controlled by rest and/or oral or transcutaneous medications. III. Acute Coronary Syndrome (ACS): Choose one: <ol style="list-style-type: none"> A. Unstable Angina: The patient was hospitalized for unstable angina documented in the medical record with serial ECG's and biochemical profiles. One of the following criteria are necessary: <ol style="list-style-type: none"> 1. Angina occurring at rest and prolonged, usually > 20 minutes 2. New onset angina of at least Canadian Cardiovascular Society (CCS) Classification III severity. 3. Recent acceleration of angina reflected by an increase in severity of at least one CCS class to at least CCS Class III. The patient must also NOT have any biochemical evidence of myocardial necrosis. B. Non-ST Elevation Myocardial Infarction (NSTEMI): The patient was hospitalized for a myocardial infarction documented in the medical record. <p>AT LEAST ONE OF THE FOLLOWING BIOCHEMICAL INDICATORS for detecting myocardial necrosis must be present (see below for a definition of Reference Control Limits):</p> <ol style="list-style-type: none"> 1. Troponin T or I: <ol style="list-style-type: none"> a. Maximal concentration of troponin T or I > the MI decision limit on at least one occasion during the first 24 hours after the index clinical event. 2. CK-MB: <ol style="list-style-type: none"> a. Maximal value of CK-MB > 2 x the upper limit of normal on one occasion during the first hours after the index clinical event. OR b. Maximal value of CK-MB, preferable CK-MB mass, > upper limit of normal on two successive samples. 3. Total CK: <ol style="list-style-type: none"> a. In the absence of availability of a troponin or CK-MB assay, total CK > 2 x the upper limit of normal, or the B fraction of CK may be employed, but these last two biomarkers are considerably less satisfactory than CK-MB. <p>AND ONE OF THE FOLLOWING:</p> <ol style="list-style-type: none"> 1. Either ST segment depression or T wave abnormalities; or 2. Ischemic symptoms in the presence or absence of chest discomfort. Ischemic symptoms may include: <ol style="list-style-type: none"> a. unexplained nausea and vomiting; or b. persistent shortness of breath secondary to left ventricular failure; or c. unexplained weakness, dizziness, lightheadedness, or syncope.

ELEMENT	DEFINITION
Angina Type (continued)	<p>C. ST Elevation Myocardial Infarction (STEMI). Indicate whether the patient was hospitalized for an ST Elevation Myocardial Infarction (STEMI) documented in the medical record.</p> <p>AT LEAST ONE OF THE FOLLOWING BIOCHEMICAL INDICATORS for detecting myocardial necrosis must be present (see below for a definition of Reference Control Limits):</p> <ol style="list-style-type: none"> 1. Troponin T or I: <ol style="list-style-type: none"> a. Maximal concentration of troponin T or I > the MI decision limit on at least one occasion during the first 24 hours after the index clinical event. 2. CK-MB: <ol style="list-style-type: none"> a. Maximal value of CK-MB > 2 x the upper limit of normal on one occasion during the first hours after the index clinical event; OR b. Maximal value of CK-MB, preferable CK-MB mass, > upper limit of normal on two successive samples. 3. Total CK <ol style="list-style-type: none"> a. In the absence of availability of a troponin or CK-MB assay, total CK > 2 x the upper limit of normal, or the B fraction of CK may be employed, but these last two biomarkers are considerably less satisfactory than CK-MB. <p>AND ONE OF THE FOLLOWING ECG CHANGES:</p> <ol style="list-style-type: none"> 1. ST-segment elevation: New or presumed new ST segment elevation at the J point in two or more contiguous leads with the cut-off points ≥ 0.2 mV in leads V1, V2, or V3, or ≥ 0.1 mV in other leads; OR 2. Development of any Q wave in leads V1 through V3, or the development of a Q-wave > or = to 30 ms (0.03s) in leads I, II, aVL, aVF, V4, V5, or V6. (Q wave changes must be present in any two contiguous leads, and be > or = to 1mm in depth.)
	<p>Defining Reference Control Values (MI Diagnostic Limit and Upper Limit of Normal): Reference values must be determined in each laboratory by studies using specific assays with appropriate quality control, as reported in peer-reviewed journals. Acceptable imprecision (coefficient of variation) at the 99th percentile for each assay should be defined as < or = to 10%. Each individual laboratory should confirm the range of reference values in their specific setting.</p>
	<p>Special Circumstances:</p> <ul style="list-style-type: none"> • <i>For patients with admission MI</i>, the CK-MB associated with the recurrent MI must be increased by at least 50% of the previous value. • <i>For patients within 24 hours post PCI</i>, the CK-MB (or CK if MB not available) must be $\geq 3x$ upper limit of normal. • <i>For patients within 24 hours post CABG</i>, the CK-MB (or CK if MB not available) must be $\geq 5x$ upper limit of normal, and new Q waves must be present as defined above.
Number of Episodes of Angina in Last 24 Hours	Number of distinct episodes of anginal pain that occurred in the last 24 hours prior to hospital admission.
Secondary Cause of Angina (yes/no)	Note whether the angina was precipitated by a secondary factor such as fever, anemia, hypoxemia, tachycardia, thyrotoxicosis, or severe valvular disease, as defined by Braunwald <i>[Insert ref Circulation 1989]</i>

ELEMENT	DEFINITION
<i>ECG Findings</i>	
First 12-Lead ECG: Date and Time	Note date and time the first 12-lead ECG was performed for acute episode (whether in a pre-hospital setting, ED, or on an inpatient unit).
Location of ECG Changes	<p>The location of each type of ECG change listed below can be broken into three categories:</p> <ol style="list-style-type: none"> 1. <u>Inferior leads</u>: II, III, aVF 2. <u>Anterior leads</u>: V1 to V4 3. <u>Lateral leads</u>: I, aVL, V5 to V6 <p>Consideration can be made of recording posterior ST segment changes, the maximal amount of ST (if applicable), and/or number of leads with ST.</p>
Type of ECG Changes	<ol style="list-style-type: none"> 1. ST segment elevation indicates ≥ 1 mm elevation in 2 or more contiguous leads. 2. ST segment depression of at least 0.5 mm in 2 or more contiguous leads (includes reciprocal changes). 3. T wave inversion of at least 1 mm including inverted T waves that are not indicative of acute MI. 4. Q Waves refers to the presence Q waves that are > 0.03 seconds in width and/or \geq one-third of the total QRS complex in at least two contiguous leads.
BBB and Type	The presence of left bundle branch block or right bundle branch block should be noted.
Rhythm	<p>The categories of rhythm are:</p> <ol style="list-style-type: none"> 1. Sinus rhythm 2. Atrial fibrillation (or flutter) 3. Paced 4. Other rhythm (e.g. ventricular tachycardia, supraventricular tachycardia)
ST Elevation Lead V4R	If right-sided precordial leads are performed, the presence or absence of ST segment elevation ≥ 1 mm in lead V4R should be noted.
Follow-up ECG: New Q waves	If a follow-up ECG is performed (at least 6 hours after the initial ECG, the presence or absence of new Q waves that are > 0.03 seconds in width and/or \geq one-third of the total QRS complex in at least two contiguous leads not seen on initial ECG.

Laboratory Tests

Creatine Kinase (CK):

- Upper Limit Normal The upper limit of normal of total CK as defined by individual hospital laboratory standards.
- Unit The units of the CK and type of units (I.U., kCat/L) should be noted.
- First Value The first value should be noted.
- Peak Value The highest value during the hospitalization should be noted.

Creatine Kinase (MB):

ELEMENT	DEFINITION
• Upper Limit of Normal	The upper limit of normal of CK-MB as defined by individual hospital laboratory standards.
• Units	The units of the CK-MB and type of units (I.U., %, index, ng/dl, kCat/L) should be noted.
• First Value	The first value should be noted.
• Peak Value	The highest value during the hospitalization should be noted.

Troponin T or Troponin I:

- Troponin Type Check which type:
 ___ T
 ___ I
- Units The units of troponin (mg/dL) should be noted.
- Upper Limit of Normal Indicate the upper limit of normal (usually the 99th percentile of a normal population) and the units.
- First Value The value of the first measurement of troponin T or I and the units should be noted.
- Peak Value The peak value of troponin T or I and the units should be noted.

Serum Cholesterol Level	The first total serum cholesterol level and type of units.
-------------------------	--

LDL	First serum low density lipoprotein level (LDL) and units (either calculated or direct, if measured).
-----	---

HDL	First serum high density lipoprotein (HDL) level and units.
-----	---

Serum Creatinine	First creatinine level and the type of units.
------------------	---

Cardiac Procedures

Stress Test	Indicate whether a exercise tolerance or pharmacologic stress test was performed during the hospital stay.
-------------	--

Date	The date that the exercise tolerance or pharmacologic stress test was performed.
------	--

Type of Test Categories:

- ECG Alone, or Either Radionuclide or Echo Test involved only electrocardiographic (ECG) monitoring, or included either radionuclide (perfusion) imaging (e.g., thallium, Sestamibi), or echocardiography (Echo).

- Maximal or Submaximal Maximal stress test (symptom limited) or a submaximal test (e.g., modified Bruce protocol ending with Stage 1 or Stage 2).

ELEMENT	DEFINITION
Ischemia Result (Positive, Negative, Equivocal)	<ol style="list-style-type: none"> 1. <u>Positive</u>: On an exercise tolerance test the patient developed either: <ol style="list-style-type: none"> a. Both ischemic discomfort and ST shift \geq 1 mm or b. New ST shift \geq 2 mm felt to represent ischemia even in the absence of ischemic discomfort <p>If the patient had an equivalent type of exercise test (e.g. exercise thallium or MIBI test, stress Echo, persantine [dipyridamole] thallium, or adenosine radioisotope scan) that showed definite evidence of ischemia (e.g. an area of clear reversible ischemia) this should be considered a positive test.</p> 2. <u>Negative</u>: No evidence of ischemia (i.e., no typical angina pain and no ST shifts). 3. <u>Equivocal</u>: Either: <ol style="list-style-type: none"> a. Typical ischemic pain but no ST shift \geq 1 mm or b. ST shift 1 mm, but no ischemic discomfort.
Imaging Testing	Note presence or absence of a fixed defect indicating an old MI.
Ejection Fraction	The first ejection fraction obtained during the hospital stay. It is the percent of blood emptied from the ventricle at the end of contraction and can be obtained in preferred order from a left ventriculogram, MUGA Scan, Echocardiogram. If only a range is estimated for EF, the midpoint of the range should be the value noted.
Ejection Fraction Test	<p>Note type of test used for EF:</p> <ol style="list-style-type: none"> 1. Contrast 2. Ventriculography 3. Non-invasive testing <p>Note also if it was <u>estimated</u> or <u>calculated</u>.</p>
Cardiac Catheterization/ Angiography	Diagnostic cardiac catheterization/angiography performed during the hospital stay.
Date of Procedure	Date the procedure was performed.
Maximum Stenosis by Vessel (LAD, LCX, RCA, LM, Graft)	<p>Stenosis represents the percentage occlusion, from 0 to 100, associated with the identified vessel systems. Percent stenosis at its maximal point is estimated to be the amount of reduction in the diameter of the "normal" vessel proximal to the lesion. For the denominator, take the maximal internal lumen diameter proximal and distal to the lesion. In instances where multiple lesions are present, enter the highest percentage stenosis noted. The systems of interest are as follows and should include major branch vessels of >2.0 mm in diameter.</p> <ol style="list-style-type: none"> 1. Greatest stenosis assess in the LAD or any major branch vessel. If no stenosis enter 0. 2. Greatest stenosis assess in the LCX or any major branch vessel. If no stenosis enter 0. 3. Greatest stenosis assess in the RCA or any major branch vessel. If no stenosis enter 0. 4. Greatest stenosis assess in the LM. If no stenosis enter 0. 5. Greatest stenosis assess in the Graft. If no stenosis enter 0.

ELEMENT	DEFINITION
Culprit Artery	<p>Vessel considered to be responsible for the acute coronary syndrome. The investigator should use his/her judgement in choosing the primary vessel. In cases where it is difficult to determine (despite correlation of ECG changes and angiographic data) the vessel supplying the largest territory of myocardium should be selected. Only indicate “none” if there is no apparent coronary vessel lesion that could be responsible evidence of ischemia.</p> <ol style="list-style-type: none"> 1. LAD 2. LCX 3. RCA 4. LM 5. Graft 6. Unknown 7. None
Culprit Artery TIMI Flow	<p>The TIMI grade flow in the culprit artery is defined as:</p> <ol style="list-style-type: none"> 1. <u>Grade 0 (no perfusion)</u>: There is no antegrade flow beyond the point of occlusion. 2. <u>Grade 1 (penetration without perfusion)</u>: The contrast material passes beyond the area of obstruction but “hangs up” and fails to opacify the entire coronary bed distal to the obstruction for the duration of the cineangiographic filming sequence. 3. <u>Grade 2 (partial perfusion)</u>: The contrast material passes across the obstruction and opacifies the coronary bed distal to the obstruction. However, the rate of entry of contrast material into the vessel distal to the obstruction or its rate of clearance from the distal bed (or both) are perceptibly slower than its entry into or clearance from comparable areas not perfused by the previously occluded vessel – e.g., the opposite coronary artery or the coronary bed proximal to the obstruction. 4. <u>Grade 3 (complete perfusion)</u>: Antegrade flow into the bed distal to the obstruction occurs as promptly as antegrade flow into the bed from the involved bed is as rapid as clearance from an uninvolved bed in the same vessel or the opposite artery.
Percutaneous Coronary Intervention (PCI)	PCI performed
Date of Procedure	Date the PCI performed
Time of First Balloon Inflation	Time of the first balloon inflation or stent placement. If the exact time of first balloon inflation or initial stent (if no balloon) placement is not known, the time of the start of the procedure.

ELEMENT	DEFINITION
PCI Status	<p>Note the status of the PCI using the following categories:</p> <ol style="list-style-type: none"> I. <u>Elective</u>: The procedure could be deferred without increase risk of compromised cardiac outcome. II. <u>Urgent</u>: All of the following conditions are met: <ol style="list-style-type: none"> A. Not elective B. Not emergency C. Procedure required during same hospitalization in order to minimize chance of further clinical deterioration III. <u>Emergency</u>: The patient's clinical status includes any of the following: <ol style="list-style-type: none"> A. Ischemic dysfunction (any of the following) <ol style="list-style-type: none"> 1. Ongoing ischemia including rest angina despite maximal medical therapy (medical and/or IABP), 2. Acute Evolving MI within 24 hours before intervention, or 3. Pulmonary edema requiring intubation B. Mechanical dysfunction (either of the following): <ol style="list-style-type: none"> 1. Shock with circulatory support or 2. Shock without circulatory support IV. <u>Salvage</u>: The patient is undergoing CPR en route to the Lab
Number of Lesions Attempted	Number of lesions into which an attempt was made to pass a guidewire, whether successful or not.
Number of Stents Placed	Number of stents placed
Number of Lesions Successfully Dilated	Number of lesions where the residual post-intervention stenosis is <50% of the arterial luminal diameter, TIMI Flow is 3, and the minimal decrease in stenosis was 20%.
GP IIb/IIIa Blockade	<p>Whether GP IIb/IIIa was contraindicated or when initial dose was first administered:</p> <ol style="list-style-type: none"> 1=Contraindicated 2=Before cath lab visit 3=Immediately preceding PCI 4=During PCI, but after initial balloon inflation 5=After cath lab visit
GP IIb/IIIa Blocker Administered	<p>GP IIb/IIIa Blocker administered—indicate the exact drug used. For example, coding could be as follows:</p> <ol style="list-style-type: none"> 0=none 1=abciximab (ReoPro) 2=eptifibatide (Integrilin) 3=tirofiban (Aggrastat) 4=trial-based agent (not listed above or randomized blindly between 2 agents) 5=other
CABG	CABG procedure performed during this admission.
Date of Procedure	Date CABG procedure performed during this admission.
Intra-Aortic Balloon Pump	Intra-aortic balloon pump (IABP) used during this admission.
Pulmonary Artery Catheter	Pulmonary artery (Swan Ganz) catheter used during this admission.
Permanent Pacemaker	Permanent pacemaker placed during this admission.

ELEMENT	DEFINITION
Ventilator	Intubation and need for respiratory support on a ventilator.
Medications	<p><i>For all the medications listed below, their use at three time points should be noted:</i></p> <ol style="list-style-type: none"> <i>1. Prior to hospital admission (i.e., chronic therapy)</i> <i>2. During the first 24 hours after hospital admission (which does include medications given in the immediate pre-hospital [ambulance] setting)</i> <i>3. Hospital discharge</i> <i>4. Contraindicated</i>
Thrombolytic Therapy	Thrombolytic therapy administered. Note the exact drug used.
Date and Time Thrombolytic Initiated	Date and time the IV thrombolytic was initiated. If initiated by a bolus dose, note date and time the bolus was administered.
IV Nitrates	Intravenous nitroglycerin was administered.
Nitrates (Oral or Topical)	Oral or topical nitroglycerin was administered. Commonly prescribed agents include isorbide dinitrate, isorbide mononitrate, pentaerythritol tetranitrate, Nitrodur transdermal infusion system, Nitroglycerin paste, sublingual nitro, or nitro spray used on an as-needed basis should not be noted in this category.
IV Beta-Blockers	Intravenous beta-blockers administered. Some forms of IV beta-blockers include: atenolol, metoprolol, propranolol, timolol, esmolol, and labetalol.
Oral Beta-blockers	Oral beta-blockers administered. Some generic forms of oral beta-blockers include: atenolol, metoprolol, nadolol, pindolol, propranolol, timolol, acebutolol, bucindolol, bisoprolol, and labetalol, carvedolol.
Calcium Channel Blocker	Calcium channel blockers administered. Some generic forms of calcium channel blockers include: verapamil, nifedipine, diltiazem, nicardipine, nimodipine, nisoldipine, felodipine, and amlodipine.
Aspirin	Aspirin administered
Clopidogrel/Ticlopidine	Clopidogrel or ticlopidine administered
Other Antiplatelet	Another antiplatelet agent, not listed above, administered (e.g., dipyridamole)
GPIIb/IIIa Blocker	GP IIb/IIIa Blocker administered. Note the exact drug used. Available drugs are abciximab, eptifibatide, tirofiban, trial-based GP IIb/IIIa blocker (i.e., not listed above or randomized blindly between 2 agents), other.
Antithrombin Agent	Antothrombin agent administered. Available drugs are unfractionated heparin, LMWH (enoxaparin [Lovenox], dalteparin [Fragmin], nadroparin [Fraxiparin], danaparoid, hirudin, bivalirudin [Angiomax]), trial based antithrombin agent (i.e., not listed above or randomized blindly between 2 agents), or other.
Warfarin	Warfarin (or coumarol, coumarin) administered
Female Hormone Replacement Therapy	Female hormone replacement therapy administered
Antiarrhythmics	Antiarrhythmic drug administered. Some common drugs are amiodarone, sotalol, quinidine, procainamide, lidocaine.

ELEMENT	DEFINITION
ACE Inhibitors	ACE inhibitors administered. Some common generic forms include: captopril, enalapril, lisinopril, and ramipril.
Angiotensin II Receptor Blocker (ARB)	ARBs administered. Common forms are losartan, valsartan, candesartan.
Diuretic	Diuretics administered. Some commonly prescribed agents are: furosemide, ethacrynic acid, hydrochlorothiazide, spironolactone, metolazone, and bumetanide.
Digitalis	Digitalis administered. Some common generic forms include digoxin and digitoxin.
Lipid Lowering Agent	<p>Lipid lowering agent administered. Note the type of agent:</p> <ol style="list-style-type: none"> 1. statin (HMG co-A reductase inhibitors) 2. fibrates 3. nicotinic acid 4. resin drugs (cholestyramine) 5. other <p>Frequently prescribed drugs are: Cholestyramine, Colestipol, Probucol, Gemfibrozil, Lovastatin, atorvastatin, simvastatin, fluvastatin, pravastatin, and cerivastatin.</p>

Outcomes

Death	Patient died during this hospitalization.
Date of Death	Date of death

ELEMENT	DEFINITION
Myocardial Infarction (MI)	<p>In order to meet the criteria as a post admission event, a myocardial infarction must be distinct from the index event at the time of admission (i.e., re-infarction for a patient was admitted to the hospital with a myocardial infarction). Documented evidence of an ST or Non ST MI is defined as:</p> <p>NON ST ELEVATION MYOCARDIAL INFARCTION (NSTEMI). The patient was hospitalized for a myocardial infarction documented in the medical record.</p> <p>AT LEAST ONE OF THE FOLLOWING BIOCHEMICAL INDICATORS for detecting myocardial necrosis must be present (see below for a definition of Reference Control Limits):</p> <ol style="list-style-type: none"> 1. Troponin T or I: <ol style="list-style-type: none"> a. Maximal concentration of troponin T or I > the MI decision limit on at least one occasion during the first 24 hours after the index clinical event. 2. CK-MB: <ol style="list-style-type: none"> a. Maximal value of CK-MB > 2 x the upper limit of normal on one occasion during the first hours after the index clinical event. OR b. Maximal value of CK-MB, preferable CK-MB mass, > upper limit of normal on two successive samples. 3. Total CK: <ol style="list-style-type: none"> a. In the absence of availability of a troponin or CK-MB assay, total CK > 2 x the upper limit of normal, or the B fraction of CK may be employed, but these last two biomarkers are considerably less satisfactory than CK-MB. <p>AND ONE OF THE FOLLOWING:</p> <ol style="list-style-type: none"> 1. Either ST segment depression or T wave abnormalities; or 2. Ischemic symptoms in the presence or absence of chest discomfort. Ischemic symptoms may include: <ol style="list-style-type: none"> a. unexplained nausea and vomiting; or b. persistent shortness of breath secondary to left ventricular failure; or c. unexplained weakness, dizziness, lightheadedness, or syncope. <p>ST ELEVATION MYOCARDIAL INFARCTION (STEMI). Indicate whether the patient was hospitalized for an ST Elevation Myocardial Infarction (STEMI) documented in the medical record.</p> <p>AT LEAST ONE OF THE FOLLOWING BIOCHEMICAL INDICATORS for detecting myocardial necrosis must be present (see below for a definition of Reference Control Limits):</p> <ol style="list-style-type: none"> 1. Troponin T or I: <ol style="list-style-type: none"> a. Maximal concentration of troponin T or I > the MI decision limit on at least one occasion during the first 24 hours after the index clinical event. 2. CK-MB: <ol style="list-style-type: none"> a. Maximal value of CK-MB > 2 x the upper limit of normal on one occasion during the first hours after the index clinical event; OR b. Maximal value of CK-MB, preferable CK-MB mass, > upper limit of normal on two successive samples. 3. Total CK <ol style="list-style-type: none"> a. In the absence of availability of a troponin or CK-MB assay, total CK > 2 x the upper limit of normal, or the B fraction of CK may be employed, but these last two biomarkers are considerably less satisfactory than CK-MB.

ELEMENT	DEFINITION
MI (continued)	<p>AND ONE OF THE FOLLOWING ECG CHANGES:</p> <ol style="list-style-type: none"> 1. ST-segment elevation: New or presumed new ST segment elevation at the J point in two or more contiguous leads with the cut-off points ≥ 0.2 mV in leads V1, V2, or V3, or ≥ 0.1 mV in other leads; OR 2. Development of any Q wave in leads V1 through V3, or the development of a Q-wave $>$ or $=$ to 30 ms (0.03s) in leads I, II, aVL, aVF, V4, V5, or V6. (Q wave changes must be present in any two contiguous leads, and be ≥ 1 mm in depth.) <p>Defining Reference Control Values (MI Diagnostic Limit and Upper Limit of Normal): Reference values must be determined in each laboratory by studies using specific assays with appropriate quality control, as reported in peer-reviewed journals. Acceptable imprecision (coefficient of variation) at the 99th percentile for each assay should be defined as $<$ or $=$ to 10%. Each individual laboratory should confirm the range of reference values in their specific setting.</p> <p>Special Circumstances:</p> <ul style="list-style-type: none"> • For patients with admission MI, the CK-MB associated with the recurrent MI must be increased by at least 50% of the previous value. • For patients within 24 hours post PCI, the CK-MB (or CK if MB not available) must be $\geq 3x$ upper limit of normal. • For patients within 24 hours post CABG, the CK-MB (or CK if MB not available) must be $\geq 5x$ upper limit of normal, and new Q waves must be present as defined above.
Date and Time	Date and time of onset of MI
Peak CK and CK- MB Level	Peak CK and CK- MB level following the new MI. Check type of units of CK and CK-MB.
Q Wave MI vs. Non-Q Wave MI	New (post-admission) MI a Q-wave MI (new Q-waves that are .03 seconds in width and/or \geq one-third of the total QRS complex in contiguous leads) or a non-Q wave MI. (Information on the admission event is collected elsewhere.)
Recurrent Rest Angina With ECG Changes	Recurrent rest angina refers to recurrent ischemic pain occurring at rest (and felt to be cardiac in origin) with associated ECG or cardiac findings.
Recurrent Rest Angina Without ECG Changes	Recurrent rest angina refers to recurrent ischemic pain occurring at rest (and felt to be cardiac in origin) without associated ECG changes.
Bleeding (TIMI major, minor, none)	<p>An episode of bleeding is defined by the Thrombolysis in Myocardial Infarction criteria as:</p> <ol style="list-style-type: none"> 1. Major: Overt clinical bleeding (or documented intracranial or retroperitoneal hemorrhage) associated with a drop in Hemoglobin of > 5 gm/dl or in hematocrit of $> 15\%$ (absolute). Note: A patient who experiences an intracranial hemorrhage should be considered to have a major hemorrhage. 2. Minor: Overt clinical bleeding associated with a fall Hemoglobin of $3-5$ gm/dl or in hematocrit of $9 - \leq 15\%$ (absolute). Note: In calculating the fall in hemoglobin or hematocrit, a transfusion of whole blood or packed red blood cells is counted as 1 gm/dl hemoglobin or 3% absolute in hematocrit. 3. None: No bleeding event that meets the major or minor definition.

ELEMENT	DEFINITION
Location of Bleeding	Categories for the location of bleeding are: 0= none/not applicable 1= cardiac catheterization site 2= post CABG 3= other instrumented site 4= Gastrointestinal site 5= other (non-instrumented) site
Transfusion	Transfusion of either whole blood and/or packed red blood cells due to a hemorrhagic event. Note the number of units transfused.
Stroke	A cerebrovascular accident (CVA) with loss of neurological function caused by an ischemic or hemorrhagic event with residual symptoms at least 24 hours after onset.
Type of Stroke	Indicate the type of stroke: 1. <u>Hemorrhagic</u> : A stroke with documentation on imaging (e.g. CT scan or MRI of hemorrhage in the cerebral parenchyma, or a subdural or subarachnoid hemorrhage). Evidence of hemorrhagic stroke obtained from lumbar puncture, neurosurgery, or autopsy can also confirm the diagnosis. 2. <u>Non-hemorrhagic</u> : A focal neurologic deficit that results from a thrombus or embolus (and not due to hemorrhage) which appears and is still partially evident for more than 24 hours. 3. <u>Unknown/no imaging performed</u> if the type of stroke could not be determined by imaging or other means (from lumbar puncture, neurosurgery, or autopsy).
Transient Ischemic Attack (TIA)	The transient ischemic attack is a focal neurologic deficit (usually corresponding to the territory of a single cerebral vessel) which resolves spontaneously without any evidence of residual deficit at 24 hours.
Thrombocytopenia	Platelet count dropped to either $< 50,000 /\text{mm}^3$ or between 50,000 and $< 100,000$ and which level should be noted. This platelet count should be confirmed not to be pseudo-thrombocytopenia (i.e., platelet clumping in citrated blood)
Congestive Heart Failure (CHF)	Developed evidence of new congestive heart failure following admission 0= None (absence of rales over the lung fields) 1= Mild CHF (rales over 50% or less of the lung fields) 2= Severe CHF (rales over more than 50% of the lung fields)
Cardiogenic Shock	Experienced cardiogenic shock. Cardiogenic shock is a clinical state of hypoperfusion characterized by systolic pressure < 80 mm Hg and central filling pressure > 20 mm Hg, or a cardiac index < 1.8 liter/ mm^2 . Shock is also considered present if intravenous inotropes and/or intra-aortic balloon pump are needed to maintain a systolic blood pressure > 80 mm Hg and a cardiac index of > 1.8 liter/minute/ m^2 .

ELEMENT	DEFINITION
Atrial Arrhythmia	<p>A new episode or acute reoccurrence of atrial arrhythmia by documentation of one of the following:</p> <ol style="list-style-type: none"> 1. Atrial fibrillation/flutter 2. Supraventricular tachycardia (SVT) requiring treatment (SVT that requires cardioversion, drug therapy, or is sustained for >1 minute) 3. High-level AV block defined as 3° atrioventricular block or 2° AV block with bradycardia requiring pacing
Ventricular Arrhythmia	<p>Ventricular tachycardia, or ventricular fibrillation requiring cardioversion and/or antiarrhythmics (IV/oral).</p>
Date of Discharge	<p>Date the patient was discharged from the acute care hospital. If the patient died in the hospital, the hospital discharge date is the date of death.</p>
Discharge Destination	<p>Where the patient was discharged to upon leaving this hospital. The choices are:</p> <ol style="list-style-type: none"> 1. Home 2. Nursing home or personal care residence 3. Another hospital 4. Death in hospital
Smoking Cessation	<p>Advice or a pamphlet given, or discussion carried out with the patient (by physician, nurse, or other personnel) regarding the importance of stopping smoking:</p> <ol style="list-style-type: none"> 1. Yes 2. No 3. Not applicable
Cardiac Rehabilitation	<p>Advice or discussion carried out with the patient (by physician, nurse, or other personnel) regarding the importance of joining a cardiac rehabilitation program or an appointment made.</p>
Days in Intensive Care Unit	<p>Total number of days the patient spent in an intensive care bed at your hospital only, either consecutively or intermittently. To count days:</p> <ol style="list-style-type: none"> 1. Find the ICU/CCU admit date/time and the date/time patient was transferred-out to another unit (telemetry or unmonitored bed) 2. For every 24-hour period count 1 day 3. For any partial day remaining, round up if greater than or equal to 12 hours and round down if less than 12 hours. <p>In the case of an in-hospital infarct in which the patient is already in an intensive care bed, record the number of days spent in ICU/CCU after the diagnosis of MI was made.</p>

ELEMENT	DEFINITION
Final Diagnosis of the Admission Event	<p>The final diagnosis for the event that prompted admission:</p> <ol style="list-style-type: none"> 1. ST Elevation MI is defined as an acute coronary syndrome in which there is cardiac marker evidence of myocardial necrosis (e.g., positive CK-MB) and new (or presumably new if no prior ECG is available) ST segment elevation on the admission ECG. In addition, if new or presumably new LBBB is present and the patient has positive cardiac markers, this has similar pathophysiology and is an indication for reperfusion therapy—hence, this category should be checked. 2. Non-ST Elevation MI is defined as an acute coronary syndrome in which there is cardiac marker evidence of myocardial necrosis (e.g., <i>positive CK-MB or troponin</i>) and WITHOUT new ST segment elevation or LBBB. 3. Unstable Angina is defined as angina pectoris (or equivalent type of ischemic discomfort) with any one of three following features: 1) occurring at rest (or minimal exertion); 2) being severe and of new onset (i.e. within one month); 3) occurring with a crescendo pattern (i.e. more severe, prolonged or frequent). The patient should NOT have cardiac marker evidence of myocardial necrosis. <ol style="list-style-type: none"> a. Definite/Probable Unstable Angina: Patients with the clinical history consistent with the diagnosis of unstable angina as described above, in whom ischemia has been confirmed by the presence of ST segment changes on the initial ECG or in association with recurrent rest pain, by a positive stress test, by the presence of small elevations of troponin that do not meet criteria for MI. b. Possible Unstable Angina is present when an acute ischemic process has not been excluded as a possible cause of the presenting symptoms, or the clinical history is consistent with unstable angina but no diagnostic test (noted above) was performed to confirm the diagnosis. 4. Stable Coronary Artery Disease: The patient has the clinical diagnosis or prior history of CAD, but after evaluation in-hospital the episode of discomfort was felt not to have represented “unstable angina.” 5. Non-Cardiac Chest Pain: Pain, pressure or discomfort in the chest, neck or arms not clearly exertional or not otherwise consistent with pain or discomfort of myocardial ischemic origin. <p>Examples:</p> <ol style="list-style-type: none"> 1. If a patient was admitted with rest pain, but had negative cardiac markers, but on day 3 developed recurrent pain and ruled in for an MI, the event prompting admission should be coded “Unstable Angina” here. The MI on day 3 should be recorded in the “outcomes” section as a post-admission MI. 2. If a patient was admitted with rest pain and initial cardiac markers were negative, but the enzymes drawn over the subsequent 24 hours became positive, this is most consistent with a non-ST elevation MI as the admission event.
Follow-up Measures	<i>These elements are felt to be the most important outcomes to monitor patients with ACS. The timing could be flexible, but the most common time points are 30 days, 6 months, and/or 1 year.</i>
Death	The patient died since the previous visit/contact. Death includes all deaths regardless of etiology.

ELEMENT	DEFINITION
Primary Cause (CV vs non CV)	<ol style="list-style-type: none"> 1. <u>Cardiovascular</u> death indicates cause of death was sudden cardiac death, myocardial infarction, unstable angina or other coronary artery disease, vascular death (e.g., stroke, arterial embolism, pulmonary embolism, ruptured aortic aneurysm or dissection) congestive heart failure, hypertension, or cardiac arrhythmia. 2. <u>Non-cardiovascular</u> death indicates as respiratory failure, pneumonia, cancer, trauma, suicide, or any other already defined cause. (e.g., liver disease, renal failure etc.)
Myocardial Infarction (MI)	<p>Documented evidence of an ST or Non ST MI is defined as:</p> <p>NON ST ELEVATION MYOCARDIAL INFARCTION (NSTEMI). The patient was hospitalized for a myocardial infarction documented in the medical record.</p> <p>AT LEAST ONE OF THE FOLLOWING BIOCHEMICAL INDICATORS for detecting myocardial necrosis must be present (see below for a definition of Reference Control Limits):</p> <ol style="list-style-type: none"> 1. Troponin T or I: <ol style="list-style-type: none"> a. Maximal concentration of troponin T or I > the MI decision limit on at least one occasion during the first 24 hours after the index clinical event. 2. CK-MB: <ol style="list-style-type: none"> a. Maximal value of CK-MB > 2 x the upper limit of normal on one occasion during the first hours after the index clinical event. OR b. Maximal value of CK-MB, preferable CK-MB mass, > upper limit of normal on two successive samples. 3. Total CK: <ol style="list-style-type: none"> a. In the absence of availability of a troponin or CK-MB assay, total CK > 2 x the upper limit of normal, or the B fraction of CK may be employed, but these last two biomarkers are considerably less satisfactory than CK-MB. <p>AND ONE OF THE FOLLOWING:</p> <ol style="list-style-type: none"> 1. Either ST segment depression or T wave abnormalities; or 2. Ischemic symptoms in the presence or absence of chest discomfort. Ischemic symptoms may include: <ol style="list-style-type: none"> a. unexplained nausea and vomiting; or b. persistent shortness of breath secondary to left ventricular failure; or c. unexplained weakness, dizziness, lightheadedness, or syncope.

ELEMENT	DEFINITION
Myocardial Infarction (MI) (continued)	<p>ST ELEVATION MYOCARDIAL INFARCTION (STEMI). Indicate whether the patient was hospitalized for an ST Elevation Myocardial Infarction (STEMI) documented in the medical record.</p> <p>AT LEAST ONE OF THE FOLLOWING BIOCHEMICAL INDICATORS for detecting myocardial necrosis must be present (see below for a definition of Reference Control Limits):</p> <ol style="list-style-type: none"> 1. Troponin T or I: <ol style="list-style-type: none"> a. Maximal concentration of troponin T or I > the MI decision limit on at least one occasion during the first 24 hours after the index clinical event. 2. CK-MB: <ol style="list-style-type: none"> a. Maximal value of CK-MB > 2 x the upper limit of normal on one occasion during the first hours after the index clinical event; OR b. Maximal value of CK-MB, preferable CK-MB mass, > upper limit of normal on two successive samples. 3. Total CK <ol style="list-style-type: none"> a. In the absence of availability of a troponin or CK-MB assay, total CK > 2 x the upper limit of normal, or the B fraction of CK may be employed, but these last two biomarkers are considerably less satisfactory than CK-MB. <p>AND ONE OF THE FOLLOWING ECG CHANGES:</p> <ol style="list-style-type: none"> 1. ST-segment elevation: New or presumed new ST segment elevation at the J point in two or more contiguous leads with the cut-off points ≥ 0.2 mV in leads V1, V2, or V3, or ≥ 0.1 mV in other leads; OR 2. Development of any Q wave in leads V1 through V3, or the development of a Q-wave > or = to 30 ms (0.03s) in leads I, II, aVL, aVF, V4, V5, or V6. (Q wave changes must be present in any two contiguous leads, and be ≥ 1 mm in depth.) <p>Defining Reference Control Values (MI Diagnostic Limit and Upper Limit of Normal): Reference values must be determined in each laboratory by studies using specific assays with appropriate quality control, as reported in peer-reviewed journals. Acceptable imprecision (coefficient of variation) at the 99th percentile for each assay should be defined as < or = to 10%. Each individual laboratory should confirm the range of reference values in their specific setting.</p> <p>Special Circumstances:</p> <ul style="list-style-type: none"> • For patients with admission MI, the CK-MB associated with the recurrent MI must be increased by at least 50% of the previous value. • For patients within 24 hours post PCI, the CK-MB (or CK if MB not available) must be $\geq 3x$ upper limit of normal. • For patients within 24 hours post CABG, the CK-MB (or CK if MB not available) must be $\geq 5x$ upper limit of normal, and new Q waves must be present as defined above.
Cardiac Catheterization	Cardiac catheterization (with or without revascularization) procedure performed since the previous visit/contact.
Percutaneous Coronary Intervention (PCI)	PCI performed since the previous visit/contact.
Coronary Artery Bypass Graft (CABG)	CABG performed since the previous visit/contact.
Readmission	Readmission to a hospital

ELEMENT	DEFINITION
Readmission Reason	Reasons for admission (include all that apply): <ol style="list-style-type: none"> 1. Myocardial infarction (documented) 2. Unstable angina 3. Angina (without MI) 4. Percutaneous coronary intervention 5. Coronary artery bypass surgery 6. Congestive heart failure (without MI) 7. Arrhythmia or conduction disturbance (without MI) 8. Other medical problem
Angina Status	<u>Canadian Cardiovascular Society Classes of Angina:</u> <ol style="list-style-type: none"> I. Ordinary physical activity does not cause angina; for example walking or climbing stairs, angina occurs with strenuous or rapid or prolonged exertion at work or recreation. II. Slight limitation of ordinary activity; for example, angina occurs walking or stair climbing after meals, in cold, in wind, under emotional stress or only during the few hours after awakening, walking more than two blocks on the level or climbing more than one flight of ordinary stairs at a normal pace and in normal conditions. III. Marked limitation of ordinary activity; for example, angina occurs walking one or two blocks on the level or climbing one flight of stairs in normal conditions and at a normal pace. IV. Inability to carry on any physical activity without discomfort – angina syndrome may be present at rest.
Medication Use	<ol style="list-style-type: none"> 1. <u>ASA/Antiplatelet:</u> Aspirin, clopidogrel or ticlopidine; other (e.g., dipyridamole) 2. <u>ACE:</u> Some common generic forms include captopril, enalapril, lisinopril, and ramipril 3. <u>β-Blocker:</u> Some forms of IV beta-blockers include: atenolol, metoprolol, propranolol, timolol, esmolol, and labetalol. Some generic forms of oral beta-blockers include: atenolol, metoprolol, nadolol, pindolol, propranolol, timolol, acebutolol, bucindolol, bisoprolol, and labetalol, carvedolol. 4. <u>Lipid Lowering:</u> Type of agent includes statin (HMG co-A reductase inhibitors), fibrates, nicotinic acid, resin drugs (cholestyramine). Frequently prescribed drugs are cholestyramine, colestipol, probucol, gemfibrozil, lovastatin, atorvastatin, simvastatin, fluvastatin, pravastatin, and cerivastatin.

III. ACS Clinical Data Standards Reference Guide

Members of the ACC Database Research and Development Committee, in conjunction with the ACC staff, developed a multi-purposed reference guide to accompany the publication of the ACC Key Elements and Data Definitions for Measuring the Clinical Management and Outcomes of Patients with Acute Coronary Syndromes clinical data standards. The intent of this document is to provide a resource that:

1. Maps common data fields between ACS core elements and other national/regional data registries,
2. Links ACS core elements to relevant ACC/AHA guidelines, and
3. Identifies potential uses for each core element.

Table 2 is a sample from the reference guide to briefly illustrate the Reference Guide's layout and column headings. A description of each column heading is listed below:

- **Element**- ACS core element name
- **Definition**- ACS core element definition
- **National Registries** - Maps to other national databases or registries which have utilized this data element
- **Reference**- Links to published ACC/AHA practice guidelines and other key sources
- **Use**- List of ways to use each data element

1 **Table 2.** Sample Page From the Reference Guide

Element	Definition	National Registries	Reference	Use
Gender	Patient's Gender: Male or Female	NCDR NRMI Centocor GRACE	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 981 "There are difference in the presentations of men and women with ACS (see Section VI.A). However, the outcome for women with UA is significantly better than the outcome for men, and outcomes are similar for men and women with NSTEMI."	Risk Adjustment Clinical Risk Factor
Date of Birth	Day, month, and year of the patient's birth	NCDR NRMI Centocor GRACE	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 981 "Older patients (see Section VI.D) have increased risks of both underlying CAD and multivessel CAD; furthermore, they are at higher risk for an adverse outcome than are younger patients."	Risk Adjustment
Race	Patient's race: 1. Caucasian 2. Black 3. Hispanic 4. Asian 5. Native American 6. Other race not listed (Note: These categories could be used in a "Check all that apply" format to identify mixed race.)	NCDR NRMI	Sheifer, SE et al. Time to Presentation with Acute Myocardial Infarction in the Elderly (30) Pg. 1655 "In addition, our evaluation of interactions suggests that individuals with multiple racial, socioeconomic, and sex-based predictors of delay are at particular risk of arriving late."	Clinical Risk Factor

2

3 *A. National ACS Registries Column*

4 ACS data elements are mapped to the most recently revised data elements from three
5 national ACS data registries and the ACC National Cardiovascular Data Registry™ (NCDR). A
6 brief description of these registries and the total number of data fields for each registry that were

1 mapped to the ACS Clinical Data Standards are presented in Table 3. With this document, you
 2 will be able to quickly assess which common data fields can be mapped either to and/or from the
 3 ACS Clinical Data Standards.

4 **Table 3.** National/Regional CV Registries
 5

Cardiovascular Data Registries	Description	Number of Mapped Fields
National Registry for Myocardial Infarction (NRMI)	NRMI is a <i>Genentech, Inc.</i> - sponsored multi-center, observational study to collect national data on patients with AMI. Since 1990, NRMI has complied and reported critical information on patient presentation, treatment, and outcomes on more than 1 million AMI patient in approximately 1600 participating acute care hospitals across the nation.	76
Centocor The Acute Coronary Syndromes Registry	Sponsored by <i>Eli Lilly and Centocor</i> , the ACS Registry is an observational study designed to track patients with ACS, including acute ST-elevation, myocardial infarction, non ST-elevation MI and unstable angina. The goal of the registry is to provide physicians and hospitals with key benchmarking data that can be used to improve patient outcomes through CQI, as well as by assessing the most appropriate and cost-effective process of care for optimal short and long-term outcomes patients with ACS.	79
Aventis Global Registry of Acute Coronary Events (GRACE)	Sponsored by an educational grant from <i>Aventis Inc</i> , GRACE is an observation study designed to track patients with ACS. The aim of GRACE is to improve the quality of care patients with ACS by describing differences in and relationships between patient characteristics, treatment practices, and in-hospital and post discharge outcomes (6-months) at hospitals around the world. A goal of this study is to study approximately 10,000 patients with ACS on an annual basis. A total of 18 cluster sites in 14 countries in North America, South America, Europe, Australia, and New Zealand are currently collaborating on this project.	104
ACC National Cardiovascular Data Registry (NCDR™)	The ACC-NCDR™ is a multi-center voluntary registry designed to provide confidential risk-adjusted benchmark data for cardiologists, hospitals, and cath labs to improve the quality of care in the cardiac catheterization lab. Cath Lab Module version 2.0, the most current standardized data elements and definitions, was released in January 2001. Since 1998, 350 institutions have enrolled across the United States, representing over 400,000 patient admissions.	62

1 *B. Reference Column*

2 Linking to current scientific evidence provided the basis for selecting and defining
3 appropriate data elements required to evaluate and manage and identify relevant outcomes for
4 patients with acute coronary syndromes (ACS). By focusing primarily on evidence-based
5 national guidelines, it is our hope that these linked data elements can be used to support
6 monitoring physician adherence to clinical practice guideline recommendations. It is also our
7 intent that from the information collected and analyzed using these elements, data on the
8 effectiveness of therapies in practice may feed into the national guideline revision process.

9 With this document, you will be able to quickly review links to relevant ACC/AHA
10 guidelines. For purposes of these clinical data standards, we chose to review and reference the
11 following published guidelines or consensus statements:

- 12 • ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-
13 Segment Elevation Myocardial Infarction (12)
- 14
- 15 • ACC/AHA Guidelines for the Management of Patient with Acute Myocardial Infarction (11)
16 and the 1999 update (31)
- 17
- 18 • ACC/AHA Guidelines for Percutaneous Coronary Intervention (Revision of the 1993 PTCA
19 Guidelines) (32)
- 20
- 21 • ACC/AHA Guidelines for Coronary Angiography (33)
- 22
- 23 • ACC/AHA Guidelines for the Management of Patients with Chronic Stable Angina (34)
- 24
- 25 • ESC-ACC Consensus Conference - Myocardial Infarction Redefined- A Consensus
26 Document of The Joint European Society of Cardiology/American College of Cardiology
27 Committee for the Redefinition of Myocardial Infarction (13)
- 28

29 We chose to link the data elements to the national guidelines or consensus statements in
30 two ways: 1) as a direct link to a class recommendation or 2) through reference within the
31 guideline text and tables. Please note, in many instances these links are merely presented to be
32 illustrative of the many recommendations that speak to the importance of collecting a particular

1 data element and are not illustrative of all links. For example, aspirin is recommended for
 2 Unstable Angina patients in the most recent ACC/AHA UA/NSTEMI Guidelines (12). In Table
 3 4, the appropriate guideline, the relevant section, and the class recommendation is referenced.
 4 Similarly, there are references about the use of aspirin throughout all of the guidelines reviewed.
 5 We have selected only one such reference as an illustration. It is clear that it is necessary to
 6 collect information on aspirin use for this population.

7 **Table 4.** Guideline Link to Aspirin

Data Element	Data Definition	Reference
Aspirin	Aspirin administered	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST- Segment Elevation Myocardial Infarction (12) Pg. 999 Recommendations for Antiplatelet and Anticoagulation Therapy Class I 1. Antiplatelet therapy should be initiated promptly. Aspirin is the first choice and is administered as soon as possible after presentation and continued indefinitely. (<i>Level of Evidence: A</i>)

8

9 Secondly, the guideline may be referenced for data elements and definitions that are
 10 derived from guideline text. For example, **peripheral vascular disease** is not linked to any
 11 specific recommendation per se within any of the guidelines. However, a description of its
 12 importance in describing a potential clinical risk factor is described in UA/NSTEMI guidelines
 13 (12). See below:

14 Diabetes and the presence of extracardia (peripheral or carotid) arterial disease are
 15 major risk factors for poor outcome in patients with ACS (pg. 981).

On a few occasions, data elements and definitions were linked to other national guidelines such as the National Cholesterol Education Program (NCEP) III Guidelines (14) or elements collected in key clinical trials such as TIMI 16 (35) or GUSTO IV (36). In very few instances, data elements and definitions were linked directly to specific published literature on a specific topic (e.g., angina status and Campeau's landmark article that described the grading of angina pectoris (37)).

C. Use

In an effort to focus only on key elements required to measure clinical management and patient outcomes for patients with ACS, we included those elements required to complete this task. Using this reference guide, you will be able to quickly identify specific uses for each core data element in these clinical data standards. Common uses of these data elements are listed in below in Table 5.

Table 5. Common uses of the data elements in the ACS Clinical Data Standards

Data Element	Common Uses
Risk Adjustment – Mortality/ Adverse Outcomes	Allows appropriate identification of the incidence of mortality which is required for analysis of risk adjusted mortality. Also refers to key factors that may be causally related to in-hospital adverse outcomes.
Clinical Risk Factors	Describes additional risk factors for CAD and/or risk of mortality or morbidity for patients with Acute Coronary Syndromes.
Performance Measurement	Allows measurement of adherence to nationally recognized clinical practice guidelines. In some circumstances, some data elements could be used to construct performance measures such as Timely Reperfusion (Door to Balloon Time) and Early Administration of Aspirin monitored by national accreditation bodies.
Procedural Description	Describes procedure performed during the episode of care.
Outcomes Analysis	Describes potential clinical endpoints.
Patient Demographics	Provides a description of the patient, from the patient's age and race to their insurance status. Such information characterizes the patient population.
Health Services Research	Allows for measures of utilization, length of stay, etc.
Follow-up	Describes elements used to characterize clinical outcomes 30 days, six month and 1 year post AMI.

14

D. Reference Guide

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
<i>Baseline Characteristics:</i>				
Gender	Patient's Gender: Male or Female	NCDR NRMI Centocor GRACE	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 981 "There are differences in the presentations of men and women with ACS (see Section VI.A). However, the outcome for women with UA is significantly better than the outcome for men, and the outcomes are similar for men and women with NSTEMI."	Risk Adjustment Clinical Risk Factor
Date of Birth	Day, month and year of the patient's birth.	NCDR NRMI Centocor GRACE	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 981 "Older patients (see Section VI.D) have increased risks of both underlying CAD and multivessel CAD; furthermore, they are at higher risk for an adverse outcome than are younger patients."	Risk Adjustment

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Race	<p>Patient's race:</p> <ol style="list-style-type: none"> 1. Caucasian 2. Black 3. Hispanic 4. Asian 5. Native American 6. Other race not listed <p>(Note: These categories could be used in a "check all that apply" format to identify mixed races.)</p>	NCDR NRMI	<p>Sheifer, SE et al. Time to Presentation with Acute Myocardial Infarction in the Elderly (30)</p> <p>Pg. 1655 "In addition, our evaluation of interactions suggests that individuals with multiple racial, socioeconomic, and sex-based predictors of delay are at particular risk of arriving late."</p>	<p>Clinical Risk Factor</p> <p>Health Services Research</p>
Insurance	<p>Four broad types of insurance are defined as:</p> <ol style="list-style-type: none"> 1. <u>Government</u> insurance refers to patients who are covered by government-reimbursed care. In the U.S., this includes, Medicare, Medicaid, (including all state/federal Medicaid-type programs), and Veteran's Administration health plan. (Consider split Medicare/Medicaid.) 2. <u>Commercial</u> refers to all indemnity (fee-for-service) carriers and Preferred Provider Organizations (PPOs) (e.g., Blue Cross/Blue Shield) 3. <u>HMO</u> refers to a Health Maintenance organization characterized by coverage that provides health care services for members on a pre-paid "capitated" basis. 4. <u>None</u> refers to individuals with no or limited health insurance; thus, the individual is the payor regardless of ability to pay. Only mark "None" when "self" or "none" is denoted as the first insurance in the medical record. <p>(Note: More detailed subcategorization of these broad categories could be considered.)</p>	NCDR NRMI Centocor	<p>Sheifer, SE et al. Time to Presentation with Acute Myocardial Infarction in the Elderly (30)</p> <p>Pg. 1655 "In addition, our evaluation of interactions suggests that individuals with multiple racial, socioeconomic, and sex-based predictors of delay are at particular risk of arriving late."</p>	<p>Health Services Research</p>

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Prior Angina	History of angina prior to the current admission. "Angina" refers to evidence or knowledge of symptoms prior to this acute event described as chest pain or pressure, jaw pain, arm pain, or other equivalent discomfort suggestive of cardiac ischemia.	NRMI Centocor GRACE	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)	Risk Adjustment Clinical Risk Factor
			Pg. 978 Table 5. Likelihood That Signs and Symptoms Represent an ACS Secondary to CAD	
			<u>High Likelihood</u> Chest or left arm pain or discomfort as chief symptom reproducing prior documented angina.	

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Previous Myocardial Infarction (MI)	<p>The patient has had at least one documented previous ST or non ST MI 8 or more days prior to this admission. Documented evidence of an ST or Non ST MI is defined as:</p> <p>NON-ST ELEVATION MYOCARDIAL INFARCTION (NSTEMI). The patient was hospitalized for a myocardial infarction documented in the medical record.</p> <p>AT LEAST ONE OF THE FOLLOWING BIOCHEMICAL INDICATORS for detecting myocardial necrosis must be present (see below for a definition of Reference Control Limits):</p> <ol style="list-style-type: none"> 1. Troponin T or I: <ol style="list-style-type: none"> a. Maximal concentration of troponin T or I > the MI decision limit on at least one occasion during the first 24 hours after the index clinical event. 2. CK-MB: <ol style="list-style-type: none"> a. Maximal value of CK-MB > 2 x the upper limit of normal on one occasion during the first hours after the index clinical event. OR b. Maximal value of CK-MB, preferable CK-MB mass, > upper limit of normal on two successive samples. 3. Total CK: <ol style="list-style-type: none"> a. In the absence of availability of a troponin or CK-MB assay, total CK > 2 x the upper limit of normal, or the B fraction of CK may be employed, but these last two biomarkers are considerably less satisfactory than CK-MB. <p>AND ONE OF THE FOLLOWING:</p> <ol style="list-style-type: none"> 1. Either ST segment depression or T wave abnormalities; or 2. Ischemic symptoms in the presence or absence of chest discomfort. Ischemic symptoms may include: <ol style="list-style-type: none"> a. unexplained nausea and vomiting; or b. persistent shortness of breath secondary to left ventricular failure; or c. unexplained weakness, dizziness, lightheadedness, or syncope. 	NCDR NRMI Centocor GRACE	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 981 “In most studies of ACS, a prior history of MI has been associated not only with a high risk of obstructive CAD, but also with an increased risk of multivessel CAD.”	Risk Adjustment Performance Measurement Clinical Risk Factor

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Previous MI (continued)	<p>ST ELEVATION MYOCARDIAL INFARCTION (STEMI). Indicate whether the patient was hospitalized for an ST Elevation Myocardial Infarction (STEMI) documented in the medical record.</p> <p>AT LEAST ONE OF THE FOLLOWING BIOCHEMICAL INDICATORS for detecting myocardial necrosis must be present (see below for a definition of Reference Control Limits):</p> <ol style="list-style-type: none"> 1. Troponin T or I: <ol style="list-style-type: none"> a. Maximal concentration of troponin T or I > the MI decision limit on at least one occasion during the first 24 hours after the index clinical event. 2. CK-MB: <ol style="list-style-type: none"> a. Maximal value of CK-MB > 2 x the upper limit of normal on one occasion during the first hours after the index clinical event; OR b. Maximal value of CK-MB, preferable CK-MB mass, > upper limit of normal on two successive samples. 3. Total CK <ol style="list-style-type: none"> a. In the absence of availability of a troponin or CK-MB assay, total CK > 2 x the upper limit of normal, or the B fraction of CK may be employed, but these last two biomarkers are considerably less satisfactory than CK-MB. <p>AND ONE OF THE FOLLOWING ECG CHANGES:</p> <ol style="list-style-type: none"> 1. ST-segment elevation: New or presumed new ST segment elevation at the J point in two or more contiguous leads with the cut-off points ≥ 0.2 mV in leads V1, V2, or V3, or ≥ 0.1 mV in other leads; OR 2. Development of any Q wave in leads V1 through V3, or the development of a Q-wave > or = to 30 ms (0.03s) in leads I, II, aVL, aVF, V4, V5, or V6. (Q wave changes must be present in any two contiguous leads, and be ≥ 1 mm in depth.) 			

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Previous MI (continued)	<p>Defining Reference Control Values (MI Diagnostic Limit and Upper Limit of Normal): Reference values must be determined in each laboratory by studies using specific assays with appropriate quality control, as reported in peer-reviewed journals. Acceptable imprecision (coefficient of variation) at the 99th percentile for each assay should be defined as < or = to 10%. Each individual laboratory should confirm the range of reference values in their specific setting.</p> <p>Special Circumstances:</p> <ul style="list-style-type: none"> • For patients within 24 hours post PCI, the CK-MB (or CK if MB not available) must be $\geq 3x$ upper limit of normal. • For patients within 24 hours post CABG, the CK-MB (or CK if MB not available) must be $\geq 5x$ upper limit of normal, and new Q waves must be present as defined above. 			
Date of Most Recent MI	Previous MI prior to the current admission. Date of the most recent MI should be noted.	GRACE (adpated)	<p>ESC/ACC Consensus Conference – Myocardial Infarction Redefined (13)</p> <p>Pg. 961 “Infarcts are classified temporally according to the pathologic appearance as follow: acute (6 h to 7 days); healing (7 to 28 days), healed (29 days or more).”</p>	Clinical Risk Factor
Prior Congestive Heart Failure (CHF)	History of congestive heart failure (CHF). “CHF” refers to evidence or knowledge of symptoms prior to this acute event described as dyspnea, fluid retention, low cardiac output secondary to cardiac dysfunction; or the description of rales, jugular venous distension (JVD), or pulmonary edema prior to the current admission.	NCDR NRMI Centocor GRACE	<p>ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)</p> <p>Pg. 982 “Patients with symptoms of acute and/or chronic heart failure are also at a substantially higher risk.”</p>	Clinical Risk Factor

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Previous Percutaneous Coronary Intervention (PCI)	Previous percutaneous coronary intervention of any type (balloon angioplasty, atherectomy, stent or other), done prior to the current admission.	NCDR NRMI (PTCA only) Centocor GRACE	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)	Risk Adjustment Clinical Risk Factor
Previous PCI Date	Previous PCI of any type (balloon angioplasty, atherectomy, stent or other), done prior to the current admission. Date of the most recent PCI should be noted.	GRACE NCDR	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)	Risk Adjustment Clinical Risk Factor
			Pg. 1013 “Patients with UA who have had previous PCI or CABG should also in general be considered for early coronary angiography, unless prior coronary angiography data indicate that no further revascularization is likely to be possible.”	
			Pg. 1013-14 D. Early Conservative Versus Invasive Strategies	
			Recommendations Class I 1. An early invasive strategy in patients with UA/NSTEMI and any of the following high-risk indicators. (Level of Evidence B) ... g) PCI within 6 months	

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Previous Coronary Artery Bypass Graft (CABG)	Previous coronary artery bypass graft prior to the current admission.	NCDR NRMI Centocor GRACE	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)	Risk Adjustment Clinical Risk Factor
			Pg. 1033 “Post-CABG patients who present with UA/NSTEMI are at higher risk, with more extensive CAD and LV dysfunction than those patients who have not previously undergone surgery.”	
Previous CABG Date	Previous CABG, done prior to the current admission. Date of the CABG should be noted	NCDR	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)	Clinical Risk Factor Health Services Research
			Pg. 1033 “Overall, up to 20% of patients presenting with UA/NSTEMI have previously undergone CABG. Conversely, ≈20% of post-CABG patients develop UA/NSTEMI during an interval of 7.5 years, with a highly variable postoperative time of occurrence.”	

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Prior Catheterization With Stenosis \geq 50%	Documented coronary artery disease at coronary angiography at any time prior to the current admission, with a least a 50% stenosis in a major coronary artery. If the patient had a cardiac catheterization prior to the index event that demonstrated a stenosis of 90%, that was successfully stented to a 0% residual, this should be coded as “yes” since a stenosis of \geq 50% was documented.	GRACE	TIMI (21,22) ACC/AHA Guidelines for Coronary Angiography (33) Pg. 1774 “Coronary angiography is generally performed in symptomatic patients with suspected restenosis to reassess anatomy and to repeat revascularization as needed.”	Clinical Risk Factor
History of Stroke	Documented history of stroke or cerebrovascular accident (CVA). Typically, a patient has a history of stroke, i.e., loss of neurological function caused by an ischemic event with residual symptoms at least 24 hours after onset.	NCDR (adapted) NRMI Centocor GRACE	ACC/AHA Guidelines for Percutaneous Coronary Intervention (32) Pg. 2239xi Table 6. Clinical Risk Factors Associated with In-Hospital Adverse Events	Clinical Risk Factor
Year of Most Recent Stroke	Stroke prior to the current admission. Year of the most recent stroke should be noted.	GRACE	ACC/AHA Guidelines for the Management of Patients with Acute Myocardial Infarction (11) Pg. 1350 Table 3. Contraindications and Cautions for Thrombolytic Use in Myocardial Infarction	Clinical Risk Factor

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Type of Stroke	Type of stroke: <ol style="list-style-type: none"> 1. <u>Hemorrhagic</u>: A stroke with documentation on imaging (e.g. CT scan or MRI of hemorrhage in the cerebral parenchyma, or a subdural or subarachnoid hemorrhage). 2. <u>Non-hemorrhagic stroke</u>: a focal neurologic deficit that results from a thrombus or embolus (and not due to hemorrhage) which appears and is still partially evident for more than 24 hours. 3. <u>Unknown type/No imaging performed</u>: the type of stroke could not be determined by imaging or other means (lumbar puncture, neurosurgery) 	GRACE	TIMI (21,22) ACC/AHA Guidelines for the Management of Patients with Acute Myocardial Infarction (11) Pg. 1350 Table 3. Contraindications and Cautions for Thrombolytic Use in Myocardial Infarction	Clinical Risk Factor
History of Transient Ischemic Attack (TIA)	History of a transient ischemic attack (TIA). A TIA is when the patient has a focal neurologic deficit (usually corresponding to the territory of a single vessel), that resolved spontaneously without evidence of residual symptoms at 24 hours.	GRACE NCDR (adapted)	TIMI (21,22) ACC/AHA Guidelines for Percutaneous Coronary Intervention (32) Pg. 2239xi Table 6. Clinical Risk Factors Associated with In-Hospital Adverse Events	Clinical Risk Factor

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Peripheral Vascular Disease	Peripheral vascular disease can include: <ol style="list-style-type: none"> 1. Claudication either with exertion or at rest. 2. Amputation for arterial vascular insufficiency. 3. Vascular reconstruction, bypass surgery, or percutaneous intervention to the extremities. 4. Documented aortic aneurysm. 5. Positive non-invasive test (e.g., ankle brachial index < 0.8). 	NCDR Cenotacor GRACE	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 982 “Just as the history of extracardiac vascular disease is important, the physical examination of the peripheral vessels can also provide important prognostic information. The presence of bruits of pulse deficits that suggest extracardiac vascular disease (carotid, aortic, peripheral) identifies patients with a higher likelihood of significant CAD.”	Risk Adjustment Clinical Risk Factor

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Diabetes	<p>History of diabetes, regardless of duration of disease, need for antidiabetic agents, or medical therapy. If yes, the type of diabetic control should be noted (check at all that apply).</p> <ol style="list-style-type: none"> 1. None 2. Diet: Diet Treatment 3. Oral: Oral agent Treatment 4. Insulin: Insulin Treatment (includes any combination of insulin) 	<p>NCDR NRMI Centocor GRACE</p>	<p>Lee et al., Predictors of 30-day mortality in the era of reperfusion for acute myocardial infarction (20)</p> <p>ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)</p> <p>Pg. 1031 B. Diabetes Mellitus</p> <p>Recommendations Class I 1. Diabetes is an independent risk factor in patients with UA/NSTEMI.</p>	<p>Risk Adjustment</p>
Hypertension	<p>Hypertension as documented by:</p> <ol style="list-style-type: none"> 1. History of hypertension diagnosed and treated with medication, diet and/or exercise. 2. Blood pressure greater than 140 systolic or 90 diastolic on at least 2 occasions. 3. Currently on antihypertensive pharmacologic therapy. 	<p>NCDR NRMI Centocor GRACE</p>	<p>Lee et al., Predictors of 30-day mortality in the era of reperfusion for acute myocardial infarction (20)</p> <p>ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)</p> <p>Pg. 981 “Similarly, a history of hypertension is associated with an increased risk of poor outcome.”</p>	<p>Risk Adjustment</p>

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Smoking	<p>History confirming cigarette smoking in the past. Choose from the following categories:</p> <ol style="list-style-type: none"> 1. <u>Current</u>: Smoking cigarettes within one month of this admission. 2. <u>Former</u>: Stopped smoking cigarettes greater than one month prior to this admission. 3. <u>Never</u>: Never used tobacco products. 	<p>NCDR (adapted) NRMI Centocor GRACE</p>	<p>Lee et al., Predictors of 30-day mortality in the era of reperfusion for acute myocardial infarction (20)</p> <p>ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)</p> <p>Pg. 981 “Surprisingly, current smoking is associated with a lower risk of death in the setting of ACS, predominantly because of the less severe underlying CAD.”</p>	<p>Clinical Risk Factor</p>
Hypercholesterolemia	<p>History of hypercholesterolemia diagnosed and/or treated by a physician. Traditional criteria can include documentation of:</p> <ol style="list-style-type: none"> 1. Total cholesterol (TC) greater than 200 2. Low density lipoprotein (LDL) greater than or equal to 130 3. High density lipoprotein (HDL) less than 35, <p>Treatment is initiated also if LDL is > 100 mg/dl in patients with known coronary artery disease, and this <i>would</i> qualify as hypercholesterolemia.</p>	<p>NCDR NRMI Centocor (hyperlipidemia) GRACE (hyperlipidemia)</p>	<p>ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)</p> <p>Pg. 981 “In patients with symptoms of possible ACS, some of the traditional risk factors for CAD (e.g., hypertension, hypercholesterolemia, cigarette smoking) are only weakly predictive of the likelihood of acute ischemia and are far less important than are symptoms, ECG findings, and cardiac markers.”</p>	<p>Clinical Risk Factor</p>

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Family History of Coronary Artery Disease (CAD)	Any direct blood relatives (parents, siblings, children) who have had any of the following at age <55: 1. Angina 2. MI 3. Sudden cardiac death without obvious cause.	NCDR NRMI (<60yrs)	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 981 “Although a family history of premature CAD raises interesting issues of the genetic contribution to the development of this syndrome, it has not been a useful indicator of diagnosis or prognosis in patients evaluated for possible symptoms of ACS.”	Clinical Risk Factor
Chronic Lung Disease	Documented history of chronic lung disease (i.e., chronic obstructive pulmonary disease) or currently being treated with pharmacologic therapy (e.g., inhalers, theophylline, minophylline or steroids) and/or has a FEV1 < 75%, RA pO2 < 60% or RA pCO2 > 50 (CE24).	NCDR (adapted) NRMI Centocor	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 982 “Acute worsening of chronic obstructive pulmonary disease (COPD) (with or without superimposed infection) may lower oxygen saturation levels sufficiently to intensify ischemic symptoms in patients with CAD.”	Clinical Risk Factor

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Contraindication to Thrombolysis Due to Bleeding Risk	<p>Any one of the following:</p> <ol style="list-style-type: none"> 1. Active or significant gastrointestinal bleed within the past year, 2. Recent surgery/trauma (including head trauma) within 2 weeks 3. Active cancer (other than basal cell skin carcinoma) 4. Known intracranial tumor, malformation or surgery 5. Prolonged cardiopulmonary resuscitation (CPR), 6. Aortic dissection 7. Blood pressure > 180/100 mm/Hg on admission 8. Warfarin with therapeutic prothrombin time/international normalized ratio 9. Known bleeding disorder 10. Pregnancy 11. Recent stroke or intracranial hemorrhage 	NRMI Centocor	ACC/AHA Guidelines for the Management of Patients with Acute Myocardial Infarction (11) Pg. 1350 Table 3. Contraindications and Cautions for Thrombolytic Use in Myocardial Infarction	Performance Measurement

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
<i>Clinical Presentation</i>				
ACS Symptom Onset: Date and Time	<ul style="list-style-type: none"> Date and time of onset of the onset of symptoms that prompted the patient to seek medical attention. Symptom onset refers to the onset of cardiac ischemic symptoms related to this acute event. Commonly appearing as chest pain or pressure, arm or jaw pain, dyspnea, nausea/vomiting, syncope or cardiac arrest. In the event of stuttering symptoms, ACS symptom onset is the time at which symptoms became constant in quality or intensity. 	NRMI Centocor GRACE	ACC/AHA Guidelines for the Management of Patients with Acute Myocardial Infarction (11) Pg. 1338 “The components of delay from symptom onset to treatment are (1) patient related (ie, failure to recognize the seriousness of the problem and delay in seeking emergency care); (2) prehospital evaluation, treatment, and transport times; and (3) time required for diagnosis and initiation of treatment in the hospital.”	Health Services Research Performance Measurement
Presentation (to health care facility): Date and Time	Date and time the patient presented at hospital.	NRMI Centocor GRACE NCDR (not time)	ACC/AHA Guidelines for the Management of Patients with Acute Myocardial Infarction (11) Pg. 1338 “The components of delay from symptom onset to treatment are (1) patient related (ie, failure to recognize the seriousness of the problem and delay in seeking emergency care); (2) prehospital evaluation, treatment, and transport times; and (3) time required for diagnosis and initiation of treatment in the hospital.”	Health Services Research Performance Measurement

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Type of Admission	<p>The categories of type of admission are:</p> <ol style="list-style-type: none"> 1. <u>Elective</u> (i.e., scheduled more than 24 hours prior to hospital arrival) 2. <u>Urgent</u> (i.e., through the emergency department, directly from a physician's office) 3. <u>Transferred</u> from another facility 	Centocor GRACE	<p>ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)</p> <p>Pg. 978 1. ED or Outpatient Facility Presentation</p> <p>Recommendation Class I 1. Patients with a suspected ACS with chest discomfort at rest for > 20 min, hemodynamic instability, or recent syncope or presyncope should be strongly considered for immediate referral to an ED or a specialized chest pain unit. Other patients with a suspected ACS may be seen initially in an ED, a chest pain unit, or an outpatient facility. (<i>Level of Evidence: C</i>).</p>	Health Services Research

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Admission Location	<p>The categories of where the patient was admitted to the hospital or observation unit are:</p> <ol style="list-style-type: none"> 1. Coronary or Intensive Care Unit (CCU/ICU) 2. Stepdown unit/monitored bed/Cardiac Ward 3. Unmonitored hospital floor 4. Observation Unit/ Emergency Department Chest Pain Unit 		<p>ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)</p> <p>Pg. 978</p> <ol style="list-style-type: none"> 1. ED or Outpatient Facility Presentation <p>Recommendation Class I</p> <ol style="list-style-type: none"> 1. Patients with a suspected ACS with chest discomfort at rest for > 20 min, hemodynamic instability, or recent syncope or presyncope should be strongly considered for immediate referral to an ED or a specialized chest pain unit. Other patients with a suspected ACS may be seen initially in an ED, a chest pain unit, or an outpatient facility. (<i>Level of Evidence: C</i>). 	Health Services Research
Means of Transport	<p>The categories of the means by which the patient was transported to the facility are:</p> <ol style="list-style-type: none"> 1. Self/family 2. Ambulance 3. Mobile ICU 4. Air (helicopter) transfer from another facility 5. Ambulance transfer from another acute care facility 	Centocor	<p>ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)</p> <p>Pg. 978</p> <p>“Transport as a passenger in a private vehicle is an acceptable alternative only if the wait for an emergency vehicle would impose a delay of >20 to 30 min.”</p>	Health Services Research

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Killip Class	Killip classes of the patient at the time of hospital admission are: <ol style="list-style-type: none"> 1. <u>Class 1</u>: Absence of rales over the lung fields and absence of S3 2. <u>Class 2</u>: Rales over 50% or less of the lung fields or the presence of an S3 3. <u>Class 3</u>: Rales over more than 50% of the lung fields 4. <u>Class 4</u>: Shock 	NRMI Centocor GRACE	TIMI16 (35) Lee et al., Predictors of 30-day mortality in the era of reperfusion for acute myocardial infarction (20) ACC/AHA Guidelines for the Management of Patients with Acute Myocardial Infarction (11) Pg. 1357 Figure 9. Influence of clinical characteristics on 30-day mortality after myocardial infarction in patients treated with thrombolytic agents based on experience from the GUSTO trial.	Clinical Risk Factor
Heart Rate	Heart rate (beats per minute) should be the first recording that was done closest to the time of presentation to the health care facility.	NRMI Centocor GRACE	TIMI-11B (7) Lee et al., Predictors of 30-day mortality in the era of reperfusion for acute myocardial infarction (20) ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 982 “ Every patient with suspected ACS should have his or her vital signs measured (blood pressure in both arms, heart rate, temperature) and undergo a thorough cardiovascular and chest examination.”	Clinical Risk Factor

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Systolic and Diastolic Pressure	Supine systolic and diastolic blood pressure (mmHg) should be the first recording that was done closest to the time of presentation to the health care facility.	NRMI Centocor GRACE	TIMI-11B (7) Lee et al., Predictors of 30-day mortality in the era of reperfusion for acute myocardial infarction (20) ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 982 “ Every patient with suspected ACS should have his or her vital signs measured (blood pressure in both arms, heart rate, temperature) and undergo a thorough cardiovascular and chest examination.”	Risk Adjustment Clinical Risk Factor
Height	Patient’s height in centimeters or inches	GRACE NCDR Centocor NRMI	ACC/AHA Guidelines for the Management of Patients with Acute Myocardial Infarction (11) Pg. 1357 Figure 9. Influence of clinical characteristics on 30-day mortality after myocardial infarction in patients treated with thrombolytic agents based on experience from the GUSTO trial.	Clinical Risk Factor

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Weight	Patient's weight in kilograms or pounds	NRMI Centocor NCDR	ACC/AHA Guidelines for the Management of Patients with Acute Myocardial Infarction (11) Pg. 1357 Figure 9. Influence of clinical characteristics on 30-day mortality after myocardial infarction in patients treated with thrombolytic agents based on experience from the GUSTO trial.	Clinical Risk Factor

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Angina Type	<p>Category of patient's angina type if present (choose one):</p> <p>I. Atypical Chest Pain: Pain, pressure or discomfort in the chest, neck or arms not clearly exertional or not otherwise consistent with pain or discomfort of myocardial ischemic origin.</p> <p>II. Stable Angina: Angina without a change in frequency or pattern for the six weeks prior to this procedure. Angina is controlled by rest and/or oral or transcutaneous medications.</p> <p>III. Acute Coronary Syndrome (ACS): Choose one:</p> <p>B. Unstable Angina: The patient was hospitalized for unstable angina documented in the medical record with serial ECG's and biochemical profiles. One of the following criteria are necessary:</p> <ol style="list-style-type: none"> 4. Angina occurring at rest and prolonged, usually > 20 minutes 5. New onset angina of at least Canadian Cardiovascular Society (CCS) Classification III severity. 6. Recent acceleration of angina reflected by an increase in severity of at least one CCS class to at least CCS Class III. The patient must also NOT have any biochemical evidence of myocardial necrosis. <p>B. Non-ST Elevation Myocardial Infarction (NSTEMI): The patient was hospitalized for a myocardial infarction documented in the medical record.</p> <p>AT LEAST ONE OF THE FOLLOWING BIOCHEMICAL INDICATORS for detecting myocardial necrosis must be present (see below for a definition of Reference Control Limits):</p> <ol style="list-style-type: none"> 1. Troponin T or I: <ol style="list-style-type: none"> a. Maximal concentration of troponin T or I > the MI decision limit on at least one occasion during the first 24 hours after the index clinical event. 	NCDR Centocor GRACE	<p>ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)</p> <p>Pg. 978 Recommendations for Early Risk Stratification Class I. 2. Patients who present with chest discomfort should undergo early risk stratification that focuses on anginal symptoms, physical findings, ECG findings, and biomarkers of cardiac injury. (<i>Level of Evidence: B</i>)</p> <p>ESC/ACC Consensus Conference – Myocardial Infarction Redefined (13)</p>	<p>Risk Adjustment</p> <p>Clinical Risk Factor</p>

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Angina Type (continued)	<p>2. CK-MB:</p> <ul style="list-style-type: none"> a. Maximal value of CK-MB > 2 x the upper limit of normal on one occasion during the first hours after the index clinical event. OR b. Maximal value of CK-MB, preferable CK-MB mass, > upper limit of normal on two successive samples. <p>3. Total CK:</p> <ul style="list-style-type: none"> a. In the absence of availability of a troponin or CK-MB assay, total CK > 2 x the upper limit of normal, or the B fraction of CK may be employed, but these last two biomarkers are considerably less satisfactory than CK-MB. <p>AND ONE OF THE FOLLOWING:</p> <ul style="list-style-type: none"> 1. Either ST segment depression or T wave abnormalities; or 2. Ischemic symptoms in the presence or absence of chest discomfort. Ischemic symptoms may include: <ul style="list-style-type: none"> a. unexplained nausea and vomiting; or b. persistent shortness of breath secondary to left ventricular failure; or c. unexplained weakness, dizziness, lightheadedness, or syncope. <p>C. <u>ST Elevation Myocardial Infarction (STEMI)</u>. Indicate whether the patient was hospitalized for an ST Elevation Myocardial Infarction (STEMI) documented in the medical record.</p> <p>AT LEAST ONE OF THE FOLLOWING BIOCHEMICAL INDICATORS for detecting myocardial necrosis must be present (see below for a definition of Reference Control Limits):</p> <ul style="list-style-type: none"> 1. Troponin T or I: <ul style="list-style-type: none"> a. Maximal concentration of troponin T or I > the MI decision limit on at least one occasion during the first 24 hours after the index clinical event. 			

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Angina Type (continued)	<p>2. CK-MB:</p> <ul style="list-style-type: none"> a. Maximal value of CK-MB > 2 x the upper limit of normal on one occasion during the first hours after the index clinical event; OR b. Maximal value of CK-MB, preferable CK-MB mass, > upper limit of normal on two successive samples. <p>3. Total CK</p> <ul style="list-style-type: none"> a. In the absence of availability of a troponin or CK-MB assay, total CK > 2 x the upper limit of normal, or the B fraction of CK may be employed, but these last two biomarkers are considerably less satisfactory than CK-MB. 			
	<p>AND ONE OF THE FOLLOWING ECG CHANGES:</p> <ul style="list-style-type: none"> 1. ST-segment elevation: New or presumed new ST segment elevation at the J point in two or more contiguous leads with the cut-off points ≥ 0.2 mV in leads V1, V2, or V3, or ≥ 0.1 mV in other leads; OR 2. Development of any Q wave in leads V1 through V3, or the development of a Q-wave $>$ or $=$ to 30 ms (0.03s) in leads I, II, aVL, aVF, V4, V5, or V6. (Q wave changes must be present in any two contiguous leads, and be $>$ or $=$ to 1mm in depth.) 			
	<p>Defining Reference Control Values (MI Diagnostic Limit and Upper Limit of Normal): Reference values must be determined in each laboratory by studies using specific assays with appropriate quality control, as reported in peer-reviewed journals. Acceptable imprecision (coefficient of variation) at the 99th percentile for each assay should be defined as $<$ or $=$ to 10%. Each individual laboratory should confirm the range of reference values in their specific setting.</p>			
	<p>Special Circumstances:</p> <ul style="list-style-type: none"> • <i>For patients with admission MI</i>, the CK-MB associated with the recurrent MI must be increased by at least 50% of the previous value. • <i>For patients within 24 hours post PCI</i>, the CK-MB (or CK if MB not available) must be $\geq 3x$ upper limit of normal. • <i>For patients within 24 hours post CABG</i>, the CK-MB (or CK if MB not available) must be $\geq 5x$ upper limit of normal, and new Q waves must be present as defined above. 			

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Number of Episodes of Angina in Last 24 Hours	Number of distinct episodes of anginal pain that occurred in the last 24 hours prior to hospital admission.		TIMI (21,22)	Risk Adjustment
			ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)	Clinical Risk Factor
Secondary Cause of Angina (yes/no)	Note whether the angina was precipitated by a secondary factor such as fever, anemia, hypoxemia, tachycardia, thyrotoxicosis, or severe valvular disease, as defined by Braunwald (38)		Pg. 982 "The tempo of angina is characterized by an assessment of changes in the duration of episodes, their frequency, and the anginal threshold."	Risk Adjustment
			Braunwald, E. Unstable Angina: A Classification (38)	Risk Adjustment
			ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)	Clinical Risk Factor
			Pg. 975 "Secondary UA is precipitated by conditions that 1) increase myocardial oxygen requirements, such as fever, tachycardia, and thyrotoxicosis; 2) reduce coronary blood flow, such as hypotension; or 3) reduce myocardial oxygen delivery, such as anemia or hypoxemia."	

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
<i>ECG Findings</i>				
First 12-Lead ECG: Date and Time	Note date and time the first 12-lead ECG was performed for acute episode (whether in a pre-hospital setting, ED, or on an inpatient unit).	NRMI Centocor GRACE	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 978 Recommendations for Early Risk Stratification Class I 3. A 12-lead ECG should be obtained immediately (within 10 min.) in patients with ongoing chest discomfort and as rapidly as possible in patients who have a history of chest discomfort consistent with ACS but whose discomfort has resolved by the time of evaluation. (<i>Level of Evidence: C</i>)	Performance Measurement Health Services Research

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Location of ECG Changes	<p>The location of each type of ECG change listed below can be broken into three categories:</p> <ol style="list-style-type: none"> 1. <u>Inferior leads</u>: II, III, aVF 2. <u>Anterior leads</u>: V1 to V4 3. <u>Lateral leads</u>: I, aVL, V5 to V6 <p>Consideration can be made of recording posterior ST segment changes, the maximal amount of ST (if applicable), and/or number of leads with ST.</p>	GRACE	<p>TIMI (21,22)</p> <p>ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)</p> <p>Pg. 983 “Acute reperfusion therapy is contraindicated for ACS patients without ST-segment elevation, except for those with isolated acute posterior infarction manifested as ST-segment depressions in leads V1 to V3 and/or isolated ST-segment elevation in posterior chest leads.”</p>	<p>Risk Adjustment</p> <p>Clinical Risk Factor</p>
Type of ECG Changes	<ol style="list-style-type: none"> 1. ST segment elevation indicates ≥ 1 mm elevation in 2 or more contiguous leads. 	NRMI Centocor GRACE	<p>ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)</p> <p>Pg. 983 “The diagnosis of AMI is confirmed with serial cardiac markers in >90% of patients who present with ST-segment elevation of ≥ 0.1 mV in ≥ 2 contiguous leads, and such patients should be considered potential candidates for acute reperfusion therapy.”</p>	<p>Performance Measurement</p> <p>Clinical Risk Factor</p>

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Type of ECG Changes (continued)	2. ST segment depression of at least 0.5 mm in 2 or more contiguous leads (includes reciprocal changes).	Centocor GRACE NRMI	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)	Performance Measurement Clinical Risk Factor
			Pg. 983 "Patients who present with ST-segment depression are initially considered to have either UA or NSTEMI; the distinction between the 2 diagnoses is based ultimately on the detection in the blood of markers of myocardial necrosis."	
Type of ECG Changes (continued)	3. T wave inversion of at least 1 mm including inverted T waves that are not indicative of acute MI.	Centocor GRACE NRMI	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)	Clinical Risk Factor
			Pg. 983 "Inverted T waves may also indicate ischemia or non-Q-wave infarction."	
Type of ECG Changes (continued)	4. Q Waves refers to the presence Q waves that are > 0.03 seconds in width and/or \geq one-third of the total QRS complex in at least two contiguous leads	NRMI Centocor GRACE	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)	Clinical Risk Factor
			Pg. 983 "Established Q waves \geq 0.04 s are also less helpful in the diagnosis of UA, although by suggesting prior MI, they do indicate a high likelihood of significant CAD."	

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
BBB and Type	The presence of left bundle branch block or right bundle branch block should be noted.		ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)	Performance Measurement
Rhythm	The categories of rhythm are: 1. Sinus rhythm, 2. Atrial fibrillation (or flutter), 3. Paced 4. Other rhythm (e.g. ventricular tachycardia, supraventricular tachycardia)	Centocor GRACE	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)	Clinical Risk Factor
			Pg. 983 “Patients with ACS and confounding ECG patterns such as bundle branch block, paced rhythm, or LV hypertrophy are at the highest risk for death, followed by patients with ST-segment deviation (ST-segment elevation or depression); at the lowest risk are patients with isolated T-wave inversion or normal ECG patterns.”	
			Pg. 994 “Patients should undergo continuous ECG monitoring during their ED evaluation and early hospital phase, because sudden, unexpected ventricular fibrillation is the major preventable cause of death in this early period.”	

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
ST Elevation Lead V4R	If right-sided precordial leads are performed, the presence or absence of ST segment elevation ≥ 1 mm in lead V4R should be noted.		<p>ACC/AHA Guidelines for the Management of Patients with Acute Myocardial Infarction (11)</p> <p>Pg. 1346 Thrombolysis</p> <p>Recommendation Class I 1. ST elevation (greater than 0.1 mV, two or more contiguous leads) time to therapy 12 hours or less, age less than 75 years. <i>Comment:....Benefit is less with inferior acute MI, except for the subgroup with associated right ventricular infarction (ST elevation RV-4) or anterior-segment depression.</i></p>	Clinical Risk Factor

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Follow-up ECG: New Q waves	If a follow-up ECG is performed (at least 6 hours after the initial ECG, the presence or absence of new Q waves that are > 0.03 seconds in width and/or \geq one-third of the total QRS complex in at least two contiguous leads not seen on initial ECG	GRACE	<p>ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)</p> <p>Pg. 988 C. Immediate Management</p> <p>Recommendations Class I 2. Patients with definite or possible ACS, but whose initial 12-lead ECG and cardiac marker levels are normal, should be observed in a facility with cardiac monitoring (e.g., chest pain unit), and a repeat ECG and cardiac marker measurement should be obtained 6 to 12 h after the onset of symptoms (<i>Level of Evidence: B</i>)</p>	<p>Health Services Research</p> <p>Performance Measurement</p>

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
<i>Laboratory Tests</i>				
Creatine Kinase (CK):		Centocor	ESC-ACC Consensus Conference Myocardial Infarction Redefined (13) Pg. 961 "Measurement of total CK is not recommended for the routine diagnosis of acute MI, because of the wide tissue distribution of this enzyme."	Health Services Research Performance Measurement
• Upper Limit Normal	The upper limit of normal of total CK as defined by individual hospital laboratory standards	GRACE	ESC-ACC Consensus Conference Myocardial Infarction Redefined (13) Pg. 961 "Reference values must be determined in each laboratory by studies using specific assays with appropriate quality control, as reported in peer-review journals.... Each individual laboratory should confirm the range of reference values in their specific setting."	Performance Measurement Health Services Research
• Unit	The units of the CK and type of units (I.U., kCat/L) should be noted.	GRACE		Performance Measurement Health Services Research

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
• First Value	The first value should be noted.	GRACE	ESC-ACC Consensus Conference Myocardial Infarction Redefined (13) Pg. 961 “In most situations, elevated values for biomarkers should be recorded from two successive blood samples to diagnose MI.”	Performance Measurement Health Services Research
• Peak Value	The highest value during the hospitalization should be noted.	GRACE	ESC-ACC Consensus Conference Myocardial Infarction Redefined (13) Pg. 961 “In most situations, elevated values for biomarkers should be recorded from two successive blood samples to diagnose MI.”	Performance Measurement Health Services Research

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Creatine Kinase-MB:		Centocor	<p>ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)</p> <p>Pg. 978 Recommendations for Early Risk Stratification Class I 4. Biomarkers of cardiac injury should be measured in all patients who present with chest discomfort consistent with ACS. A cardiac-specific troponin is the preferred marker, and if available, it should be measured in all patients. CK-MB by mass assay is also acceptable. In patients with negative cardiac markers within 6 h of the onset of pain, another sample should be drawn in the 6- to 12-h time frame (e.g., at 9 h after the onset of symptoms). (<i>Level of Evidence: C</i>).</p>	<p>Performance Measurement</p> <p>Health Services Research</p>
<ul style="list-style-type: none"> Upper Limit of Normal 	<p>The upper limit of normal of CK-MB as defined by individual hospital laboratory standards.</p>	NCDR	<p>ESC-ACC Consensus Conference Myocardial Infarction Redefined (13)</p> <p>Pg. 961 “Reference values must be determined in each laboratory by studies using specific assays with appropriate quality control, as reported in peer-review journals.... Each individual laboratory should confirm the range of reference values in their specific setting.”</p>	<p>Performance Measurement</p>

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
• Units	The units of the CK-MB and type of units (I.U., %, index, ng/dl, kCat/L) should be noted.			Performance Measurement
• First Value	The first value should be noted.	NCDR GRACE	ESC-ACC Consensus Conference Myocardial Infarction Redefined (13) Pg. 961 “In most situations, elevated values for biomarkers should be recorded from two successive blood samples to diagnose MI.”	Performance Measurement
• Peak Value	The highest value during the hospitalization should be noted.	NCDR GRACE	ESC-ACC Consensus Conference Myocardial Infarction Redefined (13) Pg. 961 “In most situations, elevated values for biomarkers should be recorded from two successive blood samples to diagnose MI.”	Performance Measurement

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Troponin T or Troponin I:			<p>ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)</p> <p>Pg. 978 Recommendations for Early Risk Stratification Class I 4. Biomarkers of cardiac injury should be measured in all patients who present with chest discomfort consistent with ACS. A cardiac-specific troponin is the preferred marker, and if available, it should be measured in all patients. CK-MB by mass assay is also acceptable. In patients with negative cardiac markers within 6 h of the onset of pain, another sample should be drawn in the 6- to 12-h time frame (e.g., at 9 h after the onset of symptoms). (<i>Level of Evidence: C</i>).</p>	
• Troponin Type	Check which type: <input type="checkbox"/> T <input type="checkbox"/> I	Centacor GRACE	<p>ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)</p> <p>Pg. 984 “Elevated levels of cTnT or cTnI convey prognostic information beyond that supplied by the clinical characteristics of the patient, the ECG at presentation, and a pre-discharge exercise test.”</p>	Performance Measurement

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
• Units	The units of troponin (mg/dL) should be noted.			
• Upper Limit of Normal	Indicate the upper limit of normal (usually the 99 th percentile of a normal population) and the units.		<p>ESC-ACC Consensus Conference Myocardial Infarction Redefined (13)</p> <p>Pg. 961 “Reference values must be determined in each laboratory by studies using specific assays with appropriate quality control, as reported in peer-review journals.... Each individual laboratory should confirm the range of reference values in their specific setting.”</p>	Performance Measurement
• First Value	The value of the first measurement of troponin T or I and the units should be noted.	GRACE	<p>ESC-ACC Consensus Conference Myocardial Infarction Redefined (13)</p> <p>Pg. 961 “In most situations, elevated values for biomarkers should be recorded from two successive blood samples to diagnose MI.”</p>	Performance Measurement
• Peak Value	The peak value of troponin T or I and the units should be noted.	GRACE	<p>ESC-ACC Consensus Conference Myocardial Infarction Redefined (13)</p> <p>Pg. 961 “In most situations, elevated values for biomarkers should be recorded from two successive blood samples to diagnose MI.”</p>	Performance Measurement

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Serum Cholesterol Level	The first total serum cholesterol level and type of units	Centocor GRACE	ACC/AHA Guidelines for the Management of Patients with Acute Myocardial Infarction (11) Pg. 1396 “The National Cholesterol Education Panel II has recommended that a complete blood lipid profile be taken in all patients with established coronary heart disease. In the infarct patient, this should be done at the time of admission or no later than the first 24 hours...”	Clinical Risk Factors
LDL	First serum low density lipoprotein level (LDL) and units (either calculated or direct, if measured)	GRACE	Executive Summary of The Third Report of the National Cholesterol Education Program (NCEP) (14) Pg. 14 “ In persons admitted to the hospital for a major coronary event, LDL cholesterol should be measured on admission or within 24 hours.”	Clinical Risk Factor
HDL	First serum high density lipoprotein (HDL) level and units		ACC/AHA Guidelines for the Management of Patients with Acute Myocardial Infarction (11) Pg. 1396 “The National Cholesterol Education Panel II has recommended that a complete blood lipid profile be taken in all patients with established coronary heart disease. In the infarct patient, this should be done at the time of admission or no later than the first 24 hours...”	Clinical Risk Factor

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Serum Creatinine	First creatinine level and the type of units	GRACE		Clinical Risk Factor Performance Measurement
Cardiac Procedures				
Stress Test	Indicate whether a exercise tolerance or pharmacologic stress test was performed during the hospital stay.	NRMI GRACE	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 1010 C. Risk Stratification Recommendations Class I 3. Choice of stress test is based on the resting ECG, ability to perform exercise, local expertise, and technologies available. Treadmill exercise is suitable in patients able to exercise in whom the ECG is free of baseline ST-segment abnormalities, bundle-branch block, LV hypertrophy, intraventricular conduction defect, paced rhythm, preexcitation, and digoxin effect. (Level of Evidence: C)	Outcomes Analysis Procedure Description
Date	The date that the exercise tolerance or pharmacologic stress test was performed.	GRACE		Procedure Description

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Type of Test Categories:	<ul style="list-style-type: none"> ECG Alone, or Either Radionuclide or Echo Test involved only electrocardiographic (ECG) monitoring, or included either radionuclide (perfusion) imaging (e.g., thallium, Sestamibi), or echocardiography (Echo).	NRMI GRACE	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 1010 C. Risk Stratification Recommendations Class I 3. Choice of stress test is based on the resting ECG, ability to perform exercise, local expertise, and technologies available. Treadmill exercise is suitable in patients able to exercise in whom the ECG is free of baseline ST-segment abnormalities, bundle-branch block, LV hypertrophy, intraventricular conduction defect, paced rhythm, preexcitation, and digoxin effect. <i>(Level of Evidence: C)</i>	Procedure Description

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
<ul style="list-style-type: none"> Maximal or Submaximal 	Maximal stress test (symptom limited) or a submaximal test (e.g., modified Bruce protocol ending with Stage 1 or Stage 2).		ACC/AHA Guidelines for the Management of Patients with Acute Myocardial Infarction (11)	
			Pg. 1386 Noninvasive Evaluation of Low-Risk Patients Recommendations Class I 1. Stress ECG a. Before discharge for prognostic assessment or functional capacity (submaximal at 4 to 6 days or symptom limited at 10 to 14 days).	
Ischemia Result (Positive, Negative, Equivocal)	<ol style="list-style-type: none"> <u>Positive</u>: On an exercise tolerance test the patient developed either: <ol style="list-style-type: none"> Both ischemic discomfort and ST shift ≥ 1 mm New ST shift ≥ 2 mm felt to represent ischemia even in the absence of ischemic discomfort If the patient had an equivalent type of exercise test (e.g. exercise thallium or MIBI test, stress Echo, persantine [dipyridamole] thallium, or adenosine radioisotope scan) that showed definite evidence of ischemia (e.g. an area of clear reversible ischemia) this should be considered a positive test. <u>Negative</u>: No evidence of ischemia (i.e., no typical angina pain and no ST shifts). <u>Equivocal</u>: Either: <ol style="list-style-type: none"> Typical ischemic pain but no ST shift ≥ 1 mm or ST shift 1 mm, but no ischemic discomfort. 	NCDR (adapted) GRACE	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 1011 “The goals of noninvasive testing are to 1) determine the presence or absence of ischemia in patients with a low likelihood of coronary artery disease and 2) estimate prognosis.”	Outcomes Analysis

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Imaging Testing	Note presence or absence of a fixed defect indicating an old MI.		ACC/AHA Guidelines for the Management of Patients with Acute Myocardial Infarction (11) Pg. 1389 “Localized perfusion defects occur in a high percentage of patients with acute LV infarction associated with coronary occlusion. However, such perfusion defects do not distinguish between acute ischemia, acute infarction, or previous infarction.”	
Ejection Fraction	The first ejection fraction obtained during the hospital stay. It is the percent of blood emptied from the ventricle at the end of contraction and can be obtained in preferred order from a left ventriculogram, MUGA Scan, Echocardiogram. If only a range is estimated for EF, the midpoint of the range should be the value noted.	NCDR (adapted) GRACE NRMI	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 1011 Class IIa 1. A noninvasive test (echocardiogram or radionuclide angiogram) to evaluate LV function in patients with definite ACS who are not scheduled for coronary arteriography and left ventriculography. (<i>Level of Evidence: C</i>)	Risk Adjustment

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Ejection Fraction Test	<p>Note type of test used for EF:</p> <ol style="list-style-type: none"> 1. Contrast, 2. Ventriculography, or 3. Non-invasive testing <p>Note also if it was <u>estimated</u> or <u>calculated</u>.</p>	NCDR	<p>ACC/AHA Guidelines for the Management of Patients with Acute Myocardial Infarction (11)</p> <p>Pg. 1389 “Multiple techniques for assessing LV function of patients after infarction have been shown to have important prognostic value and include such basic principles as clinical estimates based on patients’ symptoms..., physical findings..., and measurement of ejection fraction by contrast ventriculography, radionuclide ventriculography, and two-dimensional echocardiography.”</p>	
Cardiac Catheterization/ Angiography	Diagnostic cardiac catheterization/angiography performed during the hospital stay.	NRMI Centocor GRACE	<p>ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)</p> <p>Pg. 1013 “<i>In the early conservative strategy, coronary angiography is reserved for patients with evidence of recurrent ischemia...or a strongly positive stress test, despite vigorous medical therapy.</i>”</p>	Health Services Research Performance Measurement
Date of Procedure	Date the procedure was performed.	NCDR Centocor GRACE		Health Services Research

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Maximum Stenosis by Vessel (LAD, LCX, RCA, LM, Graft)	<p>Stenosis represents the percentage occlusion, from 0 to 100, associated with the identified vessel systems. Percent stenosis at its maximal point is estimated to be the amount of reduction in the diameter of the “normal” vessel proximal to the lesion. For the denominator, take the maximal internal lumen diameter proximal and distal to the lesion. In instances where multiple lesions are present, enter the highest percentage stenosis noted. The systems of interest are as follows and should include major branch vessels of >2.0 mm in diameter.</p> <ol style="list-style-type: none"> 1. Greatest stenosis assess in the LAD or any major branch vessel. If no stenosis enter 0. 2. Greatest stenosis assess in the LCX or any major branch vessel. If no stenosis enter 0. 3. Greatest stenosis assess in the RCA or any major branch vessel. If no stenosis enter 0. 4. Greatest stenosis assess in the LM. If no stenosis enter 0. 5. Greatest stenosis assess in the Graft. If no stenosis enter 0. 	NCDR GRACE	<p>ACC/AHA Guidelines for Coronary Angiography (33)</p> <p>Pg. 1791-92 “Stenosis severity may be estimated visually, but is more accurately estimated by electric or digital means, with percent stenosis defined as the ratio of reference luminal diameter divided by the reference diameter vessel measurement.”</p>	
Culprit Artery	<p>Vessel considered to be responsible for the acute coronary syndrome. The investigator should use his/her judgement in choosing the primary vessel. In cases where it is difficult to determine (despite correlation of ECG changes and angiographic data) the vessel supplying the largest territory of myocardium should be selected. Only indicate “none” if there is no apparent coronary vessel lesion that could be responsible evidence of ischemia</p> <ol style="list-style-type: none"> 1. LAD 2. LCX 3. RCA 4. LM 5. Graft 6. Unknown 7. None 	GRACE	<p>TIMI (21,22)</p> <p>ACC/AHA Guidelines for Coronary Angiography (33)</p> <p>Pg. 1791 “Coronary artery lesions can be described by their location, severity, and classification.”</p>	Clinical Risk Factor

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Culprit Artery TIMI Flow	<p>The TIMI grade flow in the culprit artery is defined as:</p> <ol style="list-style-type: none"> 1. <u>Grade 0 (no perfusion)</u>: There is no antegrade flow beyond the point of occlusion 2. <u>Grade 1 (penetration without perfusion)</u>: The contrast material passes beyond the area of obstruction but “hangs up” and fails to opacify the entire coronary bed distal to the obstruction for the duration of the cineangiographic filming sequence. 3. <u>Grade 2 (partial perfusion)</u>: The contrast material passes across the obstruction and opacifies the coronary bed distal to the obstruction. However, the rate of entry of contrast material into the vessel distal to the obstruction or its rate of clearance from the distal bed (or both) are perceptibly slower than its entry into or clearance from comparable areas not perfused by the previously occluded vessel – e.g., the opposite coronary artery or the coronary bed proximal to the obstruction. 4. <u>Grade 3 (complete perfusion)</u>: Antegrade flow into the bed distal to the obstruction occurs as promptly as antegrade flow into the bed from the involved bed is as rapid as clearance from an uninvolved bed in the same vessel or the opposite artery. 	NCDR	<p>TIMI (21,22)</p> <p>ACC/AHA Guidelines for Coronary Angiography (33)</p> <p>Pg. 1792 “In addition to the above characteristics of coronary lesions, a scaled qualitative measurement of flow through the stenosis has been proposed...for the TIMI investigators. Table 10 describes TIMI flow grades for native coronary vessels, collateral vessels, and coronary bypass graft conduits.”</p> <p>Table 10. Distal Flow of Native Vessel, Collaterals, and Grafts</p>	Clinical Risk Factor

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Percutaneous Coronary Intervention (PCI)	PCI performed	NRMI Centocor GRACE NCDR	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 1019-20 Recommendations for Revascularization with PCI and CABG in Patients with UA/NSTEMI Class I 4. PCI or CABG for patients with 1- or 2-vessel CAD without significant proximal left anterior descending CAD but with a large area of viable myocardium and high-risk criteria on noninvasive testing. (<i>Level of Evidence: B</i>)	Performance Measurement Health Services Research
Date of Procedure	Date the PCI performed	NRMI Centocor		Health Services Research

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Time of First Balloon Inflation	Time of the first balloon inflation or stent placement. If the exact time of first balloon inflation or initial stent (if no balloon) placement is not known, the time of the start of the procedure.	NRMI Centocor GRACE NCDR	<p>ACC/AHA Guidelines for Percutaneous Coronary Intervention (32)</p> <p>Pg. 2239xxxi Recommendations for Primary PCI for Acute Transmural MI Patients as an Alternative to Thrombolysis</p> <p>Class I 1. As an alternative to thrombolytic therapy in patients with AMI and ST-segment elevation or new or presumed new left bundle branch block who can undergo angioplasty of the infarct artery ≤ 12 h from the onset of ischemic symptoms or >12 h if symptoms persist, if performed in a timely fashion* by individuals skilled in the procedure and supported by experienced personnel in an appropriate laboratory environment. (<i>Level of Evidence: A</i>)</p> <p>*Performance standard: balloon inflation within 90 ± 30 min of hospital admission.</p> <p>Cannon, C.P., et al. Oral glycoprotein IIb/IIIa inhibition with orbofiban in patients with unstable coronary syndromes (OPUS-TIMI 16) trial (35)</p>	Performance Measures JCAHO- Timing of emergent PTCA w/AM HCFA- National AMI Project

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
PCI Status	Note the status of the PCI using the following categories: I. <u>Elective</u> : The procedure could be deferred without increase risk of compromised cardiac outcome. II. <u>Urgent</u> : All of the following conditions are met: A. Not elective B. Not emergency C. Procedure required during same hospitalization in order to minimize chance of further clinical deterioration. III. <u>Emergency</u> : The patient's clinical status includes any of the following: A. Ischemic dysfunction (any of the following) 1. Ongoing ischemia including rest angina despite maximal medical therapy (medical and/or IABP); 2. Acute Evolving MI within 24 hours before intervention; or 3. Pulmonary edema requiring intubation B. Mechanical dysfunction (either of the following): 1. Shock with circulatory support; or 2. Shock without circulatory support. IV. <u>Salvage</u> : The patient is undergoing CPR en route to the Lab	NCDR Centocor GRACE NRMI	ACC/AHA Guidelines for Percutaneous Coronary Intervention (32) Pg. 2239xi Table 6. Clinical Risk Factors Associated with In-Hospital Adverse Events.	Clinical Risk Factor
Number of Lesions Attempted	Number of lesions into which an attempt was made to pass a guidewire, whether successful or not.	NCDR Centocor GRACE		Procedural Description Health Services Research
Number of Stents Placed	Number of stents placed	Centocor GRACE NRMI	ACC/AHA Guidelines for Percutaneous Coronary Intervention (32) Pg. 2239xxvii "Intracoronary stents appear to augment the results of PCI for MI."	Health Services Research

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Number of Lesions Successfully Dilated	Number of lesions where the residual post-intervention stenosis is <50% of the arterial luminal diameter, TIMI Flow is 3, and the minimal decrease in stenosis was 20%.	NCDR Centocor	ACC/AHA Guidelines for Percutaneous Coronary Intervention (32) Pg. 2239v “The consensus definition prior to the widespread use of stents was the achievement of a minimum stenosis diameter reduction to <50% in the presence of grade 3 TIMI flow (assessed by angiography)”	Health Services Research
GP IIb/IIIa Blockade	Whether GP IIb/IIIa was contraindicated or when initial dose was first administered: 1=Contraindicated 2=Before cath lab visit 3=Immediately preceding PCI 4=During PCI, but after initial balloon inflation 5=After cath lab visit		ACC/AHA Guidelines for Percutaneous Coronary Intervention (32) <i>Pgs. 2239xxxix-xlii</i>	
GP IIb/IIIa Blocker Administered	GP IIb/IIIa Blocker administered—indicate the exact drug used. For example, coding could be as follows: 0=none 1=abciximab (ReoPro) 2=eptifibatide (Integrilin) 3=tirofiban (Aggrastat) 4=trial-based agent (not listed above or randomized blindly between 2 agents) 5=other	NCDR GRACE Centocor	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 1020 Recommendations for Revascularization with PCI and CABG in Patients with UA/NSTEMI Class I 6. Intravenous platelet GP IIb/IIIa inhibitor in UA/NSTEMI patients undergoing PCI (<i>Level of Evidence: A</i>)	Performance Measurement

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
CABG	CABG procedure performed during this admission.	NCDR NRMI Centocor GRACE	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 1019 Recommendations for Revascularization with PCI and CABG in Patients with UA/NSTEMI Class I 1. CABG for patients with significant left main CAD. (<i>Level of Evidence: A</i>)	Procedural Description Health Services Research
Date of Procedure	Date CABG procedure performed during this admission.	NCDR Centocor GRACE		Procedural Description
Intra-Aortic Balloon Pump	Intra-aortic balloon pump (IABP) used during this admission.	NCDR NRMI GRACE	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 994 “A few patients will require prompt triage to emergency or urgent cardiac catheterization and/or the placement of an IABP.”	Procedural Description
Pulmonary Artery Catheter	Pulmonary artery (Swan Ganz) catheter used during this admission	GRACE		Procedural Description

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Permanent Pacemaker	Permanent pacemaker placed during this admission	GRACE (ICD) NRMI	ACC/AHA Guidelines for the Management of Patients with Acute Myocardial Infarction (11) Pg. 1368 "Indications for permanent pacing after acute MI in patients experiencing conduction disturbances are related primarily to the degree and type of AV block and do not necessarily depend on the presence of symptoms."	Procedural Description
Ventilator	Intubation and need for respiratory support on a ventilator.	GRACE		Procedural Description
Medications	<i>For all the medications listed below, their use at three time points should be noted:</i> <ol style="list-style-type: none"> 1. <i>Prior to hospital admission (i.e., chronic therapy)</i> 2. <i>During the first 24 hours after hospital admission (which does include medications given in the immediate pre-hospital [ambulance] setting)</i> 3. <i>Hospital discharge</i> 4. <i>Contraindicated</i> 			
Thrombolytic Therapy	Thrombolytic therapy administered. Note the exact drug used.	NCDR (adapted) GRACE NRMI Centocor	ACC/AHA Guidelines for the Management of Patients with Acute Myocardial Infarction (11) <i>Pg. 1340</i>	Risk Adjustment (Type used)

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Date and Time Thrombolytic Initiated	Date and time the IV thrombolytic was initiated. If initiated by a bolus dose, note date and time the bolus was administered.	NRMI NCDR (adapted) GRACE Centocor	ACC/AHA Guidelines for the Management of Patients with Acute Myocardial Infarction (11) Pg. 1340 Recommendation Class I 1. Emergency department acute MI protocol...door-to needle time that is less than 30 minutes.	Performance Measurement JCAHO-HCFA- Timely reperfusion
IV Nitrates	Intravenous nitroglycerin was administered.	Centocor GRACE NRMI	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 993 Recommendations for Anti-Ischemic Therapy Class I 2. NTG, sublingual tablet or spray, followed by intravenous administration, for the immediate relief of ischemia and associated symptoms. (<i>Level of Evidence: C</i>)	Performance Measurement Health Services Research

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Nitrates (Oral or Topical)	Oral or topical nitroglycerin was administered. Commonly prescribed agents include isorbide dinitrate, isorbide mononitrate, pentaerythritol tetranitrate, Nitrodur transdermal infusion system, Nitroglycerin paste, sublingual nitro, or nitro spray used on an as-needed basis should not be noted in this category.	GRACE Centocor	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 993 Recommendations for Anti-Ischemic Therapy Class I 2. NTG, sublingual tablet or spray, followed by intravenous administration, for the immediate relief of ischemia and associated symptoms. (<i>Level of Evidence: C</i>)	Performance Measurement Health Services Research
IV Beta-Blockers	Intravenous beta-blockers administered. Some forms of IV beta-blockers include: atenolol, metoprolol, propranolol, timolol, esmolol, and labetalol.	Centocor GRACE NRMI	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 993 Recommendations for Anti-Ischemic Therapy Class I 5. A β -blocker, with the first dose administered intravenously if there is ongoing chest pain, followed by oral administration, in the absence of contraindications. (<i>Level of Evidence: B</i>)	Performance Measurement Health Services Research

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Oral Beta-Blockers	Oral beta-blockers administered. Some generic forms of oral beta-blockers include: atenolol, metoprolol, nadolol, pindolol, propranolol, timolol, acebutolol, bucindolol, bisoprolol, and labetalol, carvedolol.	GRACE Centocor	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 993 Recommendations for Anti-Ischemic Therapy Class I 5. A β -blocker, with the first dose administered intravenously if there is ongoing chest pain, followed by oral administration, in the absence of contraindications. (<i>Level of Evidence: B</i>)	Performance Measurement Health Services Research
Calcium Channel Blocker	Calcium channel blockers administered. Some generic forms of calcium channel blockers include: verapamil, nifedipine, diltiazem, nicardipine, nimodipine, nisoldipine, felodipine, and amlodipine.	Centocor GRACE NRMI	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 993 Recommendations for Anti-Ischemic Therapy Class I 6. In patients with continuing or frequently recurring ischemia when β -blockers are contraindicated, a nondihydropyridine calcium antagonist...as initial therapy in the absence of severe LV dysfunction or other contraindications. (<i>Level of Evidence: B.</i>)	Performance Measurement Health Services Research

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Aspirin	Aspirin administered	NCDR Centocor GRACE NRMI	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 999 Recommendations for Antiplatelet and Anticoagulation Therapy Class I 1. Antiplatelet therapy should be initiated promptly. Aspirin is the first choice and is administered as soon as possible after presentation and continued indefinitely. (<i>Level of Evidence: A</i>)	Performance Measurement Health Services Research HCFA- Aspirin on admission JCAHO- Aspirin on admission
Clopidogrel/Ticlopidine	Clopidogrel or ticlopidine administered:	Centocor GRACE NRMI NCDR	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 999 Recommendations for Antiplatelet and Anticoagulation Therapy Class I 2. A thienopyridine...should be administered to patients who are unable to take ASA because of hypersensitivity or major gastrointestinal intolerance. (<i>Level of Evidence: B</i>)	Performance Measurement Health Services Research

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Other Antiplatelet	Another antiplatelet agent, not listed above, administered (e.g., dipyridamole).		<p>ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)</p> <p>Pg. 1002 “Sulfinpyrazone, dipyridamole, prostacyclin, and prostacyclin analogs have not been associated with benefit in UA or NSTEMI and are not recommended.”</p>	Health Services Research
GPIIb/IIIa Blocker	GP IIb/IIIa Blocker administered. Note the exact drug used. Available drugs are abciximab, eptifibatide, tirofiban, trial-based GP IIb/IIIa blocker (i.e., not listed above or randomized blindly between 2 agents), other.	NCDR Centocor GRACE NRMI	<p>ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)</p> <p>Pg. 999 Recommendations for Antiplatelet and Anticoagulation Therapy</p> <p>Class I 4. A platelet GP IIb/IIIa should be administered, in addition to ASA and UFH, to patients with continuing ischemia or with other high-risk features...and to patients in whom a PCI is planned. Eptifibatide and tirofiban are approved for this use. <i>(Level of Evidence: A)</i>. Abciximab can also be used for 12 to 24 h in patients with UA/NSTEMI in whom a PCI is planned within the next 24 h. <i>(Level of Evidence: A)</i></p>	<p>Performance Measurement</p> <p>Health Services Research</p>

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Antithrombin Agent	Antithrombin agent administered. Available drugs are unfractionated heparin, LMWH (enoxaparin [Lovenox], dalteparin [Fragmin], nadroparin [Fraxiparin], danaparoid, hirudin, bivalirudin [Angiomax]), trial based antithrombin agent (i.e., not listed above or randomized blindly between 2 agents), or other.	NCDR Centocor GRACE NRMI	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 999 Recommendations for Antiplatelet and Anticoagulation Therapy Class I 3. Parenteral anticoagulation with intravenous unfractionated heparin (UFH) or with subcutaneous LMWH should be added to antiplatelet therapy with ASA or a thienopyridine. (<i>Level of Evidence: B</i>)	Performance Measurement Health Services Research
Warfarin	Warfarin (or coumarol, coumarin) administered	Centocor GRACE NRMI	ACC/AHA Guidelines for Percutaneous Coronary Intervention (32) Pg. 2239xxxix “The routine use of warfarin is no longer recommended after stent implantation, unless there are other indications for its use, such as a poor LV function, atrial fibrillation, or mechanical heart valves.”	Performance Measurement Health Services Research

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Female Hormone Replacement Therapy	Female hormone replacement therapy administered	Centocor GRACE NRMI	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 1026 “It is recommended that post menopausal women who receive HRT may continue but that HRT should <i>not</i> be initiated for the secondary prevention of coronary events.”	Health Services Research
Antiarrhythmics	Antiarrhythmic drug administered. Some common drugs are amiodarone, sotalol, quinidine, procainamide, lidocaine.	GRACE NRMI	TIMI (21,22) ACC/AHA Guidelines for the Management of Patients with Acute Myocardial Infarction (11) Pg. 1380 “Antiarrhythmic therapy plays an important but more limited role in acute MI than in the past, as summarized in “Hospital Management.”...In general, both acute and long-term antiarrhythmic therapy except with β -adrenoceptor blocking agents is indicated only for life-threatening or severely symptomatic arrhythmias and not for risk reduction in patients with non-life-threatening arrhythmias.”	Health Services Research

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
ACE Inhibitors	ACE inhibitors administered. Some common generic forms include: captopril, enalapril, lisinopril, and ramipril.	Centocor GRACE NRMI	TIMI (21,22) ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 993 Recommendations for Anti-Ischemic Therapy Class I 7. An ACEI when hypertension persists despite treatment with NTG and a β -blocker in patients with LV systolic dysfunction or congestive heart failure and in ACS patients with diabetes. (<i>Level of Evidence: B</i>)	Health Services Research Performance Measurement
Angiotensin II Receptor Blocker (ARB)	ARBs administered. Common forms are losartan, valsartan, candesartan.	GRACE NRMI Centocor		Health Services Research
Diuretic	Diuretics administered. Some commonly prescribed agents are: furosemide, ethacrynic acid, hydrochlorothiazide, spironolactone, metolazone, and bumetanide.	Centocor GRACE NRMI	TIMI (21,22)	Health Services Research

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Digitalis	Digitalis administered. Some common generic forms include digoxin and digitoxin.	Centocor GRACE NRMI	TIMI (21,22) ACC/AHA Guidelines for the Management of Patients with Acute Myocardial Infarction (11) Pg. 1386 "Thus, the current recommendation, based on previous clinical experience, supports the use of digoxin in selected patients recovering from an MI if they have supraventricular arrhythmias or CHF refractory to ACE inhibitors or diuretics."	Health Services Research
Lipid Lowering Agent	Lipid lowering agent administered. Note the type of agent: 1. statin (HMG co-A reductase inhibitors) 2. fibrates 3. nicotinic acid 4. resin drugs (cholestyramine) 5. other Frequently prescribed drugs are: Cholestyramine, Colestipol, Probucol, Gemfibrozil, Lovastatin, atorvastatin, simvastatin, fluvastatin, pravastatin, and cerivastatin.	Centocor GRACE NRMI	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 1026 1. Long-term Medical Therapy Recommendations Class I 5. Lipid-lowering agents if LDL cholesterol level after diet is >100 mg/dL. (<i>Level of Evidence C</i>)	Performance Measurement Health Services Research

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
<i>Outcomes</i>				
Death	Patient died during this hospitalization.	NCDR Centocor GRACE NRMI	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 979 “The medical history, physical examination, ECG, and biochemical cardiac marker measurements in patients with symptoms suggestive of ACS at the time of the initial presentation can be integrated into an estimation of the risk of death and nonfatal cardiac ischemic events.”	Outcomes Analysis Performance Measurement
Date of Death	Date of death	Centocor GRACE NRMI NCDR		Outcomes Analysis Health Services Research

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Myocardial Infarction (MI)	<p>In order to meet the criteria as a post admission event, a myocardial infarction must be distinct from the index event at the time of admission (i.e., re-infarction for a patient was admitted to the hospital with a myocardial infarction). Documented evidence of an ST or Non ST MI is defined as:</p> <p>NON ST ELEVATION MYOCARDIAL INFARCTION (NSTEMI). The patient was hospitalized for a myocardial infarction documented in the medical record.</p> <p>AT LEAST ONE OF THE FOLLOWING BIOCHEMICAL INDICATORS for detecting myocardial necrosis must be present (see below for a definition of Reference Control Limits):</p> <ol style="list-style-type: none"> 1. Troponin T or I: <ol style="list-style-type: none"> a. Maximal concentration of troponin T or I > the MI decision limit on at least one occasion during the first 24 hours after the index clinical event. 2. CK-MB: <ol style="list-style-type: none"> a. Maximal value of CK-MB > 2 x the upper limit of normal on one occasion during the first hours after the index clinical event. OR b. Maximal value of CK-MB, preferable CK-MB mass, > upper limit of normal on two successive samples. 3. Total CK: <ol style="list-style-type: none"> a. In the absence of availability of a troponin or CK-MB assay, total CK > 2 x the upper limit of normal, or the B fraction of CK may be employed, but these last two biomarkers are considerably less satisfactory than CK-MB. <p>AND ONE OF THE FOLLOWING:</p> <ol style="list-style-type: none"> 1. Either ST segment depression or T wave abnormalities; or 2. Ischemic symptoms in the presence or absence of chest discomfort. Ischemic symptoms may include: <ol style="list-style-type: none"> a. unexplained nausea and vomiting; or b. persistent shortness of breath secondary to left ventricular failure; or c. unexplained weakness, dizziness, lightheadedness, or syncope. 	<p>NCDR Centocor NRMI GRACE</p>	<p>TIMI (21,22)</p> <p>GUSTO (8-10)</p> <p>ESC-ACC Consensus Conference Myocardial Infarction Redefined (13)</p> <p>ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)</p>	<p>Outcomes Analysis</p>
			<p>Pg. 979 “The medical history, physical examination, ECG, and biochemical cardiac marker measurements in patients with symptoms suggestive of ACS at the time of the initial presentation can be integrated into an estimation of the risk of death and nonfatal cardiac ischemic events. The latter include new or recurrent MI, recurrent UA, disabling angina that requires hospitalization, and/or urgent coronary revascularization.”</p>	

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
MI (continued)	<p>ST ELEVATION MYOCARDIAL INFARCTION (STEMI). Indicate whether the patient was hospitalized for an ST Elevation Myocardial Infarction (STEMI) documented in the medical record.</p> <p>AT LEAST ONE OF THE FOLLOWING BIOCHEMICAL INDICATORS for detecting myocardial necrosis must be present (see below for a definition of Reference Control Limits):</p> <ol style="list-style-type: none"> 1. Troponin T or I: <ol style="list-style-type: none"> a. Maximal concentration of troponin T or I > the MI decision limit on at least one occasion during the first 24 hours after the index clinical event. 2. CK-MB: <ol style="list-style-type: none"> a. Maximal value of CK-MB > 2 x the upper limit of normal on one occasion during the first hours after the index clinical event; OR b. Maximal value of CK-MB, preferable CK-MB mass, > upper limit of normal on two successive samples. 3. Total CK <ol style="list-style-type: none"> a. In the absence of availability of a troponin or CK-MB assay, total CK > 2 x the upper limit of normal, or the B fraction of CK may be employed, but these last two biomarkers are considerably less satisfactory than CK-MB. <p>AND ONE OF THE FOLLOWING ECG CHANGES:</p> <ol style="list-style-type: none"> 1. ST-segment elevation: New or presumed new ST segment elevation at the J point in two or more contiguous leads with the cut-off points ≥ 0.2 mV in leads V1, V2, or V3, or ≥ 0.1 mV in other leads; OR 2. Development of any Q wave in leads V1 through V3, or the development of a Q-wave > or = to 30 ms (0.03s) in leads I, II, aVL, aVF, V4, V5, or V6. (Q wave changes must be present in any two contiguous leads, and be ≥ 1mm in depth.) 			

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
MI (continued)	<p>Defining Reference Control Values (MI Diagnostic Limit and Upper Limit of Normal): Reference values must be determined in each laboratory by studies using specific assays with appropriate quality control, as reported in peer-reviewed journals. Acceptable imprecision (coefficient of variation) at the 99th percentile for each assay should be defined as \leq 10%. Each individual laboratory should confirm the range of reference values in their specific setting.</p> <p>Special Circumstances:</p> <ul style="list-style-type: none"> • For patients with admission MI, the CK-MB associated with the recurrent MI must be increased by at least 50% of the previous value. • For patients within 24 hours post PCI, the CK-MB (or CK if MB not available) must be \geq 3x upper limit of normal. • For patients within 24 hours post CABG, the CK-MB (or CK if MB not available) must be \geq 5x upper limit of normal, and new Q waves must be present as defined above. 			
Date and Time	Date and time of onset of MI			Outcomes Analysis
Peak CK and CK- MB Level	Peak CK and CK- MB level following the new MI. Check type of units of CK and CK-MB.	Centacor GRACE NCDR	ACC/AHA Guidelines for Percutaneous Coronary Intervention (32) Pg. 2239vi “In patients in whom a clinically driven CK-MB determination is made, a CK-MB of >3 times the upper limit of normal would constitute a clinically significant MI.”	Outcomes Analysis

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Q Wave MI vs. Non-Q Wave MI	New (post-admission) MI a Q-wave MI (new Q-waves that are .03 seconds in width and/or \geq one-third of the total QRS complex in contiguous leads) or a non-Q wave MI. (Information on the admission event is collected elsewhere.)		<p>ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)</p> <p>Pg. 979 “The medical history, physical examination, ECG, and biochemical cardiac marker measurements in patients with symptoms suggestive of ACS at the time of the initial presentation can be integrated into an estimation of the risk of death and nonfatal cardiac ischemic events. The latter include new or recurrent MI, recurrent UA, disabling angina that requires hospitalization, and/or urgent coronary revascularization.”</p>	Outcomes Analysis

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Recurrent Rest Angina With ECG Changes	Recurrent rest angina refers to recurrent ischemic pain occurring at rest (and felt to be cardiac in origin) with associated ECG or cardiac findings.	Centocor GRACE NRMI	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 979 “The medical history, physical examination, ECG, and biochemical cardiac marker measurements in patients with symptoms suggestive of ACS at the time of the initial presentation can be integrated into an estimation of the risk of death and nonfatal cardiac ischemic events. The latter include new or recurrent MI, recurrent UA, disabling angina that requires hospitalization, and/or urgent coronary revascularization.”	Outcomes Analysis
Recurrent Rest Angina Without ECG Changes	Recurrent rest angina refers to recurrent ischemic pain occurring at rest (and felt to be cardiac in origin) without associated ECG changes.	Centocor GRACE NRMI	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 979 “The medical history, physical examination, ECG, and biochemical cardiac marker measurements in patients with symptoms suggestive of ACS at the time of the initial presentation can be integrated into an estimation of the risk of death and nonfatal cardiac ischemic events. The latter include new or recurrent MI, recurrent UA, disabling angina that requires hospitalization, and/or urgent coronary revascularization.”	Outcomes Analysis

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Bleeding (TIMI major, minor, none)	<p>An episode of bleeding is defined by the Thrombolysis in Myocardial Infarction criteria as:</p> <ol style="list-style-type: none"> <li data-bbox="432 363 1171 513">1. <u>Major</u>: Overt clinical bleeding (or documented intracranial or retroperitoneal hemorrhage) associated with a drop in Hemoglobin of > 5 gm/dl or in hematocrit of > 15% (absolute). Note: A patient who experiences an intracranial hemorrhage should be considered to have a major hemorrhage. <li data-bbox="432 545 1171 727">2. <u>Minor</u>: Overt clinical bleeding associated with a fall Hemoglobin of 3-≤5 gm/dl or in hematocrit of 9 - ≤15% (absolute). Note: In calculating the fall in hemoglobin or hematocrit, a transfusion of whole blood or packed red blood cells is counted as 1 gm/dl hemoglobin or 3% absolute in hematocrit. <li data-bbox="432 760 1171 813">3. <u>None</u>: No bleeding event that meets the major or minor definition. 	Centocor GRACE NRMI NCDR (adapted)	<p>TIMI (21,22)</p> <p>ACC/AHA Guidelines for Percutaneous Coronary Intervention (32)</p> <p>Pg. 2239vi Table 1. Definitions of Procedural Complications</p> <p>“Bleeding- Blood loss at the site of the arterial or venous access or due to perforation of a traversed artery or vein requiring transfusion and/or prolonging the hospital stay, and /or causing a drop in hemoglobin >3.0 mg/dl. Bleeding attributable to the vascular site could be retroperitoneal, a local hematoma >10 cm diameter or external.”</p>	Outcomes Analysis

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Location of Bleeding	Categories for the location of bleeding are: 0= none/not applicable 1= cardiac catheterization site 2= post CABG 3= other instrumented site 4= Gastrointestinal site 5= other (non-instrumented) site	GRACE Centecor	TIMI (21,22) ACC/AHA Guidelines for Percutaneous Coronary Intervention (32) Pg. 2239vi Table 1. Definitions of Procedural Complications “Bleeding- Blood loss at the site of the arterial or venous access or due to perforation of a traversed artery or vein requiring transfusion and/or prolonging the hospital stay, and /or causing a drop in hemoglobin >3.0 mg/dl. Bleeding attributable to the vascular site could be retroperitoneal, a local hematoma >10 cm diameter or external.”	Outcomes Analysis

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Transfusion	Transfusion of either whole blood and/or packed red blood cells due to a hemorrhagic event. Note the number of units transfused.	Centocor GRACE	ACC/AHA Guidelines for Percutaneous Coronary Intervention (32) Pg. 2239vi Table 1. Definitions of Procedural Complications “Bleeding- Blood loss at the site of the arterial or venous access or due to perforation of a traversed artery or vein requiring transfusion and/or prolonging the hospital stay, and /or causing a drop in hemoglobin >3.0 mg/dl. Bleeding attributable to the vascular site could be retroperitoneal, a local hematoma >10 cm diameter or external.”	Health Services Research
Stroke	A cerebrovascular accident (CVA) with loss of neurological function caused by an ischemic or hemorrhagic event with residual symptoms at least 24 hours after onset.	NCDR Centocor NRMI	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 978 “Outcomes of concern include death, MI (or recurrent MI), stroke, heart failure, recurrent symptoms of ischemia, and serious arrhythmia.”	Outcomes Analysis

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Type of Stroke	<p>Indicate the type of stroke:</p> <ol style="list-style-type: none"> 1. <u>Hemorrhagic</u>: A stroke with documentation on imaging (e.g. CT scan or MRI of hemorrhage in the cerebral parenchyma, or a subdural or subarachnoid hemorrhage). Evidence of hemorrhagic stroke obtained from lumbar puncture, neurosurgery, or autopsy can also confirm the diagnosis. 2. <u>Non-hemorrhagic</u>: A focal neurologic deficit that results from a thrombus or embolus (and not due to hemorrhage) which appears and is still partially evident for more than 24 hours. 3. <u>Unknown/no imaging performed</u> if the type of stroke could not be determined by imaging or other means (from lumbar puncture, neurosurgery, or autopsy). 	NRMI GRACE	<p>TIMI (21,22)</p> <p>ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)</p> <p>Pg. 978 “Outcomes of concern include death, MI (or recurrent MI), stroke, heart failure, recurrent symptoms of ischemia, and serious arrhythmia.”</p>	Outcomes Analysis
Transient Ischemic Attack (TIA)	<p>The transient ischemic attack is a focal neurologic deficit (usually corresponding to the territory of a single cerebral vessel) which resolves spontaneously without any evidence of residual deficit at 24 hours.</p>		<p>TIMI (21,22)</p> <p>ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)</p> <p>Pg. 978 “Outcomes of concern include death, MI (or recurrent MI), stroke, heart failure, recurrent symptoms of ischemia, and serious arrhythmia.”</p>	Outcomes Analysis

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Thrombocytopenia	Platelet count dropped to either < 50,000 /mm ³ or between 50,000 and <100,000 and which level should be noted. This platelet count should be confirmed not to be pseudo-thrombocytopenia (i.e., platelet clumping in citrated blood)	Centocor GRACE	TIMI (21,22) ACC/AHA Guidelines for the Management of Patients with Acute Myocardial Infarction (11) Pg. 1380 "If the platelet count drops below 100,000 a test for heparin-induced thrombocytopenia should be obtained, and the clinician should be vigilant for thrombotic complications as the prognosis in patients with thrombocytopenia is substantially worse."	Outcomes Analysis Performance Measurement
Congestive Heart Failure (CHF)	Developed evidence of new congestive heart failure following admission 0= None (absence of rales over the lung fields) 1= Mild CHF (rales over 50% or less of the lung fields) 2= Severe CHF (rales over more than 50% of the lung fields)	Centocor GRACE NRMI NCDR (adapted)	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 978 "Outcomes of concern include death, MI (or recurrent MI), stroke, heart failure, recurrent symptoms of ischemia, and serious arrhythmia."	Outcomes Analysis
Cardiogenic Shock	Experienced cardiogenic shock. Cardiogenic shock is a clinical state of hypoperfusion characterized by systolic pressure < 80 mm Hg and central filling pressure > 20 mm Hg, or a cardiac index < 1.8 liter/mm ² . Shock is also considered present if intravenous inotropes and/or intra-aortic balloon pump are needed to maintain a systolic blood pressure > 80 mm Hg and a cardiac index of > 1.8 liter/minute/m ² .	NCDR Centocor GRACE NRMI		Outcomes Analysis

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Atrial Arrhythmia	<p>A new episode or acute reoccurrence of atrial arrhythmia by documentation of one of the following:</p> <ol style="list-style-type: none"> 1. Atrial fibrillation/flutter 2. Supraventricular tachycardia (SVT) requiring treatment (SVT that requires cardioversion, drug therapy, or is sustained for >1 minute) 3. High-level AV block defined as 3° atrioventricular block or 2° AV block with bradycardia requiring pacing 	NCDR GRACE NRMI	<p>ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)</p> <p>Pg. 978 “Outcomes of concern include death, MI (or recurrent MI), stroke, heart failure, recurrent symptoms of ischemia, and serious arrhythmia.”</p>	Outcomes Analysis
Ventricular Arrhythmia	Ventricular tachycardia, or ventricular fibrillation requiring cardioversion and/or antiarrhythmics (IV/oral).	NCDR Centocor GRACE NRMI	<p>ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)</p> <p>Pg. 978 “Outcomes of concern include death, MI (or recurrent MI), stroke, heart failure, recurrent symptoms of ischemia, and serious arrhythmia.”</p>	Outcomes Analysis
Date of Discharge	Date the patient was discharged from the acute care hospital. If the patient died in the hospital, the hospital discharge date is the date of death.	NCDR Centocor GRACE NRMI	<p>ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)</p> <p>Pg. 1025 “Patients who have undergone successful PCI with an uncomplicated course are usually discharged the next day, and patients who undergo uncomplicated CABG are generally discharged 4 to 7 days after CABG.”</p>	Outcomes Analysis LOS

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Discharge Destination	Where the patient was discharged to upon leaving this hospital. The choices are: 5. Home 6. Nursing home or personal care residence 7. Another hospital 8. Death in hospital	Centocor GRACE NRMI		Outcomes Analysis
Smoking Cessation	Advice or a pamphlet given, or discussion carried out with the patient (by physician, nurse, or other personnel) regarding the importance of stopping smoking: 1. Yes 2. No 3. Not applicable	GRACE NRMI	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 1029 “Particular attention should be paid to smoking cessation.... Referral to a smoking cessation program and the use of nicotine patches or gum are recommended.”	Performance Measure
Cardiac Rehabilitation	Advice or discussion carried out with the patient (by physician, nurse, or other personnel) regarding the importance of joining a cardiac rehabilitation program or an appointment made.	NRMI	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 1028 D. Risk Factor Modification Recommendations Class I 2. Consider the referral of patients who are smokers to a smoking cessation program or clinic and/or an outpatient cardiac rehabilitation program. (<i>Level of Evidence: B</i>)	

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Days in Intensive Care Unit	<p>Total number of days the patient spent in an intensive care bed at your hospital only, either consecutively or intermittently. To count days:</p> <ol style="list-style-type: none"> 1. Find the ICU/CCU admit date/time and the date/time patient was transferred-out to another unit (telemetry or unmonitored bed) 2. For every 24-hour period count 1 day 3. For any partial day remaining, round up if greater than or equal to 12 hours and round down if less than 12 hours. <p>In the case of an in-hospital infarct in which the patient is already in an intensive care bed, record the number of days spent in ICU/CCU after the diagnosis of MI was made.</p>	NRMI GRACE	<p>ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)</p> <p>Pg. 992 “Patients with continuing discomfort and/or hemodynamic instability should be hospitalized for at least 24 h in a coronary care unit...”</p>	Outcomes Analysis

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Final Diagnosis of the Admission Event	<p>The final diagnosis for the event that prompted admission:</p> <ol style="list-style-type: none"> 1. <u>ST Elevation MI</u> is defined as an acute coronary syndrome in which there is cardiac marker evidence of myocardial necrosis (e.g., positive CK-MB) and new (or presumably new if no prior ECG is available) ST segment elevation on the admission ECG. In addition, if new or presumably new LBBB is present and the patient has positive cardiac markers, this has similar pathophysiology and is an indication for reperfusion therapy—hence, this category should be checked. 2. <u>Non-ST Elevation MI</u> is defined as an acute coronary syndrome in which there is cardiac marker evidence of myocardial necrosis (e.g., <i>positive CK-MB or troponin</i>) and WITHOUT new ST segment elevation or LBBB. 3. <u>Unstable Angina</u> is defined as angina pectoris (or equivalent type of ischemic discomfort) with any one of three following features: 1) occurring at rest (or minimal exertion); 2) being severe and of new onset (i.e. within one month); 3) occurring with a crescendo pattern (i.e. more severe, prolonged or frequent. The patient should NOT have cardiac marker evidence of myocardial necrosis. <ol style="list-style-type: none"> a. <u>Definite/Probable Unstable Angina</u>: Patients with the clinical history consistent with the diagnosis of unstable angina as described above, in whom ischemia has been confirmed by the presence of ST segment changes on the initial ECG or in association with recurrent rest pain, by a positive stress test, by the presence of small elevations of troponin that do not meet criteria for MI. b. <u>Possible Unstable Angina</u> is present when an acute ischemic process has not been excluded as a possible cause of the presenting symptoms, or the clinical history is consistent with unstable angina but no diagnostic test (noted above) was performed to confirm the diagnosis. 	NRMI (adapted) Cenotcor GRACE	ESC-ACC Consensus Conference Myocardial Infarction Redefined (13)	Outcomes Analysis

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Final Diagnosis of the Admission Event (continued)	<p>4. <u>Stable Coronary Artery Disease</u>: The patient has the clinical diagnosis or prior history of CAD, but after evaluation in-hospital the episode of discomfort was felt not to have represented “unstable angina.”</p> <p>5. <u>Non-Cardiac Chest Pain</u>: Pain, pressure or discomfort in the chest, neck or arms not clearly exertional or not otherwise consistent with pain or discomfort of myocardial ischemic origin.</p> <p>Examples:</p> <ol style="list-style-type: none"> 1. If a patient was admitted with rest pain, but had negative cardiac markers, but on day 3 developed recurrent pain and ruled in for an MI, the event prompting admission should be coded “Unstable Angina” here. The MI on day 3 should be recorded in the “outcomes” ssection as a post-admission MI. 2. If a patient was admitted with rest pain and initial cardiac markers were negative, but the enzymes drawn over the subsequent 24 hours became positive, this is most consistent with a non-ST elevation MI as the admission event. 			
<i>Follow-up Measures</i>	<i>These elements are felt to be the most important outcomes to monitor patients with ACS. The timing could be flexible, but the most common time points are 30 days, 6 months, and/or 1 year.</i>			
Death	The patient died since the previous visit/contact. Death includes all deaths regardless of etiology.	GRACE NCDR	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 1025 “The acute phase of UA/NSTEMI is usually over within 2 months. The risk of progression to MI or the development of recurrent MI or death is highest during that period.”	Follow up Outcomes

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Primary Cause (CV vs non CV)	<ol style="list-style-type: none"> <li data-bbox="432 269 1136 448">1. <u>Cardiovascular</u> death indicates cause of death was sudden cardiac death, myocardial infarction, unstable angina or other coronary artery disease, vascular death (e.g., stroke, arterial embolism, pulmonary embolism, ruptured aortic aneurysm or dissection) congestive heart failure, hypertension, or cardiac arrhythmia. <li data-bbox="432 451 1136 537">2. <u>Non-cardiovascular</u> death indicates as respiratory failure, pneumonia, cancer, trauma, suicide, or any other already defined cause. (e.g. liver disease, renal failure etc.) 	GRACE NCDR (adapted)	<p data-bbox="1430 269 1759 415">ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)</p> <p data-bbox="1430 451 1759 633">Pg. 1025 “The acute phase of UA/NSTEMI is usually over within 2 months. The risk of progression to MI or the development of recurrent MI or death is highest during that period.”</p>	Follow up Outcomes

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Myocardial Infarction (MI)	<p>Documented evidence of an ST or Non ST MI is defined as:</p> <p>NON ST ELEVATION MYOCARDIAL INFARCTION (NSTEMI). The patient was hospitalized for a myocardial infarction documented in the medical record.</p> <p>AT LEAST ONE OF THE FOLLOWING BIOCHEMICAL INDICATORS for detecting myocardial necrosis must be present (see below for a definition of Reference Control Limits):</p> <ol style="list-style-type: none"> 1. Troponin T or I: <ol style="list-style-type: none"> a. Maximal concentration of troponin T or I > the MI decision limit on at least one occasion during the first 24 hours after the index clinical event. 2. CK-MB: <ol style="list-style-type: none"> a. Maximal value of CK-MB > 2 x the upper limit of normal on one occasion during the first hours after the index clinical event. OR b. Maximal value of CK-MB, preferable CK-MB mass, > upper limit of normal on two successive samples. 3. Total CK: <ol style="list-style-type: none"> a. In the absence of availability of a troponin or CK-MB assay, total CK > 2 x the upper limit of normal, or the B fraction of CK may be employed, but these last two biomarkers are considerably less satisfactory than CK-MB. <p>AND ONE OF THE FOLLOWING:</p> <ol style="list-style-type: none"> 1. Either ST segment depression or T wave abnormalities; or 2. Ischemic symptoms in the presence or absence of chest discomfort. Ischemic symptoms may include: <ol style="list-style-type: none"> a. unexplained nausea and vomiting; or b. persistent shortness of breath secondary to left ventricular failure; or c. unexplained weakness, dizziness, lightheadedness, or syncope. 	GRACE	<p>TIMI (21,22)</p> <p>ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)</p> <p>Pg. 1025 “The acute phase of UA/NSTEMI is usually over within 2 months. The risk of progression to MI or the development of recurrent MI or death is highest during that period.”</p>	Follow up Outcomes

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
MI (continued)	<p>ST ELEVATION MYOCARDIAL INFARCTION (STEMI). Indicate whether the patient was hospitalized for an ST Elevation Myocardial Infarction (STEMI) documented in the medical record.</p> <p>AT LEAST ONE OF THE FOLLOWING BIOCHEMICAL INDICATORS for detecting myocardial necrosis must be present (see below for a definition of Reference Control Limits):</p> <ol style="list-style-type: none"> 1. Troponin T or I: <ol style="list-style-type: none"> a. Maximal concentration of troponin T or I > the MI decision limit on at least one occasion during the first 24 hours after the index clinical event. 2. CK-MB: <ol style="list-style-type: none"> a. Maximal value of CK-MB > 2 x the upper limit of normal on one occasion during the first hours after the index clinical event; OR b. Maximal value of CK-MB, preferable CK-MB mass, > upper limit of normal on two successive samples. 3. Total CK <ol style="list-style-type: none"> a. In the absence of availability of a troponin or CK-MB assay, total CK > 2 x the upper limit of normal, or the B fraction of CK may be employed, but these last two biomarkers are considerably less satisfactory than CK-MB. <p>AND ONE OF THE FOLLOWING ECG CHANGES:</p> <ol style="list-style-type: none"> 1. ST-segment elevation: New or presumed new ST segment elevation at the J point in two or more contiguous leads with the cut-off points ≥ 0.2 mV in leads V1, V2, or V3, or ≥ 0.1 mV in other leads; OR 2. Development of any Q wave in leads V1 through V3, or the development of a Q-wave > or = to 30 ms (0.03s) in leads I, II, aVL, aVF, V4, V5, or V6. (Q wave changes must be present in any two contiguous leads, and be ≥ 1mm in depth.) 			

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
MI (continued)	<p>Defining Reference Control Values (MI Diagnostic Limit and Upper Limit of Normal): Reference values must be determined in each laboratory by studies using specific assays with appropriate quality control, as reported in peer-reviewed journals. Acceptable imprecision (coefficient of variation) at the 99th percentile for each assay should be defined as $< \text{ or } =$ to 10%. Each individual laboratory should confirm the range of reference values in their specific setting.</p> <p>Special Circumstances:</p> <ul style="list-style-type: none"> • For patients with admission MI, the CK-MB associated with the recurrent MI must be increased by at least 50% of the previous value. • For patients within 24 hours post PCI, the CK-MB (or CK if MB not available) must be $\geq 3x$ upper limit of normal. • For patients within 24 hours post CABG, the CK-MB (or CK if MB not available) must be $\geq 5x$ upper limit of normal, and new Q waves must be present as defined above. 	GRACE	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)	Follow up Outcomes
Cardiac Catheterization	Cardiac catheterization (with or without revascularization) procedure performed since the previous visit/contact.	GRACE	<p>Pg. 979</p> <p>“The medical history, physical examination, ECG, and biochemical cardiac marker measurements in patients with symptoms suggestive of ACS at the time of the initial presentation can be integrated into an estimation of the risk of death and nonfatal cardiac ischemic events. The latter include new or recurrent MI, recurrent UA, disabling angina that requires hospitalization, and/or urgent coronary revascularization.”</p>	Follow up Outcomes

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Percutaneous Coronary Intervention (PCI)	PCI performed since the previous visit/contact.	Centocor GRACE	<p data-bbox="1421 271 1829 423">ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)</p> <p data-bbox="1421 451 1829 847">Pg. 979 “The medical history, physical examination, ECG, and biochemical cardiac marker measurements in patients with symptoms suggestive of ACS at the time of the initial presentation can be integrated into an estimation of the risk of death and nonfatal cardiac ischemic events. The latter include new or recurrent MI, recurrent UA, disabling angina that requires hospitalization, and/or urgent coronary revascularization.”</p>	Follow up Outcomes

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Coronary Artery Bypass Graft (CABG)	CABG performed since the previous visit/contact.	GRACE	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)	Follow up Outcomes
			<p>Pg. 979 “The medical history, physical examination, ECG, and biochemical cardiac marker measurements in patients with symptoms suggestive of ACS at the time of the initial presentation can be integrated into an estimation of the risk of death and nonfatal cardiac ischemic events. The latter include new or recurrent MI, recurrent UA, disabling angina that requires hospitalization, and/or urgent coronary revascularization.”</p>	
Readmission	Readmission to a hospital.	NCDR GRACE		Follow up Outcomes

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Readmission Reason	Reasons for admission (include all that apply): <ol style="list-style-type: none"> 1. Myocardial infarction (documented). 2. Unstable angina 3. Angina (without MI) 4. Percutaneous coronary intervention. 5. Coronary artery bypass surgery. 6. Congestive heart failure (without MI). 7. Arrhythmia or conduction disturbance (without MI). 8. Other medical problem 	NCDR GRACE	ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12) Pg. 979 “The medical history, physical examination, ECG, and biochemical cardiac marker measurements in patients with symptoms suggestive of ACS at the time of the initial presentation can be integrated into an estimation of the risk of death and nonfatal cardiac ischemic events. The latter include new or recurrent MI, recurrent UA, disabling angina that requires hospitalization, and/or urgent coronary revascularization.”	Follow up Outcomes
Angina Status	<u>Canadian Cardiovascular Society Classes of Angina:</u> <ol style="list-style-type: none"> I. Ordinary physical activity does not cause angina; for example walking or climbing stairs, angina occurs with strenuous or rapid or prolonged exertion at work or recreation. II. Slight limitation of ordinary activity; for example, angina occurs walking or stair climbing after meals, in cold, in wind, under emotional stress or only during the few hours after awakening, walking more than two blocks on the level or climbing more than one flight of ordinary stairs at a normal pace and in normal conditions. III. Marked limitation of ordinary activity; for example, angina occurs walking one or two blocks on the level or climbing one flight of stairs in normal conditions and at a normal pace. IV. Inability to carry on any physical activity without discomfort – angina syndrome may be present at rest. 		Campeau, L. Grading of angina pectoris (37)	Follow up Outcomes

ELEMENT	DEFINITION	NATIONAL REGISTERIES	REFERENCE	USE
Medication Use	<ol style="list-style-type: none"> <u>ASA/Antiplatelet</u>: Aspirin, clopidogrel or ticlopidine; other (e.g., dipyridamole) <u>ACE</u>: Some common generic forms include captopril, enalapril, lisinopril, and ramipril <u>β-Blocker</u>: Some forms of IV beta-blockers include: atenolol, metoprolol, propranolol, timolol, esmolol, and labetalol. Some generic forms of oral beta-blockers include: atenolol, metoprolol, nadolol, pindolol, propranolol, timolol, acebutolol, bucindolol, bisoprolol, and labetalol, carvedolol. <u>Lipid Lowering</u>: Type of agent includes statin (HMG co-A reductase inhibitors), fibrates, nicotinic acid, resin drugs (cholestyramine). Frequently prescribed drugs are cholestyramine, colestipol, probucol, gemfibrozil, lovastatin, atorvastatin, simvastatin, fluvastatin, pravastatin, and cerivastatin. 	GRACE	<p>ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction (12)</p> <p>Pg. 1026 1. Long-Term Medical Therapy</p> <p>Recommendations Class I</p> <ol style="list-style-type: none"> Aspirin 75 to 325 mg/d in the absence of contraindications. (<i>Level of Evidence: A</i>) Clopidogrel 75 qd for patients with a contraindication to ASA (<i>Level of Evidence: B</i>) β-blockers in the absence of contraindications (<i>Level of Evidence: B</i>) Lipid-lowering agents and diet in post ACS patients, including patients post revascularization, with low-density lipoprotein (LDL) cholesterol of >130 mg/dL. (<i>Level of Evidence: A</i>) ... ACE is for patients with CHF, LV dysfunction (EF <0.40), hypertension, or diabetes. (<i>Level of Evidence: A</i>) 	Performance Measurement Follow up Outcomes

References

1. American College of Cardiology-National Cardiovascular Data Registry Version 2.0. American College of Cardiology Web site. Available at: <http://www.acc.org/ncdr/cathlab.htm> Accessed April 4, 2001.
2. Weintraub WS, McKay CR, Riner RN, et al. The American College of Cardiology National Database: progress and challenges. American College of Cardiology Database Committee. *J Am Coll Cardiol.* 1997;29:459-465.
3. Rogers WJ, Bowlby LJ, Chandra NC, et al. Treatment of myocardial infarction in the United States (1990 to 1993). Observations from the National Registry of Myocardial Infarction. *Circulation.* 1994;90:2103-2114.
4. Granger CB. Strategies of patient care in acute coronary syndromes: rationale for the Global Registry of Acute Coronary Events (GRACE) registry. *Am J Cardiol.* 2000;86:4M-9M.
5. Cannon CP, Braunwald E, McCabe CH, Antman EM. The Thrombolysis in Myocardial Infarction (TIMI) trials: the first decade. *J Interv Cardiol.* 1995;8:117-135.
6. Antman EM. Hirudin in acute myocardial infarction. Thrombolysis and Thrombin Inhibition in Myocardial Infarction (TIMI) 9B trial. *Circulation.* 1996;94:911-921.
7. Antman EM, McCabe CH, Gurfinkel EP, et al. Enoxaparin prevents death and cardiac ischemic events in unstable angina/non-Q-wave myocardial infarction. Results of the thrombolysis in myocardial infarction (TIMI) 11B trial. *Circulation.* 1999;100:1593-1601.
8. An international randomized trial comparing four thrombolytic strategies for acute myocardial infarction. The GUSTO investigators. *N Engl J Med.* 1993;329:673-682.
9. A comparison of recombinant hirudin with heparin for the treatment of acute coronary syndromes. The Global Use of Strategies to Open Occluded Coronary Arteries (GUSTO) IIb investigators. *N Engl J Med.* 1996;335:775-782.
10. A comparison of reteplase with alteplase for acute myocardial infarction. The Global Use of Strategies to Open Occluded Coronary Arteries (GUSTO III) Investigators. *N Engl J Med.* 1997;337:1118-1123.
11. Ryan TJ, Anderson JL, Antman EM, et al. ACC/AHA guidelines for the management of patients with acute myocardial infarction. A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee on Management of Acute Myocardial Infarction). *J Am Coll Cardiol.* 1996;28:1328-1428.
12. Braunwald E, Antman EM, Beasley JW, et al. ACC/AHA guidelines for the management of patients with unstable angina and non-ST-segment elevation myocardial infarction. A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee on the Management of Patients With Unstable Angina). *J Am Coll Cardiol.* 2000;36:970-1062.
13. Myocardial infarction redefined--a consensus document of The Joint European Society of Cardiology/American College of Cardiology Committee for the redefinition of myocardial infarction. *Eur Heart J.* 2000;21:1502-1513.
14. Executive Summary of The Third Report of The National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, And Treatment of High Blood Cholesterol In Adults (Adult Treatment Panel III). *JAMA.* 2001;285:2486-2497.
15. Rationale and design of the GRACE (Global Registry of Acute Coronary Events) Project: a multinational registry of patients hospitalized with acute coronary syndromes. *Am Heart J.* 2001;141:190-199.

- 1 16. Cannon CP, Johnson EB, Cermignani M, Scirica BM, Sagarin MJ, Walls RM. Emergency department
2 thrombolysis critical pathway reduces door-to-drug times in acute myocardial infarction. *Clin Cardiol.*
3 1999;22:17-20.
- 4 17. Ellerbeck EF, Jencks SF, Radford MJ, et al. Quality of care for Medicare patients with acute myocardial
5 infarction. A four-state pilot study from the Cooperative Cardiovascular Project. *JAMA.* 1995;273:1509-1514.
- 6 18. Barron HV, Bowlby LJ, Breen T, et al. Use of reperfusion therapy for acute myocardial infarction in the United
7 States: data from the National Registry of Myocardial Infarction 2. *Circulation.* 1998;97:1150-1156.
- 8 19. Scirica BM, Moliterno DJ, Every NR, et al. Differences between men and women in the management of
9 unstable angina pectoris (The GUARANTEE Registry). The GUARANTEE Investigators. *Am J Cardiol.*
10 1999;84:1145-1150.
- 11 20. Lee KL, Woodlief LH, Topol EJ, et al. Predictors of 30-day mortality in the era of reperfusion for acute
12 myocardial infarction. Results from an international trial of 41,021 patients. GUSTO-I Investigators.
13 *Circulation.* 1995;91:1659-1668.
- 14 21. Antman EM, Cohen M, Bernink PJ, et al. The TIMI risk score for unstable angina/non-ST elevation MI: A
15 method for prognostication and therapeutic decision making. *JAMA.* 2000;284:835-842.
- 16 22. Morrow DA, Antman EM, Charlesworth A, et al. TIMI risk score for ST-elevation myocardial infarction: A
17 convenient, bedside, clinical score for risk assessment at presentation: An intravenous nPA for treatment of
18 infarcting myocardium early II trial substudy. *Circulation.* 2000;102:2031-2037.
- 19 23. Jacobs DR, Jr., Kroenke C, Crow R, et al. PREDICT: A simple risk score for clinical severity and long-term
20 prognosis after hospitalization for acute myocardial infarction or unstable angina: the Minnesota heart survey.
21 *Circulation.* 1999;100:599-607.
- 22 24. Mark DB, Naylor CD, Hlatky MA, et al. Use of medical resources and quality of life after acute myocardial
23 infarction in Canada and the United States. *N Engl J Med.* 1994;331:1130-1135.
- 24 25. Mark DB, Hlatky MA, Califf RM, et al. Cost effectiveness of thrombolytic therapy with tissue plasminogen
25 activator as compared with streptokinase for acute myocardial infarction. *N Engl J Med.* 1995;332:1418-1424.
- 26 26. Weintraub WS, Mauldin PD, Becker E, Kosinski AS, King SB, III. A comparison of the costs of and quality of
27 life after coronary angioplasty or coronary surgery for multivessel coronary artery disease. Results from the
28 Emory Angioplasty Versus Surgery Trial (EAST). *Circulation.* 1995;92:2831-2840.
- 29 27. Mark DB, Talley JD, Topol EJ, et al. Economic assessment of platelet glycoprotein IIb/IIIa inhibition for
30 prevention of ischemic complications of high-risk coronary angioplasty. EPIC Investigators. *Circulation.*
31 1996;94:629-635.
- 32 28. Mark DB, Cowper PA, Berkowitz SD, et al. Economic assessment of low-molecular-weight heparin
33 (enoxaparin) versus unfractionated heparin in acute coronary syndrome patients: results from the ESSENCE
34 randomized trial. Efficacy and Safety of Subcutaneous Enoxaparin in Non-Q wave Coronary Events [unstable
35 angina or non-Q-wave myocardial infarction]. *Circulation.* 1998;97:1702-1707.
- 36 29. The Thrombolysis in Myocardial Infarction (TIMI) trial. Phase I findings. TIMI Study Group. *N Engl J Med.*
37 1985;312:932-936.
- 38 30. Sheifer SE, Rathore SS, Gersh BJ, et al. Time to presentation with acute myocardial infarction in the elderly:
39 associations with race, sex, and socioeconomic characteristics. *Circulation.* 2000;102:1651-1656.

- 1 31. Ryan TJ, Antman EM, Brooks NH, et al. 1999 update: ACC/AHA Guidelines for the Management of Patients
2 With Acute Myocardial Infarction: Executive Summary and Recommendations: A report of the American
3 College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee on
4 Management of Acute Myocardial Infarction). *Circulation*. 1999;100:1016-1030.
- 5 32. Smith SC, Jr., Dove JT, Jacobs AK, et al. ACC/AHA guidelines for percutaneous coronary intervention: a
6 report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines
7 (Committee to Revise the 1993 Guidelines for Percutaneous Transluminal Coronary Angioplasty). *J Am Coll*
8 *Cardiol*. 2001;37:2239i-2239lxvi.
- 9 33. Scanlon PJ, Faxon DP, Audet AM, et al. ACC/AHA guidelines for coronary angiography. A report of the
10 American College of Cardiology/American Heart Association Task Force on practice guidelines (Committee on
11 Coronary Angiography). Developed in collaboration with the Society for Cardiac Angiography and
12 Interventions. *J Am Coll Cardiol*. 1999;33:1756-1824.
- 13 34. Gibbons RJ, Chatterjee K, Daley J, et al. ACC/AHA/ACP-ASIM guidelines for the management of patients
14 with chronic stable angina: a report of the American College of Cardiology/American Heart Association Task
15 Force on Practice Guidelines (Committee on Management of Patients With Chronic Stable Angina). *J Am Coll*
16 *Cardiol*. 1999;33:2092-2197.
- 17 35. Cannon CP, McCabe CH, Wilcox RG, et al. Oral glycoprotein IIb/IIIa inhibition with orbofiban in patients with
18 unstable coronary syndromes (OPUS-TIMI 16) trial. *Circulation*. 2000;102:149-156.
- 19 36. Califf RM. Glycoprotein IIb/IIIa blockade and thrombolytics: early lessons from the SPEED and GUSTO IV
20 trials. *Am Heart J*. 1999;138:S12-S15
- 21 37. Campeau L. Letter: Grading of angina pectoris. *Circulation*. 1976;54:522-523.
- 22 38. Braunwald E. Unstable angina. A classification. *Circulation*. 1989;80:410-414.
- 23