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ACC/AHA CLINICAL DATA STANDARDS

2022 ACC/AHA Key Data Elements and Definitions for Chest Pain and Acute Myocardial Infarction: A Report of the American Heart Association/American College of Cardiology Joint Committee on Clinical Data Standards

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Key Words: AHA Scientific Statements ■ angina pectoris ■ cardiomyopathies ■ chest pain myocardial infarction ■ myocarditis ■ ST-segment elevation myocardial infarction

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TOP 10 TAKE-HOME MESSAGES

1. This document presents a clinical lexicon comprising data elements related to chest pain and acute myocardial infarction (MI), in the sense and context of how these terms are used in the recently released guideline: "2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR Guideline for the Evaluation and Diagnosis of Chest Pain."
2. This lexicon follows the plans contained in the new chest pain guideline. Not all conceivable types and causes of chest pain are considered here.
3. This lexicon is designed to focus on serious cardiovascular causes of chest pain as they might be encountered in emergency departments.
4. Data elements for etiology of chest pain syndromes are enumerated for potentially serious cardiac, as well as certain noncardiac, causes.
5. Data elements are grouped into 3 broad categories as outlined in the new guideline: chest pain, myocardial injury, and myocardial infarction.
6. Data elements for patient demographics, history, cardiovascular risk factors, laboratory testing, and revascularization or other therapies are not included here as they have been the subjects of other published references.
7. The terms "typical" and "atypical" as descriptors of chest pain or anginal syndromes are not used here. In keeping with the new chest pain guideline, the terms "cardiac," "possible cardiac," and "noncardiac" are used for categorizing chest pain syndromes.
8. Data elements for risk stratification scoring according to several common risk scoring algorithms are included.
9. Data elements for procedure-related myocardial injury and procedure-related MI are included.
10. This clinical lexicon and data standard should be broadly applicable in various settings, including patient care, electronic health records (EHRs), quality and performance improvement initiatives, registries, and public reporting programs.

PREAMBLE

The American College of Cardiology (ACC) and the American Heart Association (AHA) support their members' goal to improve the prevention and treatment of cardiovascular diseases through professional education, research, the development of guidelines and standards, and by fostering policy that supports optimal patient care and outcomes. The ACC and AHA also recognize the importance of using clinical data standards for patient management, assessment of outcomes, and conduct of research, as well as the importance of defining the processes and outcomes of clinical care, whether in randomized trials, observational studies, registries, oversight and regulatory programs, or quality improvement initiatives.Clinical data standards aim to identify, define, and standardize data elements relevant to clinical topics in cardiovascular medicine, with the primary goal of assisting data collection and use by providing a compilation of data elements and definitions applicable to various cardiovascular conditions. Broad agreement on common vocabulary and definitions is needed to pool and compare data from EHRs, clinical registries, administrative datasets, and other databases and to assess whether these data are applicable to clinical practice and research endeavors. Emerging federal standards, such as the US Department of Health & Human Services, Office of the National Coordinator for Health Information Technology, and the US Core Data for Interoperability, support efforts to "promote interoperability" and the more effective use of EHR data to improve health care quality. The purpose of clinical data standards is to contribute to the infrastructure necessary to accomplish the ACC's mission to transform cardiovascular care and improve heart health and the AHA's mission of being a relentless force for a world of longer and healthier lives for all individuals.The specific goals of clinical data standards are:

1. To establish a consistent, interoperable, and universal clinical vocabulary as a foundation for clinical care and research
2. To facilitate consistent and equitable exchange of data across systems through harmonized, standardized definitions of key data elements
3. To facilitate further development of clinical registries and guidelines, quality and performance improvement programs, public reporting, and clinical research, including the comparison of results within and across these initiatives

The key data elements and definitions are a compilation of variables intended to facilitate the consistent, accurate, and reproducible capture of clinical concepts; standardize the terminology used to describe cardiovascular diseases and procedures; create a data environment conducive to the implementation of clinical guidelines, assessment of patient management and outcomes for quality and performance improvement, and clinical and translational research; and increase opportunities for sharing data across disparate data sources. The AHA/ACC Joint Committee on Clinical Data Standards (Joint Committee) selects cardiovascular conditions, procedures, and other topics related to cardiovascular health and medicine that will benefit from the creation of a clinical data standard set. Experts in the subject area are selected to examine and consider existing standards and develop a comprehensive, yet not exhaustive, data standard set. When undertaking a data collection effort, only a subset of the elements contained in a clinical data standard listing may be needed. Conversely, users

may want to consider whether it may be necessary to collect and incorporate additional elements. For example, in the setting of a randomized, clinical trial of a new drug, additional information would likely be required regarding study procedures and medical therapies. Alternatively, if a data set is to be used for quality improvement, safety initiatives, or administrative functions, elements such as Current Procedural Terminology (CPT) codes, *International Classification of Diseases, 10th Revision, Clinical Modification (ICD-10-CM)* codes, or outcomes may be added. The intent of the Joint Committee is to standardize clinical concepts, focusing on the patient and clinical care and not on administrative billing or coding concepts. The clinical concepts selected for development are predominantly cardiovascular-specific and usually encompass areas where a standardized terminology does not already exist. The clinical data standards can, therefore, serve as a guide to develop administrative data sets, and complementary administrative or quality assurance elements can evolve from these core clinical concepts and elements. Thus, rather than forcing the clinical data standards to harmonize with existing administrative codes, such as *ICD-10-CM* or CPT codes, we envision the administrative codes to follow the lead of the clinical data standards. This approach would allow clinical care to lead standardization of cardiovascular health care terminology.

The ACC and AHA recognize that there are other national efforts to establish clinical data standards, and every attempt is made to harmonize newly published standards with existing ones. Writing committees are instructed to consider adopting or adapting existing nationally recognized data standards if the definitions and characteristics are validated, useful, and applicable to the set under development. In addition, the ACC and AHA are committed to continually expanding their portfolio of clinical data standards and will create new standards and update existing ones as needed to maintain their currency and promote harmonization with other standards as health information technology and clinical practice evolve.

The Privacy Rule of the Health Insurance Portability and Accountability Act (HIPPA) privacy regulations, which went into effect in April 2003, emphasizes the importance of our professional commitment to safeguard patients' privacy. The HIPPA privacy regulations specify which information elements are considered "protected health information." These elements may not be disclosed to third parties (including registries and research studies) without meeting all relevant privacy sharing requirements. Protected health information may be included in databases used for health care operations under a data use agreement. Research studies using protected health information must be reviewed by an institutional review board. We have included identifying information in all clinical data standards to facilitate uniform collection of these elements when appropriate. For example, a longitudinal clinic database may contain these elements because access is restricted to the patient's health care team.

In clinical care, health care professionals communicate with each other through a common vocabulary. In an analogous manner, the integrity of clinical research depends on firm adherence to prespecified procedures for patient enrollment and follow-up; these procedures are guaranteed through careful attention to definitions enumerated in the study design and case report forms. Harmonizing data elements and definitions across studies facilitates comparisons and enables the conduct of pooled analyses and meta-analyses, thus deepening our understanding of individual study results.

The recent development of quality performance measurement initiatives, particularly those for which the comparison of health care professionals and institutions is an implicit or explicit aim, has further raised awareness about the importance of clinical data standards. Indeed, a wide audience, including nonmedical professionals such as payers, regulators, and consumers, may draw conclusions about care and outcomes from these comparisons. To understand and compare care patterns and outcomes, the data elements that characterize them must be clearly defined, consistently used, and properly interpreted.

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Clinical Data Standards

1. INTRODUCTION

Recently, the ACC/AHA Joint Committee on Clinical Practice Guidelines developed and published a guideline for evaluation and diagnosis of chest pain.[1] The intent of the new guideline is to outline a framework for evaluation of acute or stable chest pain syndromes or other anginal equivalents in various clinical settings, but especially in emergency departments, with emphasis on identification of ischemic and other potentially high-risk etiologies.

Chest pain is the second most common reason for adults to present to an emergency department in the United States, accounting for >7 million visits annually.[2] Although noncardiac causes of chest pain account for a large majority of these cases, there are several dangerous and life-threatening causes of chest pain that must be identified and treated promptly. Distinguishing between serious and nonserious causes of chest pain is an urgent imperative.

Our writing committee was established with the charge to develop a set of data elements and definitions that could be used for describing clinical care relevant for chest pain and acute MI, as outlined in the new guideline. Further, the selected elements and definitions are meant to be useful in clinical trials, observational studies, and

data registries. They also should advance the mission of achieving interoperability in EHRs and across computer networks.

In developing these data elements and definitions, we sought first to identify those items from existing vocabularies and lexicons that would be suitable for this purpose. The intent is to continue ongoing efforts meant to harmonize and synchronize data elements and definitions across multiple standards-based platforms. To that end, we reviewed previous publications related to guidelines, performance measures, data standards, and other documents containing appropriately structured data elements and definitions. Our goal was to employ to the fullest extent possible all existing elements and definitions. New elements and definitions were to be created only if existing ones were found not to be appropriate or useful. Given the expansive nature of a "chest pain" syndrome, this necessarily entailed close examination of previously published work. In particular, the writing committee considered previously published joint ACC/AHA publications, AHA and ACC clinical statements, and other relevant national and international guidelines, registry data dictionaries, standardized health care coding organization documents, and administrative datasets.

We did not attempt to create data elements and definitions for all conceivable types and causes of chest pain beyond the intended scope of the guideline. Instead, we deliberately followed the plans contained in the new guideline and focused on potentially serious cardiovascular causes of chest pain as might be encountered in emergency departments.[1] Data elements that might be used for the collection of demographic data, history and risk factors, laboratory test results, diagnostic procedures, and cardiovascular complications of other illnesses are beyond the scope of this document. Many of these other items can be found in previous ACC/AHA data standards publications.[3,4]

The data element tables are also included as an Excel file in the Online Data Supplement.

1.1. Abbreviations

Abbreviation	Meaning/Phrase
CPT	Current Procedural Terminology
cTn	cardiac troponin
EHR	electronic health record
ICD-10-CM	*International Classification of Diseases, 10th Revision, Clinical Modification*
LOINC	Logical Observation Identifiers Names and Codes
MI	myocardial infarction
NSTEMI	non–ST-segment elevation myocardial infarction
SNOMED-CT	Systematized Nomenclature of Medicine–Clinical Terms
STEMI	ST-segment elevation myocardial infarction
URL	upper reference limit

2. METHODOLOGY

2.1. Writing Committee Composition

Members of the writing committee were nominated by the Joint Committee, ACC, AHA, American College of Emergency Physicians, and Society for Cardiovascular Angiography and Interventions. Relevant RWI was taken into consideration when finalizing the writing committee, and every effort was made to ensure that the committee was well balanced and diverse with regards to professional expertise and interests, geographic location and institution, sex, ethnicity, and race. The writing committee consisted of 15 individuals with domain expertise in various disciplines: clinical cardiology, interventional cardiology, preventive cardiology, cardiovascular disease in women, emergency medicine, heart failure, coronary physiology, nursing, cardiac imaging, racial and ethnic disparities in cardiovascular outcomes, outcomes research, performance measures, health care quality management, medical informatics, and clinical registries.

2.2. Relationships With Industry and Other Entities

The Joint Committee makes every effort to avoid actual or potential conflicts of interest that might arise as a result of an outside relationship or a personal, professional, or business interest of any member of the writing committee. Specifically, all members of the writing committee are required to complete and submit a disclosure form showing all such relationships that could be perceived as real or potential conflicts of interest. These statements are updated when changes occur. Authors' and peer reviewers' relationships with industry and other entities pertinent to this data standards document are disclosed in Appendixes 1 and 2, respectively. In addition, for complete transparency, the disclosure information of each writing committee member—including relationships not pertinent to this document—is available as a Supplemental Appendix. The work of the writing committee was supported exclusively by the ACC and AHA without commercial support. Writing committee members volunteered their time for this effort. Meetings of the writing committee were confidential and attended only by committee members and staff.

2.3. Review of Literature and Existing Data Definitions

A substantial body of literature was reviewed for this manuscript. The primary sources of information were the "2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR Guideline for the Evaluation and Diagnosis of Chest Pain,"[1] "2020 AHA/ACC Key Data Elements and Definitions for Coronary Revascularization,"[3] and "Fourth

Universal Definition of Myocardial Infarction."[5] This information was augmented by multiple peer-reviewed references listed in the tables under the column "Mapping/Source of Definition."

2.4. Development of Terminology Concepts

The writing committee aggregated, reviewed, harmonized, and extended the selected data elements to develop a terminology set that would be usable in as many contexts as possible. As necessary, the writing committee identified contexts where individual terms required differentiation according to their proposed use (ie, research/regulatory versus clinical care contexts).

This publication was developed to serve as a common lexicon and base infrastructure by end users to augment ongoing work related to standardization and interoperability including, but not limited to, structural, administrative, and technical metadata development. The resulting appendixes (Appendixes 3 to 5) list the data element in the first column, followed by the clinical definition of the data element. The allowed responses ("permissible values") for each data element in the next column are the acceptable means of recording this information. For data elements with multiple permissible values, a bulleted list of the permissible values is provided in the row listing the data element, followed by multiple rows listing each permissible value and corresponding permissible value definition, as needed. Where possible, clinical definitions (and clinical definitions of the corresponding permissible values) are repeated verbatim as previously published in reference documents.

2.5. Consensus Development

The Joint Committee established the writing committee as described in the Joint Committee on Clinical Data Standards' methodology paper.[6] The primary responsibility of the writing committee was to aggregate existing information relevant to the care of patients with chest pain and acute MI from external sources such as the "2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR Guideline for the Evaluation and Diagnosis of Chest Pain,"[1] "2019 ESC Guidelines for the Diagnosis and Management of Chronic Coronary Syndromes,"[7] other national and international guidelines and clinical statements, and cardiovascular subspecialty society statements. The work of the writing committee was accomplished via a series of virtual meetings, along with extensive email correspondence. The review work was distributed among subgroups of the writing committee based on interest and expertise in the components of the terminology set. The proceedings of the workgroups were then assembled, resulting in the vocabulary in Appendixes 3 to 5, and associated descriptive text in Section 3. All members reviewed and approved the final lexicon.

2.6. Relation to Other Standards

The writing committee reviewed the available published data standards, including previous ACC/AHA data standards publications and data dictionaries from the ACC's National Cardiovascular Data Registry.[8] Relative to published data standards, the writing committee anticipates that this terminology set will facilitate the uniform adoption of these terms, where appropriate, by the clinical, translational research, regulatory, quality and outcomes, and EHR communities.

2.7. Peer Review, Public Review, and Board Approval

This document was reviewed by official reviewers nominated by the ACC, AHA, and the collaborating organizations, as well as content reviewers appointed by these organizations and the Joint Committee. To increase its applicability further, the document was posted on the ACC and AHA websites for a 30-day public comment period. This document was approved by the ACC Clinical Policy Approval Committee and AHA Science Advisory and Coordinating Committee in April 2022, and by the AHA Executive Committee in May 2022. The writing committee anticipates that these data standards will require review and updating in the same manner as other published guidelines, performance measures, and appropriate use criteria.

3. DATA ELEMENTS AND DEFINITIONS

3.1. Chest Pain

The data elements in Appendix 3 include terminology pertaining to the description of chest pain and its suspected etiologies as used in current clinical practice. Data elements related to history, cardiovascular risk factors, laboratory testing, and invasive and noninvasive testing for chest pain are not discussed here because they have been previously described.[3,4]

Chest pain is one of the leading reasons for emergency department visits among adults in the United States. Patients often report various types of chest discomfort. Traditionally, chest pain symptoms have been categorized as "typical" or "atypical." This classification was primarily aimed at differentiating symptoms relating to myocardial ischemia versus nonischemic etiologies; however, the term "atypical" is often used to describe noncardiac symptoms, as well as cardiac symptoms not representative of myocardial ischemia (eg, pericarditis), thereby creating ambiguity. The recent chest pain guideline, therefore, recommends using "cardiac," "possible cardiac," and "noncardiac" chest pain as the preferred terminology. A comprehensive history and

focused physical examination remain pivotal in the evaluation of specific chest pain etiologies and help discern serious cardiovascular causes from more benign ones. Although some patients present with nonclassic or "noncardiac" symptoms, chest pain is still the predominant symptom among men and women who have underlying coronary artery disease. In patients who present with acute chest pain and are thought to have possible acute coronary syndrome (excluding ST-segment elevation myocardial infarction [STEMI]), clinical decision pathways based on risk stratification tools can guide further testing and disposition. Several risk scores have been designed for this purpose (eg, TIMI [Thrombolysis in Myocardial Infarction], GRACE [Global Registry of Acute Coronary Events], HEART [History, ECG, Age, Risk factors and Troponin]).[9–13] They include clinical data such as electrocardiographic abnormalities, risk factors, and cardiac biomarkers. In alignment with the recent chest pain guideline, we do not recommend the use of one risk stratification system over others. Risk scores should be used within the clinical context of each patient. Additionally, in Appendix 3, we have identified data elements and permissible values for suspected chest pain etiologies besides atherosclerotic coronary artery disease, dividing them into 4 categories: nonatherosclerotic coronary causes, noncoronary causes, vascular causes, and noncardiac causes. The recent chest pain guideline highlighted the need to reach consensus for the definitions of chest pain to align with clinical practice. This document is aimed at harmonizing related data elements for uniform reporting.

3.2. Myocardial Injury

Myocardial injury, acute versus chronic (or acute-on-chronic), is defined by the presence of an elevated cardiac troponin (cTn) concentration above the 99th percentile of the upper reference limit (URL). Myocardial injury is a frequently encountered clinical syndrome and is associated with an adverse prognosis. Myocardial injury is considered acute if there is a rise or fall of cTn concentrations over time and considered chronic when cTn concentrations are persistently elevated.

Clinicians must distinguish between one of the MI subtypes and nonischemic myocardial injury. Acute myocardial injury is related to the diagnosis of MI, particularly when accompanied by supportive evidence in the form of symptoms, electrocardiographic abnormalities, or imaging evidence of new regional wall motion abnormalities or new loss of viable myocardium. Nonischemic myocardial injury may arise secondary to cardiac or noncardiac conditions.

Appendix 4 focuses on nonischemic myocardial injury, listing the appropriate vocabulary to facilitate uniform reporting.

3.3. Myocardial Infarction

MI is the irreversible necrosis of heart muscle. A common cause for infarction is deprivation in myocardial oxygen supply because of interruption of blood flow in ≥1 coronary arteries as a result of plaque rupture, erosion, fissure, or coronary dissection. Additionally, MI can result from inflammatory, metabolic, or toxic insults to the myocardium. Early and accurate detection of MI is important for initiating and maintaining appropriate therapy. In clinical trials, lack of a uniform MI definition can result in low concurrence between the initial clinical and later adjudicated assessments of MI, which will affect accuracy of primary end points and trial outcomes. Thus, uniform definitions are needed to ensure accurate reporting of MI events across clinical trials and registries.

The data element set for an MI event requires both subjective and objective findings, including symptoms, cardiac biomarkers, and electrocardiographic abnormalities. The data elements in Appendix 5 were selected based on published peer-reviewed MI definitions developed by national and international cardiovascular subspecialty societies (AHA, ACC, European Society of Cardiology, and Society for Cardiovascular Angiography and Interventions) and are commonly used by regulatory bodies that oversee the conduct of cardiovascular clinical trials. The terminology of STEMI and non-STEMI (NSTEMI) is included because it has practical implications that determine pathways of care, despite the limitations of this terminology in terms of predictive accuracy and lack of optimal correlation with the underlying pathology (occlusive versus nonocclusive culprit vessel). The value of the STEMI/NSTEMI terminology is that it allows for early identification of patients who benefit from immediate coronary revascularization, and it has been universally adopted across multiple medical specialties. Lastly, the writing committee acknowledges the controversy concerning the best definition of MI after coronary revascularization. Inclusion of the 2 most commonly used postcoronary revascularization MI definitions is intended to support continued scientific efforts to decipher the relationship between those definitions and the long-term outcomes of affected patients.

4. INFORMATICS OF CONTROLLED VOCABULARIES

Varying data definitions, data formats, and data encoding, and lack of a standardized vocabulary for representing clinical concepts in health care information systems, are known barriers that limit the capacity of computer systems to transmit data seamlessly. The ambiguity of clinical concepts and terminologies used in health care data exchange make standardization, harmonization, and maintenance of clinical vocabulary an effortful task that

demands considerable time, specialized knowledge, and a specific skill set. The writing committee identified the basic attributes of a standardized vocabulary that allow creation of a clinical data dictionary—data elements, data element definitions, permissible values, permissible value definitions, mapping/source of definitions, and notes. For this published data set to be used for full representation of clinical data, attributes such as synonyms, preferred abbreviations, data formats, data types, target values, use of case information, mapping to standardized code sets (eg, SNOMED-CT [Systematized Nomenclature of Medicine-Clinical Terms], LOINC [Logical Observation Identifiers Names and Codes], RxNorm), concept unique identifiers, and concept stewards must be included in a data dictionary. Development of comprehensive clinical data standards and use of standardized vocabularies are key to health care data interoperability and, ultimately, will help improve effective communication of patient care across all areas of practice in the health care continuum. This document presents a clinical lexicon comprising carefully selected data elements and associated values. Informatician development of the metadata of the lexicon and technical development of a database specification for semantic interoperability remain outside the scope of this document.

5. FUTURE DIRECTIONS AND AREAS FOR RESEARCH

As pointed out earlier in this document, chest pain is one of the most common symptoms for which adults seek medical care, especially in emergency departments; therefore, accurate and efficient patient evaluation should continue to be the focus of substantial research activity. One important component of this is a uniform, consistent, and standardized vocabulary of terms, and the associated methodologies, for capturing relevant clinical information. Lack of both uniform definitions and standardized data structures has impeded assessment for quality and performance improvement of clinical care and research. Although several evaluation and treatment algorithms have been used, and some found to be helpful, the absence of uniform and consistent definitions has made comparative effectiveness difficult to assess. The same is true with clinical data stored in EHRs: lack of interoperability has made data exchange impossible or very difficult.

Future activities should include much greater efforts to standardize, harmonize, and synchronize the definitions of relevant clinical terms and their implementation in electronic computer structures as semantically and syntactically interoperable data elements. This will require numerous adjustments to software programs. One place where this might begin is with imaging reports and procedure reports. Standardizing the reporting systems could go a long way toward spreading standardization and interoperability. Care algorithms, clinical risk-scoring calculators, and decision-support tools will assist with patient evaluation and management. Nevertheless, these will need to be evaluated to demonstrate their ability to improve care and patient outcomes.

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ARTICLE INFORMATION

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Appendix 1. Author Relationships With Industry and Other Entities (Relevant)–2022 ACC/AHA Key Data Elements and Definitions for Chest Pain and Acute Myocardial Infarction (January 2022)

Committee Member	Employment	Consultant	Speakers Bureau	Ownership/ Partnership/ Principal	Personal Research	Institutional, Organizational, or Other Financial Benefit	Expert Witness
H.V. ("Skip") Anderson, Chair	UT Health Science Center–Professor of Medicine, Cardiology Division	None	None	None	None	None	None
Sofia Carolina Masri, Vice Chair	University of Wisconsin School of Medicine and Public Health–Assistant Professor	None	None	None	None	None	None
Mouin S. Abdallah	MedStar Washington Hospital Center–Medical Director of Quality and Safety, MedStar Heart & Vascular Institute	None	None	None	None	None	None
Anna Marie Chang	Thomas Jefferson University–Associate Professor, Department of Emergency Medicine	None	None	None	None	• Siemens*	None
Mauricio G. Cohen	University of Miami Miller School of Medicine–Professor of Medicine; University of Miami Hospitals and Clinics–Director, Cardiac Catheterization Laboratories	None	None	None	None	None	None
Islam Y. Elgendy	Weill Cornell Medicine-Qatar–Assistant Professor of Medicine	None	None	None	None	None	None
Martha Gulati	University of Arizona Phoenix–Professor of Medicine & Chief of Cardiology	None	None	None	None	None	None
Kathleen LaPoint†	American Heart Association/American College of Cardiology–Clinical Healthcare Data Manager	None	None	None	None	None	None
Nidhi Madan	Rush University Medical Center–Fellow	None	None	None	None	None	None
Issam D. Moussa	Carle Health–Medical Director, Heart & Vascular Institute; Carle Illinois College of Medicine, University of Illinois Urbana Champaign–Professor & Associate Dean For Research and Innovation	None	None	None	None	None	None
Jorge Ramirez	SSM St. Mary's Hospital–Interventional Cardiologist, Metro Heart Group of St. Louis	None	None	None	None	None	None
April W. Simon	AWS Research, LLC–President	None	None	None	None	None	None
Vikas Singh	University of Louisville School of Medicine–Assistant Professor of Medicine and Director, Structural Heart Disease	None	None	None	None	None	None
Stephen W. Waldo	University of Colorado Denver - Anschutz Medical Campus–Associate Professor	None	None	None	None	None	None
Marlene S. Williams	The Johns Hopkins University–Associate Professor of Medicine; Johns Hopkins Bayview Medical Center–Clinical Director of Cardiology	None	None	None	None	None	None

This table represents the relationships of committee members with industry and other entities that were determined to be relevant to this document. These relationships were reviewed and updated in conjunction with all meetings and/or conference calls of the writing committee during the document development process. The table does not necessarily reflect relationships with industry at the time of publication. A person is deemed to have a significant interest in a business if the interest represents ownership of ≥5% of the voting stock or share of the business entity, or ownership of ≥$5000 of the fair market value of the business entity; or if funds received by the person from the business entity exceed 5% of the person's gross income for the previous year. Relationships that exist with no financial benefit are also included for the purpose of transparency. Relationships in this table are modest unless otherwise noted.

According to the ACC/AHA, a person has a *relevant* relationship IF: a) the *relationship or interest* relates to the same or similar subject matter, intellectual property or asset, topic, or issue addressed in the *document;* or b) the *company/entity* (with whom the relationship exists) makes a drug, drug class, or device addressed in the *document* or makes a competing drug or device addressed in the *document*; or c) the *person or a member of the person's household* has a reasonable potential for financial, professional or other personal gain or loss as a result of the issues/content addressed in the *document.* Writing committee members are required to recuse themselves from voting on sections to which their specific relationships with industry and other entities may apply.

*Significant relationship.

†Kathleen LaPoint is an AHA/ACC joint staff member and acts as the Clinical Healthcare Data Manager for the "2022 ACC/AHA Key Data Elements and Definitions for Chest Pain and Acute Myocardial Infarction." No relevant relationships to report. Nonvoting author on recommendations and not included/counted in the RWI balance for this committee.

ACC indicates American College of Cardiology; AHA, American Heart Association; and UT, University of Texas.

Appendix 2. Reviewer Relationships With Industry and Other Entities (Comprehensive)–2022 ACC/AHA Key Data Elements and Definitions for Chest Pain and Acute Myocardial Infarction (October 2021)

Reviewer	Representation	Employment	Consultant	Speakers Bureau	Ownership/ Partnership/ Principal	Personal Research	Institutional, Organizational, or Other Financial Benefit	Expert Witness
J. Dawn Abbott	Content Reviewer–ACC/AHA	Warren Alpert Medical School of Brown University–Professor of Medicine	• Boston Scientific • DynaMed • Medtronic • Philips • UpToDate	None	None	• Boston Scientific† • CSL Behring† • MicroPort†	• Recor	None
Harsh Agrawal	Official Reviewer–AHA	University of California San Francisco–Assistant Professor, Department of Medicine	None	None	None	None	None	None
Rodrigo Bagur	Content Reviewer–ACC/AHA	Schulich School of Medicine & Dentistry, Western University, London, ON–Associate Professor, Department of Medicine (Cardiology) and Epidemiology and Biostatistics	None	None	None	None	None	None
Deborah Diercks	Official Reviewer–ACEP	UT Southwestern Medical Center–Professor of Emergency Medicine, Distinguished Chair in Clinical Care and Research	• ET Healthcare	None	None	• Abbott Laboratories* • Bristol Myers Squibb† • Echosens† • Ortho Clinical† • Quidel • Roche* • Siemens • Stago†	• ACC† • Emergencies in Medicine† • SAEM†	None
Ayman Elbadawi	Content Reviewer–ACC/AHA	Baylor College of Medicine–Fellow Physician	None	None	None	None	None	None
Dhaval Kolte	Official Reviewer–AHA/ACC Joint Committee on Clinical Data Standards	Harvard Medical School–Instructor in Medicine; Massachusetts General Hospital–Structural Interventional Cardiologist	None	None	None	None	None	None
Michael C. Kontos	Content Reviewer–ACC	Virginia Commonwealth University–Professor, Division of Cardiology; Medical Director, Coronary Intensive Care Unit; Co-Director, Chest Pain Center	None	None	None	None	• ACC* • SAEM • VCSQI† • VHAC†	None
Mori J. Krantz	Official Reviewer–ACC	University of Colorado Anschutz Medical Campus–Professor of Medicine, Cardiology	None	None	None	None	None	None
Mamas A. Mamas	Content Reviewer–ACC/AHA	University of Keele, Staffordshire, UK–Professor of Cardiology and Clinical Director for the Centre for Prognosis Research	• Bristol Myers Squibb • Pfizer	• Daiichi Sankyo • Terumo	None	• Abbott Laboratories* • Terumo*	• AHA* • EAPCI† • ESC† • NIHR† • TCTMD*	None
Noreen T. Nazir	Official Reviewer–ACC	University of Illinois at Chicago–Assistant Professor of Clinical Medicine, Division of Cardiology	None	None	None	None	None	None
Andrea Price	Content Reviewer–AHA	Indiana University Health–Director, Quality Reporting & Analytics	None	None	None	• ACCF*	None	None

(*Continued*)

Appendix 2. Continued

Reviewer	Representation	Employment	Consultant	Speakers Bureau	Ownership/ Partnership/ Principal	Personal Research	Institutional, Organizational, or Other Financial Benefit	Expert Witness
Yader Sandoval	Official Reviewer–SCAI	Mayo Clinic College of Medicine and Science–Associate Professor of Medicine	None	None	None	None	• Abbott Laboratories†	None
Michael Salerno	Content Reviewer–ACC	Stanford University–Professor of Medicine (Cardiovascular) and of Radiology (Cardiovascular Imaging)	• Valo Health*	None	None	• NIH*	• Siemens† • HeartFlow‡	None
Toniya Singh	Official Reviewer–AHA	Christian Hospital Northeast–Chief of Medicine; St. Louis Heart and Vascular–Managing Partner	None	None	None	• St. Louis Heart and Vascular*	• AstraZeneca‡ • Bayer‡ • Bristol Myers Squibb‡ • Janssen Pharmaceuticals‡ • Novartis‡ • St. Louis Heart and Vascular†	None
James E. Tcheng	Content Reviewer–ACC/AHA	Duke University Medical Center–Professor of Medicine and Professor of Community and Family Medicine (Informatics); Duke Health Network–Chief Medical Information Officer	• Livmor† • Lumedx† • Medstreaming† • XenterMD†	None	None	None	• Alliance for the Implementation of Clinical Practice Guidelines† • HL7† • Regenstrief Foundation†	None
Jason H. Wasfy	Content Reviewer–ACC/AHA	Harvard Medical School–Associate Professor; Massachusetts General Hospital–Heart Center, Director of Quality and Analytics	• New England Comparative Effectiveness Council • Pfizer	None	None	• NFLPA*	• AHA* • Massachusetts General Physicians Organization* • NIH*	• Defendant, coronary angiography, 2020
William S. Weintraub	Content Reviewer–ACC/AHA	MedStar Washington Hospital Center–Director of Outcomes Research	• Amarin • AstraZeneca*	None	None	None	None	None
David Winchester	Content Reviewer–ACC	University of Florida–Associate Professor of Medicine; Co-Director, Cardiac Imaging Division at Department of Radiology	None	None	None	None	• Alachua County Medical Society Board of Directors†	None
John R. Windle	Content Reviewer–ACC/AHA	University of Nebraska Medical Center–Professor of Cardiovascular Medicine; Richard and Mary Holland Distinguished Chair of Cardiovascular Science	None	None	None	None	None	None

This table represents all relationships of reviewers with industry and other entities that were reported at the time of peer review, including those not deemed to be relevant to this document. The table does not necessarily reflect relationships with industry at the time of publication. A person is deemed to have a significant interest in a business if the interest represents ownership of ≥5% of the voting stock or share of the business entity, or ownership of ≥$5000 of the fair market value of the business entity; or if funds received by the person from the business entity exceed 5% of the person's gross income for the previous year. Relationships that exist with no financial benefit are also included for the purpose of transparency. Relationships in this table are modest unless otherwise noted. Please refer to https://www.acc.org/guidelines/about-guidelines-and-clinical-documents/relationships-with-industry-policy for definitions of disclosure categories or additional information about the ACC/AHA Disclosure Policy for Writing Committees.

*Significant relationship.

†No financial benefit.

‡This disclosure was entered under the Clinical Trial Enroller category in the ACC's disclosure system. To appear in this category, the author acknowledges that there is no direct or institutional relationship with the trial sponsor as defined in the (ACCF or ACC/AHA) Disclosure Policy for Writing Committees.

ACC indicates American College of Cardiology; ACCF, American College of Cardiology Foundation; ACEP, American College of Emergency Physicians; AHA, American Heart Association; EAPCI, European Association of Percutaneous Cardiovascular Interventions; ESC, European Society of Cardiology; HL7, Health Level Seven; NFLPA, National Football League Players Association; NIH, National Institutes of Health; NIHR, National Institute for Health Research; ON, Ontario; SCAI, Society for Cardiovascular Angiography and Interventions; SAEM, Society for Academic Emergency Medicine; SPECT, single-photon emission computed tomography; UK, United Kingdom; UT, University of Texas; VCSQI, Virginia Cardiac Services Quality Initiative; and VHAC, Virginia Heart Attack Coalition.

Appendix 3. Chest Pain

Data Element	Data Element Definition	Permissible Values	Permissible Value Definitions	Mapping/Source of Definition	Additional Notes
Chest pain (nature/character)	The various descriptors used to define the perceived chest pain sensation	• Burning • Dull • Heaviness • Pressure • Sharp • Squeezing • Stabbing • Tearing • Tightness		Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1] Boris JR, Béland MJ, Bergensen LJ, et al. 2017 AHA/ACC key data elements and definitions for ambulatory electronic health records in pediatric and congenital cardiology: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Data Standards. *Circ Cardiovasc Qual Outcomes*. 2017;10:e000027.[14]	
Chest pain (type/cause)	The cause of unpleasant or uncomfortable sensations in the anterior chest that prompt concern for a cardiac problem	• Cardiac • Possible cardiac • Noncardiac		Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1]	
		Cardiac	Chest pain occurring because of an underlying cardiac etiology. Includes classic chest discomfort based on quality, location, radiation, and provoking and relieving factors that makes it more likely to be of cardiac ischemic origin.		
		Possible cardiac	Chest pain symptoms that suggest a cardiac origin		
		Noncardiac	Chest pain symptoms likely because of a noncardiac cause in patients with persistent or recurring symptoms despite a negative stress test or anatomic cardiac evaluation, or a low-risk designation by a clinical decision pathway		
Chest pain onset and duration	The description of time for the chest pain symptoms to develop or increase in intensity	• Sudden • Gradual • Intermittent • Fleeting • Constant		Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1]	
		Sudden	Anginal symptoms build in intensity over a few minutes		
		Gradual	Anginal symptoms build in intensity gradually (over hours or days)		
		Intermittent	Periodically stopping and starting	NCI Thesaurus Code: C71325[15] Erhardt L, Herlitz J, Bossaert L, et al. Task force on the management of chest pain. *Eur Heart J*. 2002;23:1153-1176.[16]	

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Appendix 3. Continued

Data Element	Data Element Definition	Permissible Values	Permissible Value Definitions	Mapping/Source of Definition	Additional Notes
		Fleeting	Anginal symptoms of few seconds' duration	Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1]	
		Constant	Continually recurring or continuing without interruption	NCI Thesaurus Code: C64638[15]	
Chest pain chronicity	The type of chest pain based on duration of symptoms	• Acute chest pain • Stable chest pain		Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1]	
		Acute chest pain	When chest pain is new onset (<2 mo) or involves a change in pattern, intensity, or duration compared with previous episodes in a patient with recurrent symptoms	Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1]	
		Stable chest pain	When chest pain symptoms are chronic (≥2 mo) and associated with consistent precipitants such as exertion or emotional stress	Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1]	
Location and radiation	Location and radiation of chest pain sensation	• Chest • Shoulder • Arm • Neck • Back • Upper abdomen • Jaw • Other		Dehmer GJ, Badhwar V, Bermudez EA, et al. 2020 AHA/ACC key data elements and definitions for coronary revascularization: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Data Standards (Writing Committee to Develop Clinical Data Standards for Coronary Revascularization). *Circ Cardiovasc Qual Outcomes*. 2020;13:e000059.[3]	
Precipitating factors	Factors that start or worsen chest pain	• Physical exertion • Emotional stress • Certain body positions • Other		Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1]	

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Appendix 3. Continued

Data Element	Data Element Definition	Permissible Values	Permissible Value Definitions	Mapping/Source of Definition	Additional Notes
Relieving factors	Factors that help alleviate chest pain	• Rest • Certain body positions • Medications (such as sublingual nitroglycerin) • Other		Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1]	Relief with nitroglycerin is not necessarily diagnostic of myocardial ischemia and should not be used as a diagnostic criterion.
Associated symptoms	Symptoms accompanying chest pain. These are noted more frequently among patients with diabetes, women, and the elderly.	• Dyspnea • Palpitations • Diaphoresis • Nausea or vomiting • Lightheadedness • Confusion • Presyncope or syncope • Abdominal symptoms • Heartburn unrelated to meals • Other		Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1]	
Angina pectoris	Retrosternal chest discomfort that builds gradually in intensity (over several minutes), is usually precipitated by stress (physical or emotional) or occurring at rest (as in the case of an ACS) with characteristic radiation (eg, left arm, neck, jaw) and its associated symptoms (eg, dyspnea, nausea, lightheadedness). When actively treated (eg, nitroglycerin) or spontaneously resolving (eg, with rest), it dissipates over a few minutes.	• Yes • No		Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1]	
Anginal equivalent	Symptoms or pain at a site other than the chest occurring in a patient at high cardiac risk. Anginal equivalents have the same importance as angina pectoris.	• Dyspnea • Diaphoresis • Nausea • Extreme fatigue • Pain, pressure, tightness, or discomfort in shoulders, arms, neck, back, upper abdomen, or jaw		Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1] Dehmer GJ, Badhwar V, Bermudez EA, et al. 2020 AHA/ACC key data elements and definitions for coronary revascularization: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Data Standards (Writing Committee to Develop Clinical Data Standards for Coronary Revascularization). *Circ Cardiovasc Qual Outcomes*. 2020;13:e000059.[3]	Anginal equivalents are considered symptoms of myocardial ischemia.

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Appendix 3. Continued

Data Element	Data Element Definition	Permissible Values	Permissible Value Definitions	Mapping/Source of Definition	Additional Notes
Angina grade	Grade of symptoms or signs in patients with suspected or presumed stable angina (or angina equivalent) according to the Canadian Cardiovascular Society grading scale	• Class 0 • Class I • Class II • Class III • Class IV • Unknown		Campeau L. The Canadian Cardiovascular Society grading of angina pectoris revisited 30 years later. *Can J Cardiol*. 2002;18:371-379.[17] Dehmer GJ, Badhwar V, Bermudez EA, et al. 2020 AHA/ACC key data elements and definitions for coronary revascularization: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Data Standards (Writing Committee to Develop Clinical Data Standards for Coronary Revascularization). *Circ Cardiovasc Qual Outcomes*. 2020;13:e000059.[3]	
		Class 0	Asymptomatic		
		Class I	Ordinary physical activity, such as walking or climbing stairs, does not cause angina. Angina occurs with strenuous, rapid, or prolonged exertion at work or recreation.		
		Class II	Slight limitation of ordinary activity. Angina occurs on walking or climbing stairs rapidly, walking uphill, walking or climbing stairs after meals, or in cold, in wind, or under emotional stress, or only during the few hours after awakening. Angina occurs on walking >2 blocks on the level and climbing >1 flight of ordinary stairs at a normal pace and in normal conditions.		
		Class III	Marked limitation of ordinary physical activity. Angina occurs on walking 1–2 blocks on the level and climbing 1 flight of stairs in normal conditions and at a normal pace.		
		Class IV	Inability to perform any physical activity without discomfort; angina symptoms may be present at rest.		
		Unknown	A proper value is applicable but not known.		
Medically refractory angina	Medically refractory angina is the persistence of angina pectoris with substantial functional limitations (Canadian Cardiovascular Society class III or IV) despite maximum tolerated doses of optimal medical therapy.	• Yes • No		Dehmer GJ, Badhwar V, Bermudez EA, et al. 2020 AHA/ACC key data elements and definitions for coronary revascularization: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Data Standards (Writing Committee to Develop Clinical Data Standards for Coronary Revascularization). *Circ Cardiovasc Qual Outcomes*. 2020;13:e000059.[3]	

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Appendix 3. Continued

Data Element	Data Element Definition	Permissible Values	Permissible Value Definitions	Mapping/Source of Definition	Additional Notes
Etiology of acute chest pain syndrome	The potential causes of acute chest pain	• STEMI • NSTE-ACS • MI, type 2 • Acute aortic syndrome • Pulmonary embolism • Myocarditis • Pericarditis • Myopericarditis • Valvular heart disease • Heart failure • Other		Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1]	Initial assessment of patients presenting with acute chest pain is focused on the rapid identification of patients with immediately life-threatening conditions such that appropriate medical interventions can be initiated.
		STEMI	STEMIs are characterized by the presence of both criteria: 1) Electrocardiographic evidence evidence of STEMI: new or presumed new ST-segment elevation at the J-point in 2 contiguous leads with the cut-off point: ≥1 mm in all leads other than leads V_2–V_3 where the following cutpoints apply: ≥2 mm in men ≥40 y; ≥2.5 mm in men <40 y; or ≥1.5 mm in women regardless of age. (When the magnitudes of J-point elevation in leads V_2 and V_3 are registered from a prior ECG, new J-point elevation ≥1 mm [as compared with the earlier ECG] should be considered an ischemic response.) 2) Detection of a rise or fall of cardiac biomarker values (preferably cTn) with ≥1 value above the 99th percentile URL.	Thygesen K, Alpert JS, Jaffe AS, et al. Fourth universal definition of myocardial infarction (2018). *Circulation*. 2018;138:e618–e651.[5] NCDR Chest Pain-MI Registry Coder's Data Dictionary v3.0 (element #12252)[18]	
		NSTE-ACS	NSTE-ACS encompasses NSTEMI and unstable angina. NSTEMIs are characterized by the presence of both criteria: 1) Detection of a rise or fall of cardiac biomarker values (preferably cTn) with ≥1 value above the 99th percentile URL. Electrocardiographic changes or ischemic symptoms may or may not be present. 2) Absence of electrocardiographic changes that are diagnostic of a STEMI (see STEMI). Unstable angina is a condition in which there is angina pectoris that occurs without stress or activity, or with decreasing stress or activity compared with stable angina and has been present for <2 wk. It is characterized by the absence of electrocardiographic changes that are diagnostic of a STEMI.	Thygesen K, Alpert JS, Jaffe AS, et al. Fourth universal definition of myocardial infarction (2018). *Circulation*. 2018;138:e618–e651.[5] NCDR Chest Pain-MI Registry Coder's Data Dictionary v3.0 (element #12252)[18] Boris JR, Béland MJ, Bergensen LJ, et al. 2017 AHA/ACC key data elements and definitions for ambulatory electronic health records in pediatric and congenital cardiology: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Data Standards. *Circ Cardiovasc Qual Outcomes*. 2017;10:e000027.[14]	hs-cTn is becoming the preferred standard for establishing a biomarker diagnosis of AMI.

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Appendix 3. Continued

Data Element	Data Element Definition	Permissible Values	Permissible Value Definitions	Mapping/Source of Definition	Additional Notes
		MI, type 2	Ischemic myocardial injury in the context of a mismatch between oxygen supply and demand has been classified as type 2 MI. Criteria for type 2 MI: Detection of a rise or fall of cTn concentrations with at least 1 value above the 99th percentile URL, and evidence of an imbalance between myocardial oxygen supply and demand unrelated to acute coronary atherothrombosis, requiring at least 1 of the following: • Symptoms of acute myocardial ischemia • New ischemic electrocardiographic changes • Development of pathological Q waves • Imaging evidence of new loss of viable myocardium or new regional wall motion abnormality in a pattern consistent with an ischemic etiology	Thygesen K, Alpert JS, Jaffe AS, et al. Fourth universal definition of myocardial infarction (2018). *Circulation*. 2018;138:e618–e651.[5]	
		Acute aortic syndrome	Acute aortic syndrome includes aortic dissection, intramural hematoma, and symptomatic aortic ulcer.	Tsai TT, Nienaber CA, Eagle KA. Acute aortic syndromes. *Circulation*. 2005;112:3802-3813.[19]	
		Pulmonary embolism	Intravascular migration of a venous thrombus to the pulmonary arterial circulation. It is diagnosed by a positive pulmonary angiogram, an unequivocally positive helical CT scan, a high-probability ventilation-perfusion scan, or autopsy.	Dehmer GJ, Badhwar V, Bermudez EA, et al. 2020 AHA/ACC key data elements and definitions for coronary revascularization: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Data Standards (Writing Committee to Develop Clinical Data Standards for Coronary Revascularization). *Circ Cardiovasc Qual Outcomes*. 2020;13:e000059.[3] Banovac F, Buckley DC, Kuo WT, et al. Reporting standards for endovascular treatment of pulmonary embolism. *J Vasc Interv Radiol*. 2010;21:44-53.[20]	
		Myocarditis	Myocarditis is an inflammatory disease of the myocardium resulting from viral infections or postviral immune-mediated responses. Clinical manifestations of myocarditis are varied and include chest pain that is often sharp and reflective of epicardial inflammation involving the pericardium. Myocardial dysfunction often causes fatigue and exercise intolerance, and predominance of heart failure distinguishes myocarditis from pericarditis; cTn is usually elevated.	Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1] NCDR Chest Pain-MI Auxiliary Coder's Data Dictionary (element #14617)[21]	MRI is also useful as a diagnostic tool.[22]

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Appendix 3. Continued

Data Element	Data Element Definition	Permissible Values	Permissible Value Definitions	Mapping/Source of Definition	Additional Notes
		Pericarditis	Pericarditis is the inflammation of the pericardial layers characterized by chest pain, electrocardiographic changes, and often pericardial effusion. It is often the result of an infectious or a noninfectious process but can also be idiopathic. Pericarditis classically presents with chest pain that is sharp, pleuritic, and which may be improved by sitting up or leaning forward, although in many instances such findings are not present. A pericardial friction rub may be audible. Widespread ST elevation with PR depression is the electrocardiographic hallmark, although changes are nonspecific and may be transient.	Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1] NCDR Chest Pain-MI Auxiliary Coder's Data Dictionary (element #14617)[21] Chiabrando JG, Bonaventura A, Vecchié A, et al. Management of acute and recurrent pericarditis: JACC state-of-the-art review. *J Am Coll Cardiol*. 2020;75:76-92.[23] Ibanez B, James S, Agewall S, et al. 2017 ESC guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation: the Task Force for the management of acute myocardial infarction in patients presenting with ST-segment elevation of the European Society of Cardiology (ESC). *Eur Heart J*. 2018;39:119-177.[24]	Three major pericardial complications may occur: early infarct–associated pericarditis, late pericarditis, or postcardiac injury. MRI is also useful as a diagnostic tool.[23]
		Myopericarditis	Pericarditis and myocarditis share overlapping common causes and likely form a continuum. The diagnosis of predominant pericarditis with myocardial involvement, or "myopericarditis," can be clinically established if patients with definite criteria for acute pericarditis show elevated biomarkers of myocardial injury (cTn I or T) without newly developed focal or diffuse impairment of LV function in echocardiogram or CMR.	Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1] Adler Y, Charron P, Imazio M, et al. 2015 ESC guidelines for the diagnosis and management of pericardial diseases: the Task Force for the Diagnosis and Management of Pericardial Diseases of the European Society of Cardiology (ESC). *Eur Heart J*. 2015;36:2921-2964.[25]	
		Valvular heart disease	Valvular heart disease includes the following: • Aortic stenosis • Aortic regurgitation • Mitral stenosis • Mitral regurgitation • Tricuspid valve disease • Pulmonic valve disease • Mixed valve disease	Otto CM, Nishimura RA, Bonow RO, et al. 2020 ACC/AHA guideline for the management of patients with valvular heart disease: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;143:e72–e227.[26] Dehmer GJ, Badhwar V, Bermudez EA, et al. 2020 AHA/ACC key data elements and definitions for coronary revascularization: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Data Standards (Writing Committee to Develop Clinical Data Standards for Coronary Revascularization). *Circ Cardiovasc Qual Outcomes*. 2020;13:e000059.[3]	Classification of valve disease severity is based on multiple criteria, including symptoms, valve anatomy, valve hemodynamics, and the effects of valve dysfunction on ventricular and vascular function (eg, end-organ damage).

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Appendix 3. Continued

Data Element	Data Element Definition	Permissible Values	Permissible Value Definitions	Mapping/Source of Definition	Additional Notes
		Heart failure	Heart failure is a complex clinical syndrome that results from any structural or functional impairment of ventricular filling or ejection of blood. The cardinal manifestations of heart failure are dyspnea and fatigue, which may limit exercise tolerance, and fluid retention, which may lead to pulmonary or splanchnic congestion and/or peripheral edema. There is no single diagnostic test for heart failure because it is largely a clinical diagnosis based on a careful history and physical examination.	Bozkurt B, Hershberger RE, Butler J, et al. 2021 ACC/AHA key data elements and definitions for heart failure: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Data Standards (Writing Committee to Develop Clinical Data Standards for Heart Failure). *Circ Cardiovasc Qual Outcomes*. 2021;14:e000102.[4] Heidenreich PA, Bozkurt B, Aguilar D, et al. 2022 AHA/ACC/HFSA guideline for the management of heart failure: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2022;145:e895–e1032.[27] McDonagh TA, Metra M, Adamo M, et al. 2021 ESC guidelines for the diagnosis and treatment of acute and chronic heart failure. *Eur Heart J*. 2021;42:3599-3726.[28]	There is no single diagnostic test for heart failure. It is a clinical diagnosis based on a careful history, physical examination, electrocardiographic findings, blood chemistry values including natriuretic peptides, and myocardial imaging (with echocardiography being the most commonly used method). A low EF alone, without clinical evidence of heart failure, does not qualify as heart failure.
		Other	Examples are esophageal rupture, tension pneumothorax, sickle cell chest crisis.		
Risk factors	Comorbidities, lifestyle, and other factors that increase the risk of developing CAD	• Age • Male sex • Diabetes • Dyslipidemia • Hypertension • Current smoking or vaping • Prior smoking or vaping • Adverse pregnancy outcomes • Physical inactivity • Overweight/ obesity • Stress • Alcohol intake • Diet and nutrition • Family history of premature CAD • Other familial/genetic factors			
		Age	≥65 y	Six AJ, Backus BE, Kelder JC. Chest pain in the emergency room: value of the HEART score. *Neth Heart J*. 2008;16:191-196.[12]	
		Male sex	Patient's sex at birth	Arnett DK, Blumenthal RS, Albert MA, et al. 2019 ACC/AHA guideline on the primary prevention of cardiovascular disease: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Circulation*. 2019;140:e596–e646.[29]	

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Appendix 3. Continued

Data Element	Data Element Definition	Permissible Values	Permissible Value Definitions	Mapping/Source of Definition	Additional Notes
		Diabetes	Presence of ≥1 of the following: • HbA1c ≥6.5%; or • Fasting plasma glucose ≥126 mg/dL (7.0 mmol/L); or • 2-h plasma glucose ≥200 mg/dL (11.1 mmol/L) during an oral glucose tolerance test; • Currently taking a medication required to control blood glucose or • In a patient with classic symptoms of hyperglycemia or hyperglycemic crisis, a random plasma glucose ≥200 mg/dL (11.1 mmol/L)	American Diabetes Association. 2. Classification and diagnosis of diabetes: standards of medical care in diabetes-2022. *Diabetes Care*. 2022;45:S17-S38.[30] Dehmer GJ, Badhwar V, Bermudez EA, et al. 2020 AHA/ACC key data elements and definitions for coronary revascularization: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Data Standards (Writing Committee to Develop Clinical Data Standards for Coronary Revascularization). *Circ Cardiovasc Qual Outcomes*. 2020;13:e000059.[3]	Some patients may be taking a medication such as SGLT-2 inhibitor or GLP-1 RA for reasons other than diabetes.
		Dyslipidemia	History of dyslipidemia that was diagnosed or treated by a clinician. Criteria include documentation of the following: • Total cholesterol >200 mg/dL (5.18 mmol/L); or • LDL ≥130 mg/dL (3.37 mmol/L); or • HDL <40 mg/dL (1.04 mmol/L) in men and <50 mg/dL (1.30 mmol/L) in women; or • Lipoprotein (a) >50 mg/dL (125 nmol/L), or persistent elevations of triglycerides ≥175 mg/dL (≥1.97 mmol/L); • Currently receiving antilipidemic treatment	Grundy SM, Stone NJ, Bailey AL, et al. 2018 AHA/ACC/AACVPR/AAPA/ABC/ACPM/ADA/AGS/APhA/ASPC/NLA/PCNA guideline on the management of blood cholesterol: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Circulation*. 2019;139:e1082–e1143.[31] Dehmer GJ, Badhwar V, Bermudez EA, et al. 2020 AHA/ACC key data elements and definitions for coronary revascularization: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Data Standards (Writing Committee to Develop Clinical Data Standards for Coronary Revascularization). *Circ Cardiovasc Qual Outcomes*. 2020;13:e000059.[3]	
		Hypertension	Elevated blood pressure (120–129 mm Hg systolic/<80 mm Hg diastolic); stage 1 hypertension (130–139 mm Hg systolic or 80–89 mm Hg diastolic), or stage 2 hypertension (≥140 mm Hg systolic or ≥90 mm Hg diastolic)	Whelton PK, Carey RM, Aronow WS, et al. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA guideline for the prevention, detection, evaluation, and management of high blood pressure in adults: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Hypertension*. 2018;71:e13–e115.[32] Dehmer GJ, Badhwar V, Bermudez EA, et al. 2020 AHA/ACC key data elements and definitions for coronary revascularization: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Data Standards (Writing Committee to Develop Clinical Data Standards for Coronary Revascularization). *Circ Cardiovasc Qual Outcomes*. 2020;13:e000059.[3]	

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Appendix 3. Continued

Data Element	Data Element Definition	Permissible Values	Permissible Value Definitions	Mapping/Source of Definition	Additional Notes
		Current smoking or vaping	A person who has smoked at least 100 cigarettes or e-cigarettes and reports currently smoking tobacco or vaping every day (ie, daily smoker) or on some days (nondaily smoker)	NCDR CathPCI Registry Coder's Data Dictionary v5.0 (element #4625)[33] Dehmer GJ, Badhwar V, Bermudez EA, et al. 2020 AHA/ACC key data elements and definitions for coronary revascularization: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Data Standards (Writing Committee to Develop Clinical Data Standards for Coronary Revascularization). *Circ Cardiovasc Qual Outcomes*. 2020;13:e000059.[3]	
		Prior smoking or vaping	A person who has smoked at least 100 cigarettes or e-cigarettes during his/her lifetime but does not currently smoke	NCDR CathPCI Registry Coder's Data Dictionary v5.0 (element #4625)[33]	
		Adverse pregnancy outcomes	Includes hypertensive disorders of pregnancy, preterm delivery, gestational diabetes, small-for-gestational-age delivery, placental abruption, and pregnancy loss	Parikh NI, Gonzalez JM, Anderson CAM, et al. Adverse pregnancy outcomes and cardiovascular disease risk: unique opportunities for cardiovascular disease prevention in women: a scientific statement from the American Heart Association. *Circulation*. 2021;143:e902-e916.[34]	
		Physical inactivity	Does not meet minimum physical recommendations, defined as ≥150 min/wk of accumulated moderate-intensity or ≥75 min/wk of vigorous-intensity aerobic physical activity (or an equivalent combination of moderate and vigorous activity).	Arnett DK, Blumenthal RS, Albert MA, et al. 2019 ACC/AHA guideline on the primary prevention of cardiovascular disease: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Circulation*. 2019;140:e596–e646.[29]	
		Overweight/obesity	BMI 25–29.9 kg/m^2 (overweight) or ≥30 kg/m^2 (obese)	Arnett DK, Blumenthal RS, Albert MA, et al. 2019 ACC/AHA guideline on the primary prevention of cardiovascular disease: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Circulation*. 2019;140:e596–e646.[29]	
		Stress	A life situation that creates an unusual or intense level of stress that may contribute to the development or aggravation of mental disorder, illness, or maladaptive behavior	Arnett DK, Blumenthal RS, Albert MA, et al. 2019 ACC/AHA guideline on the primary prevention of cardiovascular disease: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Circulation*. 2019;140:e596–e646.[29]	

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Data Element	Data Element Definition	Permissible Values	Permissible Value Definitions	Mapping/Source of Definition	Additional Notes
		Alcohol intake	Men: >2 drinks daily Women: >1 drink daily	Arnett DK, Blumenthal RS, Albert MA, et al. 2019 ACC/AHA guideline on the primary prevention of cardiovascular disease: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Circulation*. 2019;140:e596–e646.[29]	In the United States, 1 "standard" drink contains roughly 14 g of pure alcohol, which is typically found in 12 oz of regular beer (usually about 5% alcohol), 5 oz of wine (usually about 12% alcohol), and 1.5 oz of distilled spirits (usually about 40% alcohol).
		Diet and nutrition	Diet high in red and processed meats, refined carbohydrates, sweetened beverages, saturated fats, and *trans* fats. Low intake of vegetables, fruits, legumes, nuts, whole grains, and fish	Arnett DK, Blumenthal RS, Albert MA, et al. 2019 ACC/AHA guideline on the primary prevention of cardiovascular disease: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Circulation*. 2019;140:e596–e646.[29]	
		Family history of premature CAD	History of any direct blood relatives (parents, siblings, children) who have had any of the following conditions at age <55 y for male relatives or age <65 y for female relatives: • AMI • Sudden cardiac death without obvious cause • CABG surgery • PCI	Cannon CP, Brindis RG, Chaitman BR, et al. 2013 ACCF/AHA key data elements and definitions for measuring the clinical management and outcomes of patients with acute coronary syndromes and coronary artery disease: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Clinical Data Standards (Writing Committee to Develop Acute Coronary Syndromes and Coronary Artery Disease Clinical Data Standards). *Circulation*. 2013;127:1052–1089.[35] Dehmer GJ, Badhwar V, Bermudez EA, et al. 2020 AHA/ACC key data elements and definitions for coronary revascularization: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Data Standards (Writing Committee to Develop Clinical Data Standards for Coronary Revascularization). *Circ Cardiovasc Qual Outcomes*. 2020;13:e000059.[3]	
		Other familial/genetic factors	Includes genetic abnormalities leading to vasculopathies, aneurysmal disorders, cardiomyopathies, coagulopathies, and inherited dysrhythmia syndromes	Bays HE, Taub PR, Epstein E, et al. Ten things to know about ten cardiovascular disease risk factors. *Am J Prev Cardiol*. 2021;5:100149.[36]	

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Data Element	Data Element Definition	Permissible Values	Permissible Value Definitions	Mapping/Source of Definition	Additional Notes
Electrocardiographic findings	Findings present on a 12-lead ECG, which is recommended in all patients with chest pain	• STEMI • New ST depression • New T-wave inversions • ST or PR changes consistent with myopericarditis • New Q waves • New arrhythmia • New conduction disturbances • Nonischemic or normal		Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1] O'Gara PT, Kushner FG, Ascheim DD, et al. 2013 ACCF/AHA guideline for the management of ST-elevation myocardial infarction: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *Circulation*. 2013;127:e362–e425.[37] Amsterdam EA, Wenger NK, Brindis RG, et al. 2014 AHA/ACC guideline for the management of patients with non-ST-elevation acute coronary syndromes: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *Circulation*. 2014;130:e344–e426.[38] NCI Thesaurus Code: C0438154[15]	The initial 12-lead ECG is recommended to be acquired and interpreted within 10 min of arrival to a medical facility in case of patients presenting with acute chest pain.
		STEMI	STEMIs are characterized by the presence of both criteria: 1) Electrocardiographic evidence of STEMI: new or presumed new ST-segment elevation at the J-point in 2 contiguous leads with the cut-off point: ≥1 mm in all leads other than leads V_2–V_3 where the following cutpoints apply: ≥2 mm in men ≥40 y; ≥2.5 mm in men <40 y; or ≥1.5 mm in women regardless of age. (When the magnitudes of J-point elevation in leads V_2 and V_3 are registered from a prior ECG, new J-point elevation ≥1 mm [as compared with the earlier ECG] should be considered an ischemic response.) 2) Detection of a rise or fall of cardiac biomarker values (preferably cTn) with ≥1 value above the 99th percentile URL.	Thygesen K, Alpert JS, Jaffe AS, et al. Fourth universal definition of myocardial infarction (2018). *Circulation*. 2018;138:e618–e651.[5] NCDR Chest Pain-MI Registry Coder's Data Dictionary v3.0 (element #12252)[18]	
		New ST depression	Horizontal or downsloping ST depression ≥0.05 mV in 2 contiguous leads	Dehmer GJ, Badhwar V, Bermudez EA, et al. 2020 AHA/ACC key data elements and definitions for coronary revascularization: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Data Standards (Writing Committee to Develop Clinical Data Standards for Coronary Revascularization). *Circ Cardiovasc Qual Outcomes*. 2020;13:e000059.[3]	

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Data Element	Data Element Definition	Permissible Values	Permissible Value Definitions	Mapping/Source of Definition	Additional Notes
		New T-wave inversions	T-wave inversion ≥0.1 mV in 2 contiguous leads with prominent R wave or R/S ratio >1	Dehmer GJ, Badhwar V, Bermudez EA, et al. 2020 AHA/ACC key data elements and definitions for coronary revascularization: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Data Standards (Writing Committee to Develop Clinical Data Standards for Coronary Revascularization). *Circ Cardiovasc Qual Outcomes*. 2020;13:e000059.[3]	T-wave negativity may be normal in leads with predominant negative QRS complexes but are usually abnormal when the QRS complex is upright.
		ST or PR changes consistent with myopericarditis	Widespread ST-segment elevation or PR-segment depression are the electrocardiographic hallmarks of pericarditis.	Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1]	
		New Q waves	An electrocardiographic finding assessment of new or presumed new pathological Q waves suggestive of MI	Thygesen K, Alpert JS, Jaffe AS, et al. Fourth universal definition of myocardial infarction (2018). *Circulation*. 2018;138:e618–e651.[5] NCI Thesaurus Code: C117770[15]	
		New arrhythmia	Evidence of any supraventricular or ventricular cardiac arrhythmia on ECG or other rhythm recording device not previously diagnosed	Kalarus Z, Svendsen JH, Capodanno D, et al. Cardiac arrhythmias in the emergency settings of acute coronary syndrome and revascularization: an European Heart Rhythm Association (EHRA) consensus document. *Europace*. 2019;21:1603-1604.[39] Knuuti J, Wijns W, Saraste A, et al. 2019 ESC guidelines for the diagnosis and management of chronic coronary syndromes. *Eur Heart J*. 2020;41:407-477.[7]	Follow arrhythmia-specific guidelines. ST-segment alterations recorded during supraventricular tachyarrhythmias should not be used as evidence of CAD.
		New conduction disturbances	Any evidence of new fascicular (left anterior or left posterior), bundle branch block (right or left), or atrioventricular block on ECG		
		Nonischemic or normal	Nonspecific ST-T wave abnormalities, which may indicate nonischemic changes, are usually defined as ST deviation of <0.5 mm (0.05 mV) or T-wave inversion of <2 mm (0.2 mV); ECG showing normal findings.	Amsterdam EA, Wenger NK, Brindis RG, et al. 2014 AHA/ACC guideline for the management of patients with non-ST-elevation acute coronary syndromes: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *Circulation*. 2014;130:e344–e426.[38]	A normal ECG may be associated with left circumflex or right coronary artery occlusions and posterior wall ischemia, which is often "electrically silent"; therefore, right-sided electrocardiographic leads should be considered when such lesions are suspected. A completely normal ECG in a patient with chest pain does not exclude ACS.

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Data Element	Data Element Definition	Permissible Values	Permissible Value Definitions	Mapping/Source of Definition	Additional Notes
Cardiac troponin	Initial value (0 h) Subsequent value	• Not elevated (≤99th percentile URL) • Elevated (>99th percentile URL) • Unknown • Missing • Not assessed		Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1]	hs-cTn is preferred and can detect circulating cTn in the blood of most "healthy" individuals, with different sex-specific 99th percentile URLs.
Risk stratification from clinical decision pathway	Risk strata to facilitate disposition and subsequent diagnostic evaluation of patients presenting with acute chest pain and suspected ACS	• Low risk • Intermediate risk • High risk • Unknown • Missing • Not assessed		Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1] Mahler SA, Riley RF, Hiestand BC, et al. The HEART Pathway randomized trial: identifying emergency department patients with acute chest pain for early discharge. *Circ Cardiovasc Qual Outcomes*. 2015;8:195-203.[40] Than M, Flaws D, Sanders S, et al. Development and validation of the Emergency Department Assessment of Chest pain Score and 2 h accelerated diagnostic protocol. *Emerg Med Australas*. 2014;26:34-44.[41] Stopyra JP, Miller CD, Hiestand BC, et al. Validation of the no objective testing rule and comparison to the HEART Pathway. *Acad Emerg Med*. 2017;24:1165-1168.[42]	Clinical decision pathways used to define risk include the HEART, EDACS, 2-ADAPT, NOTR, and others
TIMI risk score	The TIMI risk score is determined by the sum of the presence of 7 variables at admission; 1 point is given for each of the following variables: ≥65 y of age; ≥3 risk factors for CAD; prior coronary stenosis ≥50%; ST deviation on ECG; ≥2 anginal events in prior 24 h; use of aspirin in prior 7 d; and elevated cardiac biomarkers. The TIMI risk index is useful in predicting 30-d and 1-y mortality in patients with NSTE-ACS.	• Integer from 0 to 7, inclusive • Missing • Unknown • Not assessed		Antman EM, Cohen M, Bernink PJ, et al. The TIMI risk score for unstable angina/non-ST elevation MI: a method for prognostication and therapeutic decision making. *JAMA*. 2000;284:835-842.[9] Amsterdam EA, Wenger NK, Brindis RG, et al. 2014 AHA/ACC guideline for the management of patients with non-ST-elevation acute coronary syndromes: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *Circulation*. 2014;130:e344–e426.[38]	

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Appendix 3. Continued

Data Element	Data Element Definition	Permissible Values	Permissible Value Definitions	Mapping/Source of Definition	Additional Notes
GRACE risk score	The GRACE risk score predicts in-hospital and postdischarge mortality or MI. It derives data from age, development (or history) of heart failure, peripheral vascular disease, systolic blood pressure, Killip class, initial serum creatinine concentration, elevated initial cardiac biomarkers, cardiac arrest on admission, and ST-segment deviation. The sum of scores is applied to a reference nomogram to determine all-cause mortality from hospital discharge to 6 mo.	• Integer from 0 to 363, inclusive • Missing • Unknown • Not assessed		Amsterdam EA, Wenger NK, Brindis RG, et al. 2014 AHA/ACC guideline for the management of patients with non-ST-elevation acute coronary syndromes: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *Circulation*. 2014;130:e344–e426.[38] Fox KA, Dabbous OH, Goldberg RJ, et al. Prediction of risk of death and myocardial infarction in the six months after presentation with acute coronary syndrome: prospective multinational observational study (GRACE). *BMJ*. 2006;333:1091.[10] Fox KA, Fitzgerald G, Puymirat E, et al. Should patients with acute coronary disease be stratified for management according to their risk? Derivation, external validation and outcomes using the updated GRACE risk score. *BMJ Open*. 2014;4:e004425.[11]	GRACE ACS risk score 2.0. Accessed April 22, 2022. https://www.outcomes-umassmed.org/grace/acs_risk2/index.html.[43]
HEART risk score	The HEART risk score is a clinical risk tool for rapid stratification of patients with chest pain. The score is composed of 5 components: history, ECG, age, risk factors and troponin. Each of these components may be scored with 0, 1, or 2 points with a maximum score of 10 points. Patients are categorized as: low risk (HEART ≤3), intermediate risk (HEART 4–6), and high risk (HEART ≥7).	• Integer from 0 to 10, inclusive • Missing • Unknown • Not assessed		Six AJ, Backus BE, Kelder JC. Chest pain in the emergency room: value of the HEART score. *Neth Heart J*. 2008;16:191-196.[12] Backus BE, Six AJ, Kelder JC, et al. Chest pain in the emergency room: a multicenter validation of the HEART Score. *Crit Pathw Cardiol*. 2010;9:164-169.[13]	
HEAR risk score	The HEAR risk score (without troponin) incorporates only the history, ECG, age, and risk factor aspects of the HEART Pathway assessment.	• Integer from 0 to 8, inclusive • Missing • Unknown • Not assessed		Smith LM, Ashburn NP, Snavely AC, et al. Identification of very low-risk acute chest pain patients without troponin testing. *Emerg Med J*. 2020;37:690-695.[44]	
EDACS risk score	The EDACS risk score predicts the short-term risk of major adverse cardiac event for adults presenting to the emergency department with possible cardiac chest pain. Points are allocated according to age, sex, known CAD, CAD risk factors, and symptoms.	• Integer from −8 to 34, inclusive • Missing • Unknown • Not assessed		Than M, Flaws D, Sanders S, et al. Development and validation of the Emergency Department Assessment of Chest pain Score and 2 h accelerated diagnostic protocol. *Emerg Med Australas*. 2014;26:34-44.[41]	
NOTR risk score	The NOTR risk score identifies patients who are at low risk of ACS and could be discharged without further cardiac testing. The NOTR uses cardiac risk factors, history of MI or CAD, age, serial troponin measures, and a nonischemic ECG (no ST depression or T-wave inversion in >1 contiguous lead).	• Integer from 0 to 19, inclusive • Missing • Unknown • Not assessed		Greenslade JH, Parsonage W, Than M, et al. A clinical decision rule to identify emergency department patients at low risk for acute coronary syndrome who do not need objective coronary artery disease testing: the no objective testing rule. *Ann Emerg Med*. 2016;67:478-489.e472.[45]	

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Appendix 3. Continued

Data Element	Data Element Definition	Permissible Values	Permissible Value Definitions	Mapping/Source of Definition	Additional Notes
Acute coronary syndrome	The sudden imbalance between myocardial oxygen consumption and demand, which is usually the result of coronary artery obstruction but may be caused by other conditions, including excessive myocardial oxygen demand in the setting of a stable flow-limiting lesion; acute coronary insufficiency because of other causes (eg, coronary embolism); noncoronary causes (eg, hypotension); nonischemic myocardial injury (eg, myocarditis); and multifactorial causes that are not mutually exclusive (eg, stress cardiomyopathy)	• STEMI • NSTE-ACS		Amsterdam EA, Wenger NK, Brindis RG, et al. 2014 AHA/ACC guideline for the management of patients with non-ST-elevation acute coronary syndromes: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *Circulation*. 2014;130:e344–e426.[38]	
Chronic coronary syndrome	Chronic coronary syndrome refers to the spectrum of CAD that is chronic, often progressive, and can be modified by lifestyle adjustments, pharmacological therapies, and invasive interventions designed to achieve disease stabilization or regression.	• Yes • No		Knuuti J, Wijns W, Saraste A, et al. 2019 ESC guidelines for the diagnosis and management of chronic coronary syndromes. *Eur Heart J*. 2020;41:407-477.[7]	Chronic coronary syndrome is a replacement term for "stable ischemic heart disease."
Known CAD	Prior anatomic testing (invasive angiography or CCTA) with identified nonobstructive atherosclerotic plaque or obstructive CAD	• Yes • No		Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1]	The 2021 chest pain guideline incorporates those with lesser degrees of stenosis who do not require coronary intervention but would benefit from optimized preventive therapy, so they do not get overlooked.
Obstructive CAD	Luminal narrowing of ≥50% for left main, ≥70% stenosis for other vessels, or fractional flow reserve ≤0.80 or instantaneous wave-free ratio ≤0.89	• Yes • No		Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1]	
Nonobstructive CAD	Luminal narrowing <50% for the left main, <70% stenosis for other vessels on epicardial CCTA or invasive coronary angiography or fractional flow reserve >0.80 or instantaneous wave-free ratio >0.89	• Yes • No		Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1]	

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Appendix 3. Continued

Data Element	Data Element Definition	Permissible Values	Permissible Value Definitions	Mapping/Source of Definition	Additional Notes
Complex CAD	1. Multivessel disease 2. Left main or proximal left anterior descending artery lesion 3. Chronic total occlusion 4. Complex bifurcation lesion 5. Trifurcation lesion 6. Heavy calcification 7. Severe tortuosity 8. Aorto-ostial stenosis 9. Diffusely diseased and narrowed segments distal to the lesion 10. Thrombotic lesion 11. Lesion length >20 mm	• Yes • No		Lawton JS, Tamis-Holland JE, Bangalore S, et al. 2021 ACC/AHA/SCAI guideline for coronary artery revascularization: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2022;145:e18–e114.[46] Neumann FJ, Sousa-Uva M, Ahlsson A, et al. 2018 ESC/EACTS guidelines on myocardial revascularization. *Eur Heart J*. 2019;40:87-165.[47]	
High-risk CAD	Left main stenosis ≥50%, anatomically significant 3-vessel disease (≥70% stenosis), or proximal left anterior descending CAD	• Yes • No		Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1]	
Nonatherosclerotic coronary causes of chest pain	Potential causes of chest pain pertaining to epicardial coronary arteries without obstructive disease	• Coronary microvascular dysfunction • Epicardial coronary vasospasm • Spontaneous coronary artery dissection • INOCA • Coronary embolism • MINOCA			
		Coronary microvascular dysfunction	Epicardial or microvascular endothelial or nonendothelial dysfunction that limits myocardial perfusion, most often detected as reduced coronary flow reserve	Bairey Merz CN, Pepine CJ, Walsh MN, Fleg JL. Ischemia and no obstructive coronary artery disease (INOCA): developing evidence-based therapies and research agenda for the next decade. *Circulation*. 2017;135:1075-1092.[48] Del Buono MG, Montone RA, Camilli M, et al. Coronary microvascular dysfunction across the spectrum of cardiovascular diseases: JACC state-of-the-art review. *J Am Coll Cardiol*. 2021;78:1352-1371.[49]	
		Epicardial coronary vasospasm	Intense vasoconstriction (ie, >90%) of an epicardial coronary artery resulting in compromised myocardial blood flow. Coronary vasospasm can occur either in response to drugs or toxins (eg, cocaine, 5-fluorouracil) that result in hyper-reactivity of vascular smooth muscles or spontaneously because of disorders in coronary vasomotor tone.	Tamis-Holland JE, Jneid H, Reynolds HR, et al. Contemporary diagnosis and management of patients with myocardial infarction in the absence of obstructive coronary artery disease: a scientific statement from the American Heart Association. *Circulation*. 2019;139:e891-e908.[50]	

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Appendix 3. Continued

Data Element	Data Element Definition	Permissible Values	Permissible Value Definitions	Mapping/Source of Definition	Additional Notes
		Spontaneous coronary artery dissection	Epicardial coronary artery dissection that is not associated with atherosclerosis or trauma and is not iatrogenic. Predominant mechanism of myocardial injury occurring as a result of spontaneous coronary artery dissection is coronary artery obstruction caused by formation of an intramural hematoma or intimal disruption rather than atherosclerotic plaque rupture or intraluminal thrombus.	Hayes SN, Kim ESH, Saw J, et al. Spontaneous coronary artery dissection: current state of the science: a scientific statement from the American Heart Association. *Circulation*. 2018;137:e523-e557.[51]	
		INOCA	The following criteria should be met: 1. Stable, chronic (>2 mo) symptoms suggesting CAD such as chest discomfort with both classic (eg, angina pectoris) and atypical features in terms of location, quality, and inciting factors 2. Objective evidence for myocardial ischemia from the ECG or a cardiac imaging study (ECG, nuclear imaging, MRI, or spectroscopy) at rest or during stress (exercise, mental, or pharmacological) 3. Absence of flow-limiting obstruction by coronary angiography (invasive or CCTA) as defined by any epicardial coronary artery diameter reduction ≥50% or fractional flow reserve <0.8	Bairey Merz CN, Pepine CJ, Walsh MN, et al. Ischemia and no obstructive coronary artery disease (INOCA): developing evidence-based therapies and research agenda for the next decade. *Circulation*. 2017;135:1075-1092.[48]	
		Coronary embolism	The blockage of a coronary vessel lumen by air or solid material such as blood clot or other tissues (eg, adipose tissue, cancer cells) that have migrated from another anatomic site	NCI Thesaurus Code: C26759[15]	
		MINOCA	The diagnosis of MINOCA is made in patients with AMI that fulfills all of the following criteria: 1. AMI (modified from the "Fourth Universal Definition of Myocardial Infarction" criteria[5]): Detection of a rise or fall of cTn with ≥1 value above the 99th percentile URL and corroborative clinical evidence of infarction evidenced by ≥1 of the following: • Symptoms of myocardial ischemia • New ischemic electrocardiographic changes • Development of pathological Q waves • Imaging evidence of new loss of viable myocardium or new regional wall motion abnormality in a pattern consistent with an ischemic cause • Identification of a coronary thrombus by angiography or autopsy	Tamis-Holland JE, Jneid H, Reynolds HR, et al. Contemporary diagnosis and management of patients with myocardial infarction in the absence of obstructive coronary artery disease: a scientific statement from the American Heart Association. *Circulation*. 2019;139:e891-e908.[50]	

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Appendix 3. Continued

Data Element	Data Element Definition	Permissible Values	Permissible Value Definitions	Mapping/Source of Definition	Additional Notes
			2. Nonobstructive coronary arteries on angiography, defined as the absence of obstructive disease on angiography (ie, no coronary artery stenosis ≥50%) in any major epicardial vessel. (Note that additional review of the angiogram may be required to ensure the absence of obstructive disease.) This includes patients with normal coronary arteries (no angiographic stenosis), mild luminal irregularities (angiographic stenosis <30% stenoses), moderate coronary atherosclerotic lesions (stenoses >30% but <50%). 3. No specific alternate diagnosis for the clinical presentation. Alternate diagnoses include but are not limited to nonischemic causes such as sepsis, pulmonary embolism, and myocarditis.		
Noncoronary cardiac causes of chest pain	Causes of chest pain arising from cardiac etiologies besides the epicardial coronary arteries	• Valvular heart disease • Pericarditis • Myocarditis • Heart failure • Stress cardiomyopathy • Hypertrophic cardiomyopathy			
		Valvular heart disease	Valvular heart disease includes the following: • Aortic stenosis • Aortic regurgitation • Mitral stenosis • Mitral regurgitation • Tricuspid valve disease • Pulmonic valve disease • Mixed valve disease	Otto CM, Nishimura RA, Bonow RO, et al. 2020 ACC/AHA guideline for the management of patients with valvular heart disease: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;143:e72–e227.[26] Dehmer GJ, Badhwar V, Bermudez EA, et al. 2020 AHA/ACC key data elements and definitions for coronary revascularization: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Data Standards (Writing Committee to Develop Clinical Data Standards for Coronary Revascularization). *Circ Cardiovasc Qual Outcomes*. 2020;13:e000059.[3]	Classification of valve disease severity is based on multiple criteria, including symptoms, valve anatomy, valve hemodynamics and the effects of valve dysfunction on ventricular and vascular function (eg, end-organ damage).

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Appendix 3. Continued

Data Element	Data Element Definition	Permissible Values	Permissible Value Definitions	Mapping/Source of Definition	Additional Notes
		Pericarditis	Pericarditis is the inflammation of the pericardial layers characterized by chest pain, electrocardiographic changes, and often pericardial effusion. It is often the result of an infectious or a noninfectious process but can also be idiopathic. Pericarditis classically presents with chest pain that is sharp, pleuritic, and which may be improved by sitting up or leaning forward, although in many instances such findings are not present. A pericardial friction rub may be audible. Widespread ST elevation with PR depression is the electrocardiographic hallmark, although changes are nonspecific and may be transient.	Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1] NCDR Chest Pain-MI Auxiliary Coder's Data Dictionary (element #14617)[21] Chiabrando JG, Bonaventura A, Vecchié A, et al. Management of acute and recurrent pericarditis: JACC state-of-the-art review. *J Am Coll Cardiol*. 2020;75:76-92.[23] Ibanez B, James S, Agewall S, et al. 2017 ESC guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation: the Task Force for the management of acute myocardial infarction in patients presenting with ST-segment elevation of the European Society of Cardiology (ESC). *Eur Heart J*. 2018;39:119-177.[24]	Three major pericardial complications may occur: early infarct–associated pericarditis, late pericarditis, or postcardiac injury. MRI is also useful as a diagnostic tool.[23]
		Myocarditis	Myocarditis is an inflammatory disease of the myocardium resulting from viral infections or postviral immune-mediated responses. Clinical manifestations of myocarditis are varied and include chest pain that is often sharp and reflective of epicardial inflammation involving the pericardium. Myocardial dysfunction often causes fatigue and exercise intolerance, and predominance of heart failure distinguishes myocarditis from pericarditis. Troponin is usually elevated.	Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1] NCDR Chest Pain-MI Auxiliary Coder's Data Dictionary (element #14617)[21]	MRI is also useful as a diagnostic tool.[22]
		Heart failure	Heart failure is a complex clinical syndrome that results from any structural or functional impairment of ventricular filling or ejection of blood. The cardinal manifestations of heart failure are dyspnea and fatigue, which may limit exercise tolerance, and fluid retention, which may lead to pulmonary or splanchnic congestion or peripheral edema. There is no single diagnostic test for heart failure because it is largely a clinical diagnosis based on a careful history and physical examination.	Bozkurt B, Hershberger RE, Butler J, et al. 2021 ACC/AHA key data elements and definitions for heart failure: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Data Standards (Writing Committee to Develop Clinical Data Standards for Heart Failure). *Circ Cardiovasc Qual Outcomes*. 2021;14:e000102.[4] Heidenreich PA, Bozkurt B, Aguilar D, et al. 2022 AHA/ACC/HFSA guideline for the management of heart failure: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2022;145:e895–e1032.[27] McDonagh TA, Metra M, Adamo M, et al. 2021 ESC guidelines for the diagnosis and treatment of acute and chronic heart failure. *Eur Heart J*. 2021;42:3599-3726.[28]	There is no single diagnostic test for heart failure. It is largely a diagnosis based on a careful history, physical examination, electrocardiographic findings, blood chemistry values including natriuretic peptides, and myocardial imaging (with echocardiography being the most commonly used method). A low EF alone, without clinical evidence of heart failure, does not qualify as heart failure.

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Data Element	Data Element Definition	Permissible Values	Permissible Value Definitions	Mapping/Source of Definition	Additional Notes
		Stress cardiomyopathy	Stress-induced cardiomyopathy is characterized by acute, usually reversible LV dysfunction in the absence of significant CAD, usually triggered by acute emotional or physical stress.	Bozkurt B, Hershberger RE, Butler J, et al. 2021 ACC/AHA key data elements and definitions for heart failure: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Data Standards (Writing Committee to Develop Clinical Data Standards for Heart Failure). *Circ Cardiovasc Qual Outcomes*. 2021;14:e000102.[4] Bozkurt B, Colvin M, Cook J, et al. Current diagnostic and treatment strategies for specific dilated cardiomyopathies: a scientific statement from the American Heart Association. *Circulation*. 2016;134:e579-e646.[52]	Other commonly used terminology is Takotsubo cardiomyopathy. Most patients have a clinical presentation similar to that of ACS and may have transiently elevated cardiac biomarkers such as cTn. Although apical ballooning is seen in most (termed as Takotsubo cardiomyopathy), other diverse ventricular contraction patterns have been defined by cardiovascular imaging.
		Hypertrophic cardiomyopathy	Disorder of the heart characterized by increased and abnormal hypertrophy of the left ventricle that cannot be explained by loading changes of the heart. It can be with or without LV outflow obstruction.	Bozkurt B, Hershberger RE, Butler J, et al. 2021 ACC/AHA key data elements and definitions for heart failure: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Data Standards (Writing Committee to Develop Clinical Data Standards for Heart Failure). *Circ Cardiovasc Qual Outcomes*. 2021;14:e000102.[4] Yancy CW, Jessup M, Bozkurt B, et al. 2013 ACCF/AHA guideline for the management of heart failure: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *Circulation*. 2017;136:e137–e161.[53]	
Vascular noncardiac causes of chest pain	Causes of chest pain arising from vascular disorders excluding the heart	• Aortic disease • Aortic dissection • Intramural hematoma • Penetrating aortic ulcer			
		Aortic disease	Disease in the thoracic, thoracoabdominal, or abdominal aorta (typically aneurysm)	Dehmer GJ, Badhwar V, Bermudez EA, et al. 2020 AHA/ACC key data elements and definitions for coronary revascularization: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Data Standards (Writing Committee to Develop Clinical Data Standards for Coronary Revascularization). *Circ Cardiovasc Qual Outcomes*. 2020;13:e000059.[3]	

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Appendix 3. Continued

Data Element	Data Element Definition	Permissible Values	Permissible Value Definitions	Mapping/Source of Definition	Additional Notes
		Aortic dissection	Presence of luminal disruption in the aorta	Dehmer GJ, Badhwar V, Bermudez EA, et al. 2020 AHA/ACC key data elements and definitions for coronary revascularization: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Data Standards (Writing Committee to Develop Clinical Data Standards for Coronary Revascularization). *Circ Cardiovasc Qual Outcomes*. 2020;13:e000059.[3] Hiratzka LF, Bakris GL, Beckman JA, et al. 2010 ACCF/AHA/AATS/ACR/ASA/SCA/SCAI/SIR/STS/SVM guidelines for the diagnosis and management of patients with thoracic aortic disease: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines, American Association for Thoracic Surgery, American College of Radiology, American Stroke Association, Society of Cardiovascular Anesthesiologists, Society for Cardiovascular Angiography and Interventions, Society of Interventional Radiology, Society of Thoracic Surgeons, and Society for Vascular Medicine. *Circulation*. 2010;121:e266–e369.[54]	Infrequently, the aortic dissection flap can reduce coronary flow.
		Intramural hematoma	An entity in which a hematoma develops in the media of the aortic wall in the absence of a false lumen and intimal tear. Intramural hematoma is diagnosed in the presence of a circular or crescent-shaped thickening of 0.5 mm of the aortic wall in the absence of detectable blood flow.	Erbel R, Aboyans V, Boileau C, et al. 2014 ESC guidelines on the diagnosis and treatment of aortic diseases: document covering acute and chronic aortic diseases of the thoracic and abdominal aorta of the adult. The Task Force for the Diagnosis and Treatment of Aortic Diseases of the European Society of Cardiology (ESC). *Eur Heart J*. 2014;35:2873-2926.[55]	
		Penetrating aortic ulcer	Ulceration of an aortic atherosclerotic plaque penetrating through the internal elastic lamina into the media. More often in elderly patients, and rarely manifests as signs of organ malperfusion.	Erbel R, Aboyans V, Boileau C, et al. 2014 ESC guidelines on the diagnosis and treatment of aortic diseases: document covering acute and chronic aortic diseases of the thoracic and abdominal aorta of the adult. The Task Force for the Diagnosis and Treatment of Aortic Diseases of the European Society of Cardiology (ESC). *Eur Heart J*. 2014;35:2873-2926.[55]	
Nonvascular noncardiac causes of chest pain	Causes of chest pain unrelated to cardiac disorders	• Musculoskeletal and chest wall conditions • Gastrointestinal or hepatobiliary disorders • Psychological disorders • Respiratory disorders • Pulmonary embolism • Sickle cell disease • Drug use • Other		Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1]	

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Data Element	Data Element Definition	Permissible Values	Permissible Value Definitions	Mapping/Source of Definition	Additional Notes
		Musculoskeletal and chest wall conditions	Tietze's syndrome, costochondritis, fibromyalgia, precordial catch syndrome, slipping rib syndrome, chest wall trauma or inflammation, herpes zoster (shingles), cervical radiculopathy, breast disease, rib fracture	Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1]	
		Gastrointestinal or hepatobiliary disorders	Esophagitis, esophageal rupture, esophageal motility disorder, esophageal spasm, esophageal hypersensitivity, hiatal hernia, gastritis, gastroesophageal reflux, dyspepsia, peptic ulcer disease, intra-abdominal masses (benign and malignant), hepatitis, cholecystitis, cholelithiasis, pancreatitis	Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1]	Among outpatients who present with chest pain, approximately 10%–20% have a gastrointestinal cause. Gastrointestinal-related chest pain can mimic chest pain related to myocardial ischemia.
		Psychological disorders	Panic disorder, anxiety, clinical depression, somatization disorder, hypochondria	Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1]	
		Respiratory disorders	Pneumothorax/hemothorax, pneumomediastinum, pneumonia, bronchitis, pleural irritation, malignancy	Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1]	
		Pulmonary embolism	Intravascular migration of a venous thrombus to the pulmonary arterial circulation. It is diagnosed by a positive pulmonary angiogram, an unequivocally positive helical CT scan, a high-probability ventilation-perfusion scan, or autopsy.	Dehmer GJ, Badhwar V, Bermudez EA, et al. 2020 AHA/ACC key data elements and definitions for coronary revascularization: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Data Standards (Writing Committee to Develop Clinical Data Standards for Coronary Revascularization). *Circ Cardiovasc Qual Outcomes*. 2020;13:e000059.[3]	
		Sickle cell disease	Acute chest syndrome is a leading cause of death for patients with sickle cell disease. Although chest pain occurs in most, other manifestations of acute chest syndrome in sickle cell disease/crisis include shortness of breath, fever, arm and leg pain, and the presence of a new density on chest radiography.	Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1]	
		Drug use	Chest pain related to use of drugs such as cocaine or methamphetamine	Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1]	

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Data Element	Data Element Definition	Permissible Values	Permissible Value Definitions	Mapping/Source of Definition	Additional Notes
		Other	Hyperventilation syndrome, carbon monoxide poisoning, sarcoidosis, lead poisoning, prolapsed intervertebral disc, thoracic outlet syndrome, adverse effect of certain medications (eg, 5-fluorouracil)	Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;144:e368–e454.[1]	

ACS indicates acute coronary syndrome; ADAPT, accelerated diagnostic protocol to assess patients with chest pain symptoms using contemporary troponins as the only biomarker; AMI, acute myocardial infarction; CABG, coronary artery bypass grafting; CAD, coronary artery disease; CCTA, coronary computed tomographic angiography; CMR, cardiac magnetic resonance imaging; CT, computed tomography; cTn, cardiac troponin; ECG, electrocardiogram; EDACS, Emergency Department Assessment of Chest Pain Score; EF, ejection fraction; GLP-1 RA, glucagon-like peptide-1 receptor agonist; GRACE, Global Registry of Acute Coronary Events; HbA1c, hemoglobin A1c; HDL, high-density lipoprotein; HEAR, History, ECG, Age, Risk factors; HEART, History, ECG, Age, Risk factors and Troponin; hs-cTn, high-sensitivity cardiac troponin; INOCA, ischemia and no obstructive coronary artery disease; LDL, low-density lipoprotein; LV, left ventricular; MI, myocardial infarction; MINOCA, myocardial infarction in the absence of obstructive coronary artery disease; MRI, magnetic resonance imaging; NOTR, No Objective Testing Rule; NSTE, non–ST-elevation; NSTEMI, non-ST-segment elevation myocardial infarction; PCI, percutaneous coronary intervention; SGLT-2, sodium-glucose cotransporter-2; STEMI, ST-segment elevation myocardial infarction; TIMI, Thrombolysis in Myocardial Infarction; and URL, upper reference limit.

Appendix 4. Myocardial Injury

Data Element	Data Element Definition	Permissible Values	Permissible Value Definitions	Mapping/Source of Definition	Additional Notes
Myocardial injury	There is evidence of elevated cTn concentrations with at least 1 value above the 99th percentile URL without clinical evidence of acute myocardial ischemia. The myocardial injury is considered acute if there is a rise or fall of cTn concentrations. The myocardial injury is considered chronic in the setting of persistently elevated cTn concentrations.	• Acute • Chronic • No • Unknown		Thygesen K, Alpert JS, Jaffe AS, et al. Fourth universal definition of myocardial infarction (2018). *Circulation*. 2018;138:e618–e651.[5]	a) Acute myocardial injury should be used when there is a at least 1 value above the 99th percentile URL without clinical evidence of myocardial ischemia: • No evidence of symptoms of myocardial ischemia (eg, chest pain, dyspnea) • No evidence of new ischemic changes on the ECG • No development of pathological Q waves • No imaging evidence of new loss of myocardium or new regional wall • No motion abnormality in a pattern consistent with an ischemic etiology • Unable to identify coronary thrombus by angiography or autopsy b) hs-cTn–I or –T is the preferred biomarker, followed by conventional cTn assay.
Coronary procedure-related myocardial injury	Cardiac procedural myocardial injury is arbitrarily defined by increases of cTn concentrations >1× but <5× the 99th percentile URL in patients with normal baseline concentrations (≤99th percentile URL) or a rise of cTn concentrations >20% of the baseline value when it is above the 99th percentile URL, but it is stable or falling.	• Yes • No • Unknown		Thygesen K, Alpert JS, Jaffe AS, et al. Fourth universal definition of myocardial infarction (2018). *Circulation*. 2018;138:e618–e651.[5]	Increasing levels after the procedure can only be attributed with certainty to procedural myocardial injury when the preprocedural cTn concentrations are normal (≤99th percentile URL), or if they are stable or falling. To diagnose procedural myocardial injury in the clinical setting of only a single preprocedural cTn concentration, the cardiac Tn concentrations would need to be stable or falling postprocedure, followed by a subsequent increase that exceeds the 99th percentile URL, and if the value has not returned to baseline, the increase should be >20% with an absolute value >99th percentile URL.

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Appendix 4. Continued

Data Element	Data Element Definition	Permissible Values	Permissible Value Definitions	Mapping/Source of Definition	Additional Notes
Myocardial injury associated with cardiac procedure other than revascularization	Increase in cTn concentrations (>99th percentile URL) in patients with normal baseline values (≤99th percentile URL) or a rise of cTn concentrations >20% of the baseline value when it is above the 99th percentile URL, but it is stable or falling in the context of a cardiac procedure such as transcatheter aortic valve replacement without other ancillary criteria for AMI (ie, chest pain, new ischemic electrocardiographic changes, or loss of myocardial function on noninvasive imaging).	• Yes • No • Unknown		Thygesen K, Alpert JS, Jaffe AS, et al. Fourth universal definition of myocardial infarction (2018). *Circulation*. 2018;138:e618–e651.[5]	
Stress cardiomyopathy	Stress-induced cardiomyopathy (eg, Takotsubo syndrome) is characterized by acute, usually reversible LV dysfunction in the absence of significant CAD, usually triggered by acute emotional or physical stress.	• Yes • No • Unknown		Bozkurt B, Hershberger RE, Butler J, et al. 2021 ACC/AHA key data elements and definitions for heart failure: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Data Standards (Writing Committee to Develop Clinical Data Standards for Heart Failure). *Circ Cardiovasc Qual Outcomes*. 2021;14:e000102.[4] Bozkurt B, Colvin M, Cook J, et al. Current diagnostic and treatment strategies for specific dilated cardiomyopathies: a scientific statement from the American Heart Association. *Circulation*. 2016;134:e579-e646.[52]	Takotsubo syndrome is characterized by a transient elevation in cTn concentration, but the peak cTn is modest and is out of proportion to the large changes seen on ECG and in LV wall motion. The associated regional wall motion abnormalities are also transient. In most cases, there is nonobstructive CAD, and it does not explain the observed pattern of regional wall motion abnormalities.[5]
Nonischemic myocardial injury related to other cardiac conditions	Nonischemic myocardial injury, a term that applies to patients with dynamic rising or falling cTn concentration (acute) without clinical evidence of myocardial ischemia meeting criteria for an MI type 2 or chronic in the setting of persistently elevated cTn concentrations.	• Myocarditis • Infiltrative diseases, such as amyloidosis, sarcoidosis • Cardiomyopathy • Heart failure • Cardiac contusion • Type A aortic dissection • Myocardial contusion or hematoma • Other		Thygesen K, Alpert JS, Jaffe AS, et al. Fourth universal definition of myocardial infarction (2018). *Circulation*. 2018;138:e618–e651.[5]	
Myocardial injury associated with noncardiac procedure	Increase in perioperative cTn concentrations (>99th percentile URL) in patients with normal baseline concentrations (≤99th percentile URL) or a rise of cTn concentrations >20% of the baseline value when it is above the 99th percentile URL but is stable or falling in the context of a noncardiac procedure without other ancillary criteria for AMI (ie, chest pain, new ischemic electrocardiographic changes, or loss of myocardial function on noninvasive imaging).	• Yes • No • Unknown		Thygesen K, Alpert JS, Jaffe AS, et al. Fourth universal definition of myocardial infarction (2018). *Circulation*. 2018;138:e618–e651.[5]	

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Appendix 4. Continued

Data Element	Data Element Definition	Permissible Values	Permissible Value Definitions	Mapping/Source of Definition	Additional Notes
Nonischemic myocardial injury related to systemic conditions	Nonischemic myocardial injury, a term that applies to patients with dynamic rising or falling cTn concentration (acute) without clinical evidence of myocardial ischemia or chronic in the setting of persistently elevated cTn concentrations	• Sepsis, infectious disease • Kidney disease (acute or chronic) • Stroke, subarachnoid hemorrhage • Pulmonary embolism, pulmonary hypertension • Burns • Chemotherapeutic agents • Critical illness • Strenuous exercise • Acute COVID-19 (see Additional Notes) • Other		Thygesen K, Alpert JS, Jaffe AS, et al. Fourth universal definition of myocardial infarction (2018). *Circulation*. 2018;138:e618–e651.[5]	Refer to Bozkurt B, Das SR, Addison D, et al. 2022 ACC/AHA key data elements and definitions for cardiovascular and noncardiovascular complications of COVID-19: a report of the American Heart Association/American College of Cardiology Joint Committee on Clinical Data Standards. *Circ Cardiovasc Qual Outcomes*. 2022;15:e000111.[56] Hendren NS, Drazner MH, Bozkurt B, et al. Description and proposed management of the acute COVID-19 cardiovascular syndrome. *Circulation*. 2020;141:1903-1914.[57]

AMI indicates acute myocardial infarction; CAD, coronary artery disease; cTn, cardiac troponin; ECG, electrocardiogram; EF, ejection fraction; hs-cTn, high-sensitivity cardiac troponin; LV, left ventricular; MI, myocardial infarction; and URL, upper reference limit.

Appendix 5. Myocardial Infarction

Data Element	Data Element Definition	Permissible Values	Permissible Value Definitions	Mapping/Source of Definition	Additional Notes
MI type 1	MI caused by atherothrombotic CAD and usually precipitated by atherosclerotic plaque disruption (rupture or erosion) is designated as a type 1 MI. Criteria for type 1 MI: Detection of a rise or fall of cTn concentrations with at least 1 value above the 99th percentile URL and with at least 1 of the following: • Symptoms of acute myocardial ischemia • New ischemic electrocardiographic changes • Development of pathological Q waves • Imaging evidence of new loss of viable myocardium or new regional wall motion abnormality in a pattern consistent with an ischemic etiology • Identification of atherothrombosis by angiography including intracoronary imaging or by autopsy	• Yes • No		Thygesen K, Alpert JS, Jaffe AS, et al. Fourth universal definition of myocardial infarction (2018). *Circulation*. 2018;138:e618–e651.[5]	Postmortem demonstration of an atherothrombus in the artery supplying the infarcted myocardium, or a macroscopically large, circumscribed area of necrosis with or without intramyocardial hemorrhage, meets the type 1 MI criteria regardless of cTn concentrations.
MI type 2	Ischemic MI in the context of a mismatch between oxygen supply and demand has been classified as type 2 MI. Criteria for type 2 MI: Detection of a rise or fall of cTn concentrations with at least 1 concentration above the 99th percentile URL and evidence of an imbalance between myocardial oxygen supply and demand unrelated to acute coronary atherothrombosis, requiring at least 1 of the following: • Symptoms of acute myocardial ischemia • New ischemic electrocardiographic changes • Development of pathological Q waves • Imaging evidence of new loss of viable myocardium or new regional wall motion abnormality in a pattern consistent with an ischemic etiology	• Yes • No		Thygesen K, Alpert JS, Jaffe AS, et al. Fourth universal definition of myocardial infarction (2018). *Circulation*. 2018;138:e618–e651.[5]	
MI type 3	Patients who suffer cardiac death, with symptoms suggestive of myocardial ischemia accompanied by presumed new ischemic electrocardiographic changes or ventricular fibrillation but die before blood samples for biomarkers can be obtained, or before increases in cardiac biomarkers can be identified, or MI is detected by autopsy examination	• Yes • No		Thygesen K, Alpert JS, Jaffe AS, et al. Fourth universal definition of myocardial infarction (2018). *Circulation*. 2018;138:e618–e651.[5]	

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Appendix 5. Continued

Data Element	Data Element Definition	Permissible Values	Permissible Value Definitions	Mapping/Source of Definition	Additional Notes
MI type 4a	MI within 48 h of PCI. Coronary intervention–related MI is arbitrarily defined by an elevation of cTn concentrations >5× the 99th percentile URL in patients with normal baseline concentrations. In patients with elevated preprocedure cTn in whom the cTn concentrations are stable (≤20% variation) or falling, the postprocedure cTn must rise by >20%. However, the absolute postprocedural concentration must still be at least 5× the 99th percentile URL. In addition, 1 of the following elements is required: • New ischemic electrocardiographic changes • Development of new pathological Q waves • Imaging evidence of new loss of viable myocardium or new regional wall motion abnormality in a pattern consistent with an ischemic etiology • Angiographic findings consistent with a procedural flow-limiting complication such as coronary dissection, occlusion of a major epicardial artery or a side branch occlusion/thrombus, disruption of collateral flow, or distal embolization	• Yes • No		Thygesen K, Alpert JS, Jaffe AS, et al. Fourth universal definition of myocardial infarction (2018). *Circulation*. 2018;138:e618–e651.[5]	Isolated development of new pathological Q waves meets the type 4a MI criteria if cTn concentrations are elevated and rising but <5× the 99th percentile URL. Postmortem demonstration of a procedure-related thrombus in the culprit artery, or a macroscopically large, circumscribed area of necrosis with or without intramyocardial hemorrhage meets the type 4a MI criteria.
MI type 4b	Stent thrombosis associated with PCI. Stent thrombosis should be documented by angiography or autopsy using the same criteria utilized for type 1 MI. It is important to indicate the time of the occurrence of the stent/scaffold thrombosis in relation to the timing of the PCI procedure.	• Acute • Subacute • Late • Very late • No		Thygesen K, Alpert JS, Jaffe AS, et al. Fourth universal definition of myocardial infarction (2018). *Circulation*. 2018;138:e618–e651.[5]	
		Acute	0–24 h after stent/scaffold implantation		
		Subacute	>24 h to 30 d after stent/scaffold implantation		
		Late	>30 d to 1 y after stent/scaffold implantation		
		Very late	>1 y after stent/scaffold implantation		
		No			
MI type 4c	MI associated with angiographically documented in-stent restenosis, or restenosis following balloon angioplasty in the infarct territory, in the absence of any other culprit lesion or thrombus. A rise or fall of cTn concentrations above the 99th percentile URL, applying the same criteria utilized for type 1 MI.	• Yes • No		Thygesen K, Alpert JS, Jaffe AS, et al. Fourth universal definition of myocardial infarction (2018). *Circulation*. 2018;138:e618–e651.[5]	
MI type 5	MI within 48 h of CABG. CABG-related MI is arbitrarily defined as elevation of cTn concentrations >10× the 99th percentile URL in patients with normal baseline cTn concentrations. In patients with elevated preprocedure cTn in whom cTn concentrations are stable (≤20% variation) or falling, the postprocedure cTn must rise by >20%. However, the absolute postprocedural value still must be >10× the 99th percentile URL. In addition, 1 of the following elements is required: • Development of new pathological Q waves; • Angiographic documented new graft occlusion or new native coronary artery occlusion; • Imaging evidence of new loss of viable myocardium or new regional wall motion abnormality in a pattern consistent with an ischemic etiology	• Yes • No		Thygesen K, Alpert JS, Jaffe AS, et al. Fourth universal definition of myocardial infarction (2018). *Circulation*. 2018;138:e618–e651.[5]	Isolated development of new pathological Q waves meets the type 5 MI criteria if cTn concentrations are elevated and rising but <10× the 99th percentile URL.

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Appendix 5. Continued

Data Element	Data Element Definition	Permissible Values	Permissible Value Definitions	Mapping/Source of Definition	Additional Notes
Clinically relevant post-PCI and CABG MI in patients with normal baseline cardiac biomarkers	Peak CK-MB measured within 48 h of the procedure rises to ≥10× the local laboratory ULN, or to >5× ULN with new pathological Q-waves in >2 contiguous leads or new persistent LBBB, OR in the absence of CK-MB measurements and a normal baseline cTn, a cTn (I or T) concentration measured within 48 h of the PCI rises to >70× the local laboratory ULN, or >35× ULN with new pathological Q-waves in >2 contiguous leads or new persistent LBBB.	• Yes • No		Moussa ID, Klein LW, Shah B, et al. Consideration of a new definition of clinically relevant myocardial infarction after coronary revascularization: an expert consensus document from the Society for Cardiovascular Angiography and Interventions (SCAI). *J Am Coll Cardiol.* 2013;62:1563-1570.[58]	
Clinically relevant post-PCI and CABG MI in patients with elevated baseline cardiac biomarkers	In patients with elevated baseline CK-MB (or cTn) in whom the biomarker levels are stable or falling: there should be a new CK-MB (or cTn) increase by an absolute increment equal to those levels recommended above from the most recent preprocedure level. In patients with elevated CK-MB (or cTn) in whom the biomarker concentrations have not been shown to be stable or falling: there should be a further increase in CK-MB (or cTn) by an absolute increment equal to those levels recommended above plus new ST-segment elevation or depression plus signs consistent with a clinically relevant MI, such as new onset or worsening heart failure or sustained hypotension.	• Yes • No		Moussa ID, Klein LW, Shah B, et al. Consideration of a new definition of clinically relevant myocardial infarction after coronary revascularization: an expert consensus document from the Society for Cardiovascular Angiography and Interventions (SCAI). *J Am Coll Cardiol.* 2013;62:1563-1570.[58]	

CABG indicates coronary artery bypass grafting; CAD, coronary artery disease; CK-MB, creatine kinase MB; cTn, cardiac troponin; LBBB, left bundle branch block; MI, myocardial infarction; PCI, percutaneous coronary intervention; ULN, upper limit of normal; and URL, upper reference limit.