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# A comprehensive standardised data definitions set for acute coronary syndrome research in emergency departments in Australasia

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## Abstract

Patients with chest discomfort or other symptoms suggestive of acute coronary syndrome (ACS) are one of the most common categories seen in many Emergency Departments (EDs). While the recognition of patients at high-risk of ACS has improved steadily, identifying the majority of chest pain presentations who fall into the low-risk group remains a challenge.

Research in this area needs to be transparent, robust, applicable to all hospitals from large tertiary centres to rural and remote sites, and to allow direct comparison between different studies with minimum patient spectrum bias. A standardised approach to the research framework using a common language for data definitions must be adopted to achieve this.

The aim was to create a common framework for a standardised data definitions set that would allow maximum value when extrapolating research findings both within Australasian ED practice, and across similar populations worldwide.

Therefore a comprehensive data definitions set for the investigation of non-traumatic chest pain patients with possible ACS was developed, specifically for use in the ED setting. This standardised data definitions set will facilitate 'knowledge translation' by allowing extrapolation of useful findings into the real-life practice of emergency medicine.



## Keywords

Research design, data reporting, acute coronary syndrome, chest pain, emergency.

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Introduction

Patients with chest discomfort or other symptoms suggestive of acute coronary syndrome (ACS) are one of the most common presenting categories seen in many Emergency Departments (EDs). These patients account for an estimated 5 - 10% of presentations to Australasian EDs per year, yet between 75 and 85% of the patients assessed ultimately do not have a final diagnosis of ACS (1-5).

Although the recognition of patients at high-risk of ACS has improved steadily, identifying the majority of chest pain presentations who fall into the low-risk group remains a challenge (5, 6). The process of assessing patients in the ED with possible ACS remains time-consuming, and is not without controversy. Many key questions remain unanswered, such as the role of accelerated biomarker risk stratification as early as two hours following ED presentation; the added value of multiple biomarker assays including change in their absolute levels (delta values); and the clinical utility of early (within 72 hours) provocation testing such as an exercise ECG, particularly in patients under 40 years of age without risk factors who present with normal serial ECGs and biomarkers (see Discussion).

A recent report in 2009 by Access Economics on the impact and economic burden of acute coronary syndrome in Australia found that the cost of acute myocardial infarction (AMI) and unstable angina pectoris (UAP) was Aus $17.9 billion(7). This included the direct health care system costs such as hospital and medical bills, indirect costs such as loss of productivity, and loss in the value of health such as through disability and early death. However, the cost associated with those 85% of patients found not to have an ACS-related diagnosis remains unquantified at this time.

A valid, safe and efficient process is required to assess potential ACS patients in currently already overstretched Emergency Departments. Research in this area must be transparent, robust, applicable to all hospital from large tertiary centres to rural and remote sites, and allow direct comparisons to be made between different studies. Also, investigators must be cautious to avoid patient heterogeneity giving rise to spectrum bias, as this is the biggest source of error in determining the performance of the diagnostic tests used (8).

A standardised approach to the research framework using a common language set for data definitions must be adopted to achieve this. This standardised data definitions set will facilitate 'knowledge translation' by allowing extrapolation of useful findings into the real life practice of emergency medicine. Therefore a comprehensive data definitions set for the investigation of non-traumatic chest pain patients with possible ACS was developed, specifically for use in the ED setting.

Development of the Data Set

A modified Delphi process was performed by an expert panel of emergency physicians and cardiologists. The data elements included were chosen following an extensive review of the literature and by circular input from the authors. Key published documents containing existing data definitions relating to acute coronary syndrome were identified, and formed the initial content data set.

Those documents used in the data analysis process included amongst others the Emergency Medicine Cardiac Research and Education Group – International (EMCREG-I) guidelines for the conduct and reporting of research into the field (9) endorsed by the Society for Academic Emergency Medicine (SAEM), the American College of Emergency Physicians (ACEP), the American Heart Association (AHA) and the American College of Cardiology (ACC). Also included was the American College of Cardiology Key Data Elements document (10), which complements the EMCREG-I guidelines, as well as the AHA and the National Academy of Clinical Biochemistry (NACB) additional case definitions that defined parameters around cardiac biomarkers (11, 12). Finally, the ACS Dataset that forms part of the National Health Data Dictionary (13) which facilitates the collection of data within Australasia relating to ACS research was included, in a form to suit the local context. Key elements were sourced from these documents, and additional variables were identified from the literature including those by Hess et al (14), and by consensus opinion of the authors.

Most individual data points required no re-definition, given the robust, explicit justification of data elements already contained within these key publications. However some elements, for instance recommended by Hess et al (14), were not clearly defined. Therefore, the authors agreed on changes to these existing data definitions, which were indicated by * alongside the definition (see Appendix A). These changes included the addition of modern drugs; amalgamation of elements; changes of units to SI, and formatting changes.

In addition, new data points relevant to ED practice were introduced by consensus opinion of the authors to expand the data definitions set, where they did not previously exist. Thus for example ‘Pulmonary Embolism’ was included in both the Clinical History and Outcome Event sections as this condition is an important confounder when assessing the undifferentiated patient with chest pain. Another key addition is the ‘Reported’ and ‘Adjudicated’ elements in the patient’s history. ED physicians often have to rely on the patient’s self-reporting of the clinical history due to lack of immediate access to supporting documentation.

All data elements were then amalgamated into a single, comprehensive standardised data definitions set deemed by the authors to be most appropriate for use in ED-based research into ACS chest pain within, but not confined to, local practice in Australasia (see Appendix A).

Discussion

There is currently no universally accepted definition of what is meant by a ‘low-risk’ patient for ACS. This is a critical issue because, as according to Bayes Theorem, accurate interpretation of post-test probability following any given test result depends upon a clear recognition of the pre-test

odds. Pre- and post-test odds are most intuitive when converted into pre- and post-test probabilities (percentages). An accurate and widely accepted method to determine true risk grouping, that is prevalence, for pre-test purposes using an agreed definition is an essential requirement for test interpretation.

Assessment of the pre-test odds is also vital when deciding whether a test is required at all. Diagnostic equipoise or the 'test threshold' represents the level of pre-test probability at which the risk of proceeding with an investigation (from the investigation itself, and from any action ensuing from a false positive result) is balanced by the risk and cost of doing no investigation at all. Thus the test 'threshold' represents the pre-test probability that should be exceeded in order to justify doing a diagnostic test for the disease in question (15). Kline et al using attribute matching of standard historical risk, physical examination, electrocardiographic and laboratory data have calculated that a patient with a pre-test probability of ACS as low as <2% will not benefit from further diagnostic testing (16).

One of the reasons there is a lack of clarity over the definition of 'risk' is that some research studies of diagnostic accuracy report the risk of an ACS-related diagnosis (16, 17), while other studies of prognosis report outcome related risks, such as adverse events including death, AMI or need for urgent revascularisation (18-21). Whilst these concepts may overlap, the different research endpoint intentions must be clearly and explicitly stated.

The terms 'low-', 'intermediate- 'and 'high-risk' groups for ACS are used inconsistently, as regards their absolute risk of an adverse outcome within 30 days (22, 23). Accurate determination of risk is still the key to evaluating patients with possible ACS (24). Definitions will depend on whether the intention is to 'rule-out' ACS in a patient and therefore allow that patient to safely go home from the emergency department; or whether the intention is to 'rule-in' ACS in a patient who thus will be in need of an acute cardiology service. Thus, one suggestion for the definition of a patient being 'low-risk' for suspected ACS by outcome events is any patient with a <1% risk of a 30-day adverse event (25, 26). This definition is therefore suitable for risk stratification to 'rule out' ACS in the Emergency Department patient, who may then be allowed home. Yet it should be emphasised that this represents a 'low-risk' for short term outcomes only. The longer term adverse outcome rate at one 1 year may still be significant, and consequently such patients may still require further planned investigations and follow-up. Conversely, the Acute Coronary Insufficiency-Time Insensitive Predictive Instrument (ACI-TIPI) defines 'low-risk' as a less than 10% chance of an AMI or unstable angina (27). This is useful for 'rule in' decision making to determine the likely need for cardiac monitoring, or an acute interventional cardiology service care, but clearly this definition does not allow a 'rule out' ACS decision, signalling that the patient can be safely discharged from the emergency department, as that level of risk (potentially up to 10%) is unacceptable.

The National Heart Foundation of Australia (NHFA) and the Cardiac Society of Australia and New Zealand (CSANZ) last produced in 2006 guidelines for the initial evaluation of patients with non-traumatic chest pain, which defined the likelihood of ACS, and determined short-term risk for adverse outcomes(23). These recommendations outlined an assessment process that included elements in the history and examination, initial ECG and cardiac markers to give a risk assignment into a low-, intermediate- or a high-risk category for nonST-segment acute coronary syndrome

(NSTEACS). Patients with suspected NSTEACS were defined as 'low-risk' if the presentation was with clinical features of acute coronary syndrome *without* intermediate- or high-risk features. This 'low-risk' group included patients with the onset of anginal symptoms within the last month, or worsening in severity or frequency of angina, or lowering of anginal threshold. These 'low-risk' patients could be discharged on upgraded medical therapy *with* urgent cardiac follow up (23). The majority of patients presenting to emergency departments are classified as 'intermediate-risk' according to these guidelines (23). That is, they present with features on history, examination, ECG and investigative findings that are consistent with ACS, but they do not meet the criteria for 'high-risk' NSTEACS. These 'intermediate-risk' patients require further observation and risk stratification that moves them into either 'high-risk' (see later) or 'low-risk', to be allowed home (23). 'High-risk' NSTEACS patients need immediate admission for aggressive medical management *and* coronary angiography and revascularistion (23). Research shows that clinical findings (28, 29) and traditional risk factors (30) are not as discriminatory in risk analysis as was they were once considered.

The existence of a 'very-low risk' group of patients in whom the likelihood of ACS is so small that little or no assessment is required at all has also been suggested (25, 26). Marsan et al (25) identified a cohort of patients who were at particularly low risk (0.14%) for ACS at 30 days by using a modified clinical decision rule. Similarly the Vancouver Chest Pain rule (26) also defined a group of patients who could be safely discharged after brief ED evaluation including clinical assessment, ECG +/- CK-MB at, or before, 2 hours from presentation. These findings are to yet be prospectively validated in other centres.

These examples given exemplify the importance of standardising the definition, recognition and evaluation of specific risk groups within the spectrum of suspected acute coronary syndrome. Several methods that permit rapid identification of patients in need of more prolonged investigation or hospital admission to rule out ACS have now been described (31-34). Combinations of biomarkers, and or newer biomarkers may lead to even more rapid risk stratification for patients with possible ACS and hence facilitate early discharge. Straface et al have identified a multi-marker approach that was superior to TnI alone for the triage of patients with chest pain(35). Ultrasensitive troponin assays will increase the sensitivity for the detection of ACS compared with standard assays (36).

Addition of novel cardiac biomarkers may also provide information on prognosis for AMI and/or death, ranging from 30 day outcome to 1 year event rates, but are unable to identify those at risk of the full spectrum of ACS-related diagnoses(37). A panel-type approach that includes additional biomarkers such as natriuretic peptides, myeloperoxidase, C-reactive protein and monocyte chemo-attractant protein-1 may increase the sensitivity for the detection of short-term ACS-like events. This is likely to be at the cost of decreased test specificity (38). Again such methods may identify those at short term risk, but individuals with a detectable troponin level even if below the nominal cut-off level, should still be considered for further investigation and follow-up (39).

At present there is insufficient published evidence to support the safety of very short (2 hour) assessment pathways. Australasian-based trials such as the **AS**ia **P**acific **E**valuation of **C**hest pain **T**rial (ASPECT) and Multiple Infarct Markers In Chest pain (MIMIC) are investigator-lead, industry-sponsored studies aimed at answering some of the questions that remain about multi-marker approaches to chest pain evaluation. ASPECT will prospectively validate an investigative pathway in patients presenting to hospital with symptoms suggestive of possible ACS, which involves using risk stratification (using ECG and/or risk stratification tools) and serial cardiac biomarkers over a 2 hour time period from presentation, to allow identification of patients at very low risk of a serious adverse cardiac event at 30 days after initial presentation.

Currently the ECG and cardiac biomarkers are first used to identify patients with ST elevation myocardial infarction (STEMI) or non-ST elevation myocardial infarctions (NSTEMIs). The next step in ruling out ACS, when serial ECG and cardiac biomarkers are negative, requires provocative testing to exclude inducible ischaemia or angina. This includes those patients deemed at significant risk for an adverse event within 30 days. Questions remain in this group about the most appropriate investigation to exclude significant coronary artery disease. The utility of exercise stress ECG testing (EST) has been challenged(40). EST has a sensitivity and specificity of 68% and 77% respectively, and a positive predicative accuracy of about 70% for the diagnosis of coronary artery disease (41-44). It is not clear whether EST does indeed currently identify that population at risk. Concerns remain about false positive results leading to further unnecessary investigations such as coronary angiography, with its attendant additional risks and costs. Thus the incremental value of EST remains unclear. If EST is deemed necessary then evidence suggests that this can occur at an earlier timeframe (45)

Meanwhile, the emerging role of coronary CT angiography (CCTA) shows promise (46-49) with a reported high negative predictive value in patients presenting to the ED with possible ischaemic chest pain. Although radiation dose is an issue, the CCTA may allow the definitive rule-out of coronary disease in the low- and intermediate-risk group (46, 47, 49-51). However normal findings on CCTA do not exclude all significant diagnoses, for example myocarditis.

Finally the appropriate timing of objective testing is unclear. Inpatient assessment does at least mean that the risk assessment test is actually completed. Alternatively it may be safe and more practical to perform investigations such as exercise stress testing on an early outpatient-basis. The responsibility for test attendance and follow up of the result is then transferred to the community local medical practitioner, but he or she may be unaware of the details of the acute attendance at the ED. Likewise outpatient service follow up has the same duty of care risk with patients who fail to present for further testing.

A coordinated, health system approach to the diagnosis and management of ACS is clearly required, with current gaps in ACS management in Australasia having recently been identified by a national forum, and explicit recommendations made for strategies for closing these gaps (52).

## Conclusion

This paper aims to disseminate a comprehensive standardised data definitions set for use in research in Australasia, and across other sites wishing to replicate local research methodology in investigating patients presenting to the emergency department with possible ACS. These definitions will be essential for consistency in terminology, as well as in avoiding the danger of spectrum bias from inadvertent heterogeneity in the patients studied.

The comprehensive standardised data definitions set combined components from existing guidelines of the EMCREG-I, the AHA, the ACC and the National Health Data Dictionary, with new elements suitable for ED-based research conducted within Australasia.

The process used ensured that a common framework was developed for a standardised data definitions set that will allow maximum value when extrapolating research findings both within Australasian ED practice, and across similar populations worldwide.

Disclaimer: The comprehensive standardised data definitions set in Appendix A at present represents the consensus views of the authors alone.

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## Article type: special report

## Appendix A.

# A comprehensive standardised data definitions set for acute coronary syndrome research in emergency departments in Australasia

| General Information | |
|---|---|
| **SUBJECT DETAILS** | |
| **Hospital Identifier** | The reference number the local hospital uses to identify this patient in their computer systems and registries. |
| **Date of Birth** | Provide date in the DD/MM/YYYY format. |
| **Ethnicity/Race** | The patients reported ethnicity or race. |
| **TRIAL ELIGIBILITY** | |
| **Inclusion Criteria** | In accordance with AHA guidelines, symptoms consistent with possible ACS include:<br><br>Presence of acute chest, epigastric, neck, jaw or arm pain or discomfort or pressure without apparent non-cardiac source (1).<br><br>More general/atypical symptoms, such as fatigue, nausea, vomiting, diaphoresis, faintness and back pain, may be used as inclusion criteria if specified. Data collection must allow for sub analysis of the included groups. |
| **Exclusion Criteria** | Exclusion criteria from the study must be clearly documented. |

| PRESENTATION DATES | |
|---|---|
| **Acute Coronary Syndrome (ACS) Symptom Onset: date and time (2)** | Date and time of the onset of symptoms that prompted the patient to seek medical attention.<br><br>Provide date in the DD/MM/YYYY format and time in 24 hour format.<br><br>In the event of stuttering symptoms, ACS symptom onset is the time at which symptoms became constant in quality or intensity. |
| **Date of ED Presentation : date and time** | Date and time the patient first presented to the hospital. Provide date in the DD/MM/YYYY format and time in 24 hour format. |
| **Date of Recruitment: date and time** | Date and time the patient recruited into the trial. Provide date in the DD/MM/YYYY format and time in 24 hour format. |
| **History** | |
| **SYMPTOMS AT PRESENTATION** | |
| **Chest Pain** | If the patient complained of chest pain/discomfort that was existing on presentation to hospital. If symptoms resolved prior to arrival at hospital report as 'no'.<br><br>(Atypical symptoms are defined below). |
| **Cardiac Arrest at Admission** | If the patient is presenting to the ED in cardiac arrest. |
| **Repeat Presentation** | Identify if the patient has previously presented to hospital with possible cardiac ischemia and define the time period (e.g. within the last year). |
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| **Pain Location** | The location of the pain/discomfort can be described as follows:<br><br>**Left Chest**: The pain/discomfort is on the left side of the sternum<br><br>**Right Chest**: The pain/discomfort is on the right side of the sternum<br><br>**Sternal/parasternal**: The pain/discomfort is over, underneath or around the sternum<br><br>**Arms (L or R)**: The pain/discomfort is located in the left or right arm<br><br>**Throat/jaw**: The pain/discomfort is located above the clavicle in anterior neck or lower face<br><br>**Back (upper)**: The pain/discomfort is located in the patient's back, over the thorax/ribcage<br><br>**Epigastric**: The pain/discomfort is located in the central upper abdomen, and below the ribs |
| **Character**<br><br>**(How does the patient describe the pain/discomfort?)** | The character of the predominant pain/discomfort can be described as follows:<br><br>**Dull**: The pain/discomfort is steady or sustained, not intense or acute<br><br>**Sharp**: The pain/discomfort peaks in a highly specific area, or is described as "knife-like"<br><br>**Burning**: The pain/discomfort can be described as feeling hot, or like the pain of a burn<br><br>**Heavy**: The patient feels as though there is a heavy weight on the affected region<br><br>I**ndigestion**: The pain/discomfort feels similar to reflux, or heartburn<br><br>**Crushing**: The pain/discomfort is similar to heavy, squeezing from one or all sides<br><br>**Stabbing**: The pain/discomfort feels like having pointed object pressed against body, and may be episodic<br><br>**Other (specify):** Any descriptions which are not better described above |

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| **Exacerbating Factors** | The pain/discomfort is either reproduced or worsens in one or more of the following situations.<br><br>**On Inspiration**: The pain/discomfort is worsened by inspiration<br><br>**On Exertion**: The pain/discomfort is worsened by increased exercise<br><br>**On Palpation**: Pressing on the patient's chest reproduces the pain/discomfort of the same character as the pain they originally experienced<br><br>**On Movement**: The pain/discomfort is worsened by particular movements<br><br>**On Position**: The pain/discomfort is worsened when the patient's body is in a particular position, such as when they are standing, or sitting, or lying down. |
| **Radiation** | The extension of the pain/discomfort to another site whilst the initial pain/discomfort persists – identify the location(s):<br><br>**L chest**: The pain/discomfort is on the left side of the sternum<br><br>**R chest**: The pain/discomfort is on the right side of the sternum<br><br>**Sternal/parasternal**: The pain/discomfort is underneath or around the sternum<br><br>**Arms (L or R)**: The pain/discomfort is located in the left or right arm<br><br>**Throat/jaw**: The pain/discomfort is located above the clavicle<br><br>**Back (upper)**: The pain/discomfort is located in the patient's back, over the thorax/ribcage<br><br>**Epigastric**: The pain/discomfort is located centrally, and immediately below the ribs |
| **Associated Factors** | The patient developed one of the following symptoms in conjunction with their pain/discomfort:<br><br>**Nausea**: the sensation of need to, or likelihood of, vomiting |

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| | **Vomiting**: The patient has expelled the contents of their stomach<br><br>**Diaphoresis/sweating/clamminess**: The patient is sweating more than usual<br><br>**Syncope/blackout/unexplained LOC**: The patient has lost consciousness at some stage since the pain/discomfort started, which cannot otherwise be explained<br><br>**SOB/breathlessness**: The patient is finding breathing difficult or uncomfortable |
| **REPORTED PATIENT HISTORY** | These are to be **self-reported** (as determined during the **ED interaction** between the clinician / health researcher and the patient), without access to medical records. |
| **Previous Myocardial Infarction (MI)** | **Reported – For example-**"Have you ever suffered a heart attack?" |
| **Prior Angina** | **Reported** – **For example-**"Have you ever suffered from angina, or chest pains related to the heart?" |
| **Ventricular Tachycardia** | **Reported** – **For example - "**Have you ever suffered from a heart irregularity called Ventricular Tachycardia?" |
| **Prior CAD** | **Reported** – **For example-**"Have you ever suffered from narrowing of the heart vessels or Coronary Artery Disease?" |
| **Atrial Arrhythmia** | **Reported** – **For example-**"Have you ever suffered from Atrial Fibrillation?" or "Do you take digoxin?" |
| **Prior Congestive Heart** | **Reported** – **For example-**"Have you ever suffered from (Congestive) Heart |

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| **Failure (CHF)** | Failure?" |
| **History of Stroke or Transient Ischaemic Attack (TIA)** | **Reported** – **For example-**"Have you ever suffered from a Stroke, or Transient Ischaemic Attack?" |
| **Peripheral Arterial Disease** | **Reported** – **For example-**"Have you ever suffered from Peripheral Arterial Disease?" |
| **Previous CABG** | **Reported** – **For example-**"Have you ever had Coronary Bypass surgery?" |
| **Previous Percutaneous Coronary Intervention** | **Reported** – **For example-**"Have you ever had an Angioplasty or a Stent?" |
| **Rheumatoid Arthritis** | **Reported** – **For example-**"Have you ever had Rheumatoid arthritis?" If type of 'arthritis' is not known by the patient report as NO. |
| **Pulmonary Embolism** | **Reported** – **For example –** "Have you ever had a pulmonary embolism or a 'clot' in your lung?" |
| **Other: *specify*** | Any other **Reported** Cardiac history not otherwise specified. |
| **REPORTED RISK FACTORS** | These are to be **self-reported** (as determined during the **ED interaction** between the clinician / health researcher and the patient), without access to medical records. |
| **Hypertension** | **Reported** – **For example-**"Have you ever suffered from high blood pressure?" |
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| **Diabetes** | **Reported** – **For example-**"Have you ever suffered from diabetes?" |
| **Dyslipidaemia** | **Reported** – **For example-**"Have you ever suffered from high cholesterol?" |
| **Family History of CAD** | **Reported** – **For example-**"Has anyone in your family ever suffered from heart disease?" |
| **Smoking** | **Reported** – **For example-**"Have you ever smoked?"<br>Classify as follows (2):<br>1. Current: Smoking cigarettes within 1 month of this admission<br>2. Recent: Stopped smoking cigarettes between 1 month and 1 year before this admission<br>3. Former: Stopped smoking cigarettes greater than 1 year before this admission<br>4. Never: Never smoked |
| **Cocaine Use or Amphetamine Use** | **Reported – For example –** "Have you ever used cocaine?"<br>Classify as follows (3):<br>1. Current (past week)<br>2. Recent <1 year<br>3. Former >1year<br>4. Never |
| **ADJUDICATED CARDIOVASCULAR HISTORY** | These are to be **adjudicated** (i.e. as recorded from the notes).<br>The Adjudicated field is based on all available information of the patient's history, including patient notes. If the patient's report contradicts evidence in the notes, the notes take precedence. Provided below is the concise requirements for completing each adjudicated cardiovascular history field. |

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| | Note: The person performing the final review of the case must be clearly identified (e.g. cardiologist, emergency physician) and blinding to the results of the test article and other adjudicators explicitly stated. |
| **Previous Myocardial Infarction (MI) (2)** | **Adjudicated –** The patient has at least 1 documented previous MI before admission. (For a complete definition, please refer to "MI" in the "Endpoints" section.) Date should be noted. |
| **Prior Angina (2)** | **Adjudicated –** History of angina before the current admission. "Angina" refers to evidence or knowledge of symptoms described as chest pain or pressure, jaw pain, arm pain, or other equivalent discomfort suggestive of cardiac ischemia. Indicate if angina existed more than 2 weeks before admission and/or within 2 weeks before admission. |
| **Prior Ventricular Arrhythmia (2)** | **Adjudicated –** Ventricular tachycardia or ventricular fibrillation requiring cardioversion and/or intravenous antiarrhythmics. |
| **Prior PCI and/or CABG (2)** | **Adjudicated –** Previous percutaneous coronary intervention (PCI), coronary artery bypass graft (CABG), or prior catheterization with stenosis greater than or equal to 50%. |
| **Prior Atrial Arrhythmia (2)*** | **Adjudicated –** An episode of atrial arrhythmia documented by 1 of the following:<br>1. Atrial fibrillation/flutter<br>2. Supraventricular tachycardia requiring treatment (supraventricular tachycardia that requires cardioversion or drug therapy) or is sustained for greater than 1 minute. (2) |
| **Prior Congestive Heart Failure (CHF) (2)** | **Adjudicated –** History of CHF. "CHF" refers to evidence or knowledge of symptoms before this acute event described as dyspnea, fluid retention, or low cardiac output secondary to cardiac dysfunction, or the description of rales, jugular venous distension, or pulmonary oedema before the current admission. |
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| **History of Stroke or Transient Ischaemic Attack (TIA) (2)*** | **Adjudicated –** Documented history of stroke or cerebrovascular accident (CVA) or TIA. Typically there was loss of neurological function caused by an ischemic event with residual symptoms at least 24 hours after onset, or a focal neurological deficit that resolves spontaneously without evidence of residual symptoms at 24 hours. |
| **Peripheral Arterial Disease (2)** | **Adjudicated –** Peripheral arterial disease can include the following: 1. Claudication, either with exertion or at rest 2. Amputation for arterial vascular insufficiency 3. Vascular reconstruction, bypass surgery, or percutaneous intervention to the extremities 4. Documented aortic aneurysm 5. Positive non-invasive test (e.g., ankle brachial index less than 0.8). |
| **Previous CABG (2)*** | **Adjudicated –** Evidence that the patient had coronary artery bypass grafting. |
| **Previous Percutaneous Coronary Intervention (PCI) (2)** | **Adjudicated –** Previous PCI of any type (balloon angioplasty, atherectomy, stent, or other) done before the current admission. Date should be noted. |
| **Rheumatoid Arthritis** | **Adjudicated** – Documented history of rheumatoid arthritis or history of 'arthritis' and treatment with glucocorticoids, disease-modifying antirheumatic drugs (e.g. methotrexate, sulfasalazine, hydroxychloroquine, penicillamine), TNF inhibitors, or immunosuppressive agents (e.g. cyclosporine). |
| **Pulmonary Embolism** | **Adjudicated** – Documented history of pulmonary embolism. |
| **Other: *Specify*** | Please note if it is **Reported** or **Adjudicated**. |
| **ADJUDICATED RISK** | These are to be **adjudicated** (i.e. as recorded from the notes).<br><br>The Adjudicated field is based on all available information on the patient's history, including patient notes. If the patient's report contradicts evidence in the notes, the notes take precedence. Provided below is the concise |

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| | requirements for completing each adjudicated risk factors field.<br><br>Note: The person performing the final review of the case must be clearly identified (e.g. cardiologist, emergency physician) and blinding to the results of the test article and other adjudicators explicitly stated. |
| **Hypertension (2)** | **Adjudicated –** Hypertension as documented by: 1. History of hypertension diagnosed and treated with medication, diet, and/or exercise 2. Blood pressure greater than 140 mmHg systolic or 90 mmHg diastolic on at least 2 occasions 3. Current use of antihypertensive pharmacological therapy. |
| **Diabetes (2)** | **Adjudicated –** History of diabetes, regardless of duration of disease, need for antidiabetic agents, or a fasting blood sugar greater than 7 mmol/l or 126 mg/dl. If yes, the type of diabetic control should be noted (check all that apply): 1. None 2. Diet: Diet treatment 3. Oral: Oral agent treatment 4. Insulin: Insulin treatment (includes any combination of insulin) |
| **Dyslipidaemia (2)*** | **Adjudicated –** History of dyslipidaemia diagnosed and/or treated by a physician. |
| **Family History of CAD (2)** | **Adjudicated –** Any direct blood relatives (parents, siblings, children) who have had any of the following at age less than 55 years: 1. Angina 2. MI 3. Sudden cardiac death without obvious cause. |
| **Smoking (2)** | **Adjudicated –** History confirming cigarette smoking in the past.<br><br>Choose from the following categories:<br><br>1. Current: Smoking cigarettes within 1 month of this admission<br><br>2. Recent: Stopped smoking cigarettes between 1 month and 1 year before this admission<br><br>3. Former: Stopped smoking cigarettes greater than 1 year before this admission |

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| | 4. Never: Never smoked cigarettes |
| **Cocaine Use or Amphetamine Use** | **Adjudicated –** History confirming cocaine use. This may include results of toxicology testing.<br>Classify as follows(3):<br>1. Current (past week)<br>2. Recent (<1 year)<br>3. Former (>1year)<br>4. Never |
| **MEDICATIONS** | For all the medications listed below, their use should be noted if used **before** hospital admission. |
| **Nitrates (oral or topical) (2)** | Oral or topical nitroglycerin was administered. Commonly prescribed agents include isosorbide dinitrate, isosorbide mononitrate, Nitro-Dur transdermal infusion system, or nitroglycerin paste. (*Sublingual nitroglycerin or nitroglycerin spray used on an as-needed basis only should not be noted in this category)*. |
| **Aspirin** | Aspirin administered within 7 days. |
| **Clopidogrel** | Clopidogrel administered. |
| **Other Antiplatelet Agents** | Another antiplatelet agent not listed above that is administered (e.g., dipyridamole, ticlopidine, prasugrel). |
| **Warfarin (2)** | Warfarin (or coumarol, coumarin) administered. |

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| **Oral Beta-blockers (2)*** | Oral beta-blockers administered. Some generic forms of oral beta-blockers include atenolol, metoprolol, nadolol, pindolol, propranolol, timolol, acebutolol, bucindolol, bisoprolol, labetalol, and carvedilol. |
| **Calcium Channel Blockers (2)** | Calcium channel blockers administered. Some generic forms of calcium channel blockers include verapamil, nifedipine, diltiazem, nicardipine, nimodipine, nisoldipine, felodipine, and amlodipine. |
| **ACE Inhibitors (2)** | ACE inhibitors administered. Some generic forms include captopril, enalapril, lisinopril, and ramipril. |
| **Diuretics (2)** | Diuretics administered. Some commonly prescribed agents are furosemide, ethacrynic acid, hydrochlorothiazide, spironolactone, metolazone, and bumetanide. |
| **Other Antihypertensive Agent** | Specify agent used. |
| **Statin (HMG Co-A reductase inhibitors) (2)*** | Examples include: atorvastatin, simvastatin, pravastatin, fluvastatin, lovastatin. |
| **Other Lipid-lowering agents (2)*** | Fibrates, nicotinic acid, resin drugs (e.g. cholestyramine, colestipol, probucol, and gemfibrozil). |
| **Physical Examination** | |
| **PHYSICAL MEASURES** | The time of measurements recorded needs to be specified in the DD/MM/YYYY format. |
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| **Height (2)*** | Patient's height in centimetres. Specify 'self reported' or 'measured'. |
| **Weight (2)*** | Patient's weight in kilograms. Specify 'self reported' or 'measured'. |
| **Temperature** | Patient's body temperature on arrival in centigrade. |
| **Heart Rate (2)** | Heart rate (beats per minute) should be the recording that was done **closest to the time of presentation** to the healthcare facility. |
| **Blood Pressure** | Supine systolic and diastolic blood pressure (mmHg) should be the recording that was done **closest to the time of presentation** to the healthcare facility. |
| **Respiration Rate** | Respiratory rate should be recorded **closest to the time of presentation**. |
| **Lung Auscultation (2)*** | Findings should be reported as:<br>1. Absence of rales<br>2. Rales over 50% or less of the lung fields<br>3. Rales over more than 50% of the lung fields<br>4. Not done |
| **Killip Class (2)** | Class 1: Absence of rales over the lung fields and absence of S3<br>Class 2: Rales over 50% or less of the lung fields or the presence of an S3<br>Class 3: Rales over more than 50% of the lung fields<br>Class 4: Shock |
| **Pitting Oedema** | Presence or absence of an indentation of the skin over the mid-tibia after palpation for 2 seconds should be recorded. |

| Treatments | |
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| **TREATMENT IN HOSPITAL** | |
| **Heparin** | Indicate if heparin (unfractionated) was given to the patient during the Index admission. The duration of treatment must be stated (e.g. single dose, <24 hours or >24hours). |
| **Low Molecular Weight Heparin** | Indicate if LMWH was given to the patient during the Index admission. The duration of treatment must be stated (e.g. single dose, <24 hours or >24hours).<br>Available drugs include: ardeparin, certoparin, enoxaparin, dalteparin, nadroparin, parnaparin, reviparin. |
| **GP IIb/IIIa Inhibitors (2)*** | Indicate if GP IIb/IIIa blockers administered at any time during INDEX admission.<br>Available drugs include: abciximab, eptifibatide, tirofiban. |
| **Clopidogrel** | Indicate if clopidogrel (oral anti-platelet medication) was given to the patient during the Index admission. The duration of treatment must be stated (e.g. single dose, <24 hours or >24hours). |
| **Other Antiplatelet Medication** | Indicate if another antiplatelet agent was administered at any time during the INDEX admission. Agents include: dipyridamole, ticlopidine, prasugrel, ticagrelor. |
| **Investigations** | |
| ELECTROCARDIOGRAM<br>(ECG) | Note: The specialty of the person performing the review of the investigations must be clearly identified (e.g. cardiologist, emergency physician). |

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| **Date & Time** | Date and time of the ECG. Provide date in the DD/MM/YYYY format and time in 24 hour format. |
| **Normal (4)** | No possible evidence for ischaemia. |
| **Nonspecific ST-T wave Changes (4)** | Accepted deviation from the norm, with the lowest likelihood of ischemia (eg, inverted T wave axis in III or V1). |
| **Abnormal but not Diagnostic of Ischaemia (4)** | Prolonged PR, QRS, QTc intervals, bundle branch blocks, left ventricluar hypertrophy with strain. |
| **Ischaemia or Previous Infarction Known to be Old** | ST-segment depression of at least 0.5 mm (0.05 mV) in 2 or more contiguous leads (includes reciprocal changes), T-wave inversion of at least 1 mm (0.1 mV) including inverted T waves that are not indicative of acute MI, or Q waves ≥30ms in duration with evidence that this is pre-existing on previous ECGs |
| **Ischaemia or Previous Infarction NOT Known to be Old** | ST-segment depression of at least 0.5 mm (0.05 mV) in 2 or more contiguous leads (includes reciprocal changes), T-wave inversion of at least 1 mm (0.1 mV) including inverted T waves that are not indicative of acute MI, or Q waves ≥30ms in duration with evidence that this is not pre-existing on previous ECGs |
| **Consistent with AMI** | New or presumed new ST-segment elevation at the J point in 2 or more contiguous leads with the cut-off points greater than or equal to 0.2 mV in leads V1, V2, or V3, or greater than or equal to 0.1 mV in other leads or new LBBB STE or LBBB. |
| **ADDITIONAL ECG INTERPRETATION** | In addition to the interpretation, additional ECG findings may be reported. These include: |
| **ST-Elevation (4)** | **In men**: New ST elevation at the J-point in two contiguous leads with the cut-off points: >=0.2 mV in leads V2-V3 or >=0.1mV in other leads.<br><br>**In women**: New ST elevation at the J-point in two contiguous leads with the |

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| | cut-off points**: >=0.15 mV** in leads V2-V3 or >=0.1mV in other leads.<br><br>**OR** New ST elevation at the J-point in two contiguous leads with the cut-off points: **>=0.2 mV** in leads V2-V3 or >=0.1mV in other leads. |
| **ST-Depression (4)** | ST-segment depression of at least 0.5 mm (0.05 mV) in 2 or more contiguous leads (includes reciprocal changes). |
| **T-Wave Inversion (4)*** | T-wave inversion of at least 1 mm (0.1 mV) including inverted T waves that are not indicative of acute MI. Indicate number of contiguous leads. (E.g. one, two or more). |
| **Q Wave Abnormality** | Q waves that are greater than or equal to 0.03 seconds in width, and greater than or equal to 1 mm (0.1 mV) in depth, in at least 2 contiguous leads. |
| **LBBB** | Presence of a left bundle branch block should be noted. |
| **RBBB** | Presence of a right bundle branch block should be noted. |
| **Old Changes** | Identify all changes which are believed to have existed before the onset of presenting symptoms. Definitions are the same as above. |
| **Core Laboratory Blood Test Results** | |
| **Haemoglobin** | First Haemoglobin level and units. |
| **Serum Creatinine (2)** | First Creatinine level and units. |
| **Troponin** | First Troponin results and result >=6hrs later. Document time the sample was taken.<br><br>State the manufacturer of the assay, the 10% coefficient of variation (CV), the limit of detection (LOD) and the units used in the measurement. Also state the 99$^{th}$ percentile for the normal population. State whether Troponin I or Troponin T are used. |

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| | Classify biomarker investigations as(1):<br><br>A. *Adequate set of biomarkers*: At least 2 measurements of the same marker taken at least 6 hours apart<br><br>B. *Diagnostic biomarkers*: At least 1 positive biomarker in an adequate set (see A above) of biomarkers showing a rising or falling pattern in the setting of clinical cardiac ischemia and the absence of non-cardiac causes of biomarker elevation<br><br>C. *Equivocal biomarkers*: Only 1 available measurement that is positive, or a rising or falling pattern not in the setting of clinical cardiac ischemia or in the presence of non-ischemic causes of biomarker elevation<br><br>D. *Missing biomarkers*: Biomarkers not measured<br><br>E. *Normal biomarkers*: Measured biomarkers do not meet the criteria for a positive biomarker (see F below)<br><br>F. *Positive biomarkers*: At least 1 value exceeding the 99$^{th}$ percentile of the distribution in healthy populations or the lowest level at which a 10% coefficient of variation can be demonstrated for that laboratory |
| **Other Cardiac Biomarkers**<br><br>**Other (Specify)** | Indicate the results of other local investigations that are used to determine if there is evidence of myocardial necrosis. Indicate reference range and units. E.g. Myoglobin, CK-MB, CK-MB mass, BNP. |
| **INVESTIGATION ENDPOINTS** | Investigations performed in the 30 days following index presentation AND investigations performed prior to study enrolment may be recorded. |
| **Stress ECG**<br><br>**(Exercise tolerance test/Exercise stress test)** | State whether stress is exercise or pharmacological.<br><br>**Maximal stress test** (symptom limited) or **submaximal test** (e.g. modified Bruce protocol ending with stage 1 or stage 2) (2)<br><br>1. **Positive**: On a stress test, the patient developed either: |

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| | • Both ischemic discomfort and ST segment shift greater than or equal to 1 mm (0.1 mV) (horizontal or down sloping) or<br>• New ST shift greater than or equal to 2 mm (0.2 mV) (horizontal or down sloping) believed to represent ischemia even in the absence of ischemic discomfort. (2)<br><br>2. **Negative**: No evidence of ischemia (i.e., no typical angina pain and no ST segment shifts). (2)<br><br>***3.*Equivocal:** Either:<br><br>• Typical ischemic pain/discomfort but no ST segment shift greater than or equal to 1 mm (0.1 mV) (horizontal or down sloping) or,<br>• ST shift of 1 mm (0.1 mV) (horizontal or down sloping) but no ischemic discomfort. (2) |
| **Stress Radionuclide Imaging** | State whether stress is exercise or pharmacological<br><br>All stress radionuclide imaging should be adjudicated by two independent cardiologists or nuclear physicians (double blinded). In cases where there is disagreement between the two adjudicators, a third adjudicator will be used as a tie-breaker. Some guidance is provided below:<br><br>**Positive Stress Scan**<br><br>Reversible perfusion defect.[#]<br><br>[#]Needs a radiologist and/or cardiologist interpretation and clinical correlation, also report the size of the defect.<br><br>Exercise portion of the test is defined as positive if >1.0 mm horizontal or down sloping ST segment depression of elevation 80 msec after the J point.<br><br>**Negative Stress Scan**<br><br>Borderline or no reversible perfusion defects.<br><br>**Non-Diagnostic Scan**<br><br>Exercise ECG without ischemic changes at a peak HR less than 85% of the age predicted maximum. |
| **Stress Echocardiogram** | State whether stress is exercise or pharmacological<br><br>All stress echocardiograms will be adjudicated by two independent cardiologists (double blinded). In cases where there is disagreement between |

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| | the two adjudicators, a third adjudicator will be used as a tie-breaker. Some guidance is provided below:<br><br>**Positive Scan**<br><br>Wall motion abnormality positive for ischemia when > 2 contiguous segments exhibit resting or inducible wall motion abnormality.<br><br>**Indeterminate Scan**<br><br>If the target heart rate is not achieved. |
| **Echocardiography (non-stress)** | Echocardiogram performed that assesses ejection fraction (EF) and regional wall motion abnormalities. |
| **Coronary CT Angiography (CCTA)** | Coronary CT Angiography performed during the index admission. Provide date in the DD/MM/YYYY format.<br><br>**Calcium Score:** Report the score from radiologists or cardiologists review of CCTA.<br><br>**Percent Stenosis:** Highest degree of stenosis noted by radiologists or cardiologists. |
| **Cardiac catheterization / Angiography** | Diagnostic cardiac catheterization/angiography performed during the hospital stay. Date should be noted. (2)<br><br>Report if a stenosis of ≥70% is present OR a *Culprit Lesion* (ulcer or thrombus) in at least 1 vessel if present. |
| **ANGIOGRAPHY – ADDITIONAL INFORMATION** | Additional information may be reported from diagnostic cardiac catheterization/angiography performed during the hospital stay.<br><br>Provide date in the DD/MM/YYYY format. |
| **Maximum Stenosis by Vessel (2)** | Stenosis represents the percentage occlusion, from 0 to 100%, associated with the identified vessel systems. Percent stenosis at its maximal point is estimated |

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| | to be the amount of reduction in the diameter of the "normal" vessel proximal to the lesion. For the denominator, take the maximum internal lumen diameter proximal and distal to the lesion. In instances where multiple lesions are present, enter the highest percentage stenosis noted. The systems of interest are as follows and should include major branch vessels of greater than 2 mm diameter:<br><br>a) Greatest stenosis assessed in the LAD or any major branch vessel<br>b) Greatest stenosis assessed in the LCx or any major branch vessel<br>c) Greatest stenosis assessed in the RCA or any major branch vessel<br>d) Greatest stenosis assessed in the L M<br>e) Greatest stenosis assessed in bypass graft |
| **Culprit Artery (2)** | Vessel considered to be responsible for the ACS. The investigator should use his/her judgment in choosing the primary vessel. In cases in which this is difficult to determine (despite correlation of ECG changes and angiographic data), the vessel supplying the largest territory of myocardium should be selected: • LAD • LCx • RCA •• LM • Graft • Unknown<br><br>Note: "None" should be considered if there is no apparent coronary vessel lesion that could be responsible for evidence of ischemia. |
| **Culprit Artery TIMI Flow (2)** | TIMI grade flow in the culprit artery is defined as follows:<br><br>**Grade 0** (no perfusion): There is no antegrade flow beyond the point of occlusion.<br><br>**Grade 1** (penetration without perfusion): The contrast material passes beyond the area of obstruction but “hangs up” and fails to opacify the entire coronary bed distal to the obstruction for the duration of the cineangiographic filming sequence.<br><br>**Grade 2** (partial perfusion): The contrast material passes across the obstruction and opacifies the coronary bed distal to the obstruction. However, the rate of entry of contrast material into the vessel distal to the obstruction or its rate of clearance from the distal bed (or both) is perceptibly slower than its entry into or clearance from comparable areas not perfused by the previously occluded vessel (e.g., the opposite coronary artery or the coronary bed proximal to the obstruction). |

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| | **Grade 3** (complete perfusion): Antegrade flow into the bed distal to the obstruction occurs as promptly as antegrade flow into the bed from the involved bed and is as rapid as clearance from an uninvolved bed in the same vessel or the opposite artery. |
| **Percutaneous Intervention (PCI)** | PCI performed during admission. Provide date in the DD/MM/YYYY format. |
| **Time of First Balloon Inflation (2)** | Time of the first balloon inflation or stent placement. If the exact time of first balloon inflation or initial stent (if no balloon) placement is not known, the time of the start of the procedure should be indicated. |
| **Number of Lesions Attempted (2)** | Number of lesions into which an attempt was made to pass a guidewire, whether successful or not. |
| **Number of Stents Placed (2)** | Number of stents placed. |
| **Drug Eluting Stent (DES)** | Any stent which releases pharmacological agents after placement. |
| **Bare Metal Stent (BMS)** | Any stent which does not release pharmacological agents after placement. |
| **Number of Lesions Successfully Dilated (2)** | Number of lesions in which residual postintervention stenosis is less than 50% of the arterial luminal diameter, TIMI flow is 3, and the minimum decrease in stenosis is 20%. |
| **Inpatient Coronary Artery Bypass Grafting (CABG)** | CABG procedure performed during this admission. Provide date in the DD/MM/YYYY format. |
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| DISCHARGE INFORMATION | |
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| **ED Discharge Status** | Specify whether the patient was alive or dead at discharge from the ED. Choose one of the following:<br>• Alive<br>• Deceased |
| **ED Discharge Destination** | Identify which of the following locations the patient was discharged to:<br>• Home – The patient is not placed in the care of any inpatient health care providers, or is referred to the care of the local medical practitioner<br>• Inpatient admission – The patient is transferred to the care of a ward within the hospital<br>• ED observation admission – The patient is transferred to a short -stay observation unit within the same ED<br>• Self discharge – The patient removes themselves from the care of ED staff<br>• Transferred to another facility – The patient is transferred to the care of health care providers that is not within the same hospital. The discharge summary and relevant treatment records must be obtained from the facility the patient was transferred to in order to complete the outcomes for the study.<br><br>**Note**: Where a patient was admitted to inpatient service, ED observation unit or transferred to another facility for ongoing management then Hospital Discharge details MUST also be provided. |
| **Date and Time of ED Discharge** | Date and time the patient left the ED. Provide date in the DD/MM/YYYY format and time in 24 hour format. |
| **Date and Time of Hospital Discharge** | The date the patient was discharged from hospital following inpatient admission (or transfer) for the index event. Provide date in the DD/MM/YYYY format and time in 24 hour format. |

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| **Hospital Discharge Status** | Specify whether the patient was alive or dead at discharge from the hospital following the index admission. Choose one of the following:<br>• Alive<br>• Deceased |
| **ENDPOINTS**<br>These elements are believed to be the most important outcomes to monitor in patients with ACS. Provide date in the DD/MM/YYYY format and time in 24 hour format for each endpoint that occurs.<br>The definition for each endpoint is detailed below. | |
| **DEATH** | Indicate date and time in DD/MM/YYYY and 24 hour clock time. |
| **CAUSE OF DEATH (2)*** | This category includes all deaths regardless of primary cause of death.<br>**Primary cause can be classified as follows:**<br>• **Cardiovascular death**<br>a. **Cardiac** indicates cause of death was sudden cardiac death, MI, unstable angina, or other CAD; CHF; or cardiac arrhythmia.<br>b. **Non Cardiac** (e.g., stroke, arterial embolism, pulmonary embolism, ruptured aortic aneurysm, or dissection).<br>• **Non-cardiovascular death** indicates cause of death was respiratory failure, pneumonia, cancer, trauma, suicide, or any other already defined cause (e.g., liver disease or renal failure).<br>• **Death of uncertain cause:** If a cardiac cause of death cannot be excluded after reasonable investigation, it is assumed that the death was cardiac related.<br>For patients whom die and for whom no cardiac markers were obtained, the presence of new ST-segment elevation and new chest pain would meet criteria |

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| | for MI. |
| **Cardiac Arrest** | **Cardiac Arrest**<br>Cardiac arrest is the cessation of cardiac mechanical activity as confirmed by the absence of signs of circulation. If an EMS provider or physician did not witness the cardiac arrest, then the professional may be uncertain as to whether a cardiac arrest actually occurred.<br><br>**Cause of Arrest (Etiology)**<br>An arrest is presumed to be of cardiac etiology unless it is known or likely to have been caused by trauma, submersion, drug overdose, asphyxia, exsanguination, or any other non-cardiac cause as best determined by rescuers. |
| **Cardiogenic Shock (2)** | Experienced cardiogenic shock. Clinical criteria for cardiogenic shock are hypotension (a systolic blood pressure of less than 90 mmHg for at least 30 minutes or the need for supportive measures to maintain a systolic blood pressure of greater than or equal to 90 mmHg), end-organ hypoperfusion (cool extremities or a urine output of less than 30 ml/h, and a heart rate of greater than or equal to 60 beats per minute). The hemodynamic criteria are a cardiac index of no more than 2.2 l/min per square meter of body-surface area and a pulmonary-capillary wedge pressure of > 15 mmHg. |
| **Acute Myocardial Infarction (4)** | Detection of rise and/or fall of cardiac biomarkers (preferably troponin) with at least one value above the 99$^{th}$ percentile of the upper reference limit (URL) together with evidence of myocardial ischaemia with at least one of the following:<br>• Symptoms of ischaemia;<br>• ECG changes indicative of new ischaemia (new ST-T chamges or new left bundle branch block [LBBB]);<br>• Development of pathological Q waves in the ECG;<br>• Imaging evidence of new loss of viable myocardium or new regional wall motion abnormality. |
| | Defined as an ACS in which there is cardiac marker evidence of myocardial |

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| **STEMI (2)*** | necrosis (e.g., positive Troponin) and new (or presumably new if no prior ECG is available) ST-segment elevation* on the admission ECG.<br><br>*New ST elevation at the J-point in two contiguous leads with the cut-off points: >=0.2 mV in leads V2-V3 or >=0.1mV in other leads. |
| **NSTEMI (2)*** | Defined as an ACS in which there is cardiac marker evidence of myocardial necrosis (e.g., positive CK-MB or troponin) without new ST-segment elevation.<br><br>*For example, ST-segment depression of at least 0.5 mm (0.05 mV) in 2 or more contiguous leads (includes reciprocal changes) or T-wave inversion of at least 1 mm (0.1 mV) including inverted T waves that are not indicative of acute MI. |
| **Ventricular Arrhythmia (2)** | Ventricular tachycardia or fibrillation requiring cardioversion and/or intravenous anti-arrhythmics. |
| **High- degree Atrioventricular (AV) Block (2)*** | High-level AV block defined as third-degree AV block or second-degree AV block with bradycardia requiring pacing or pharmacological intervention. |
| **Emergency Revascularisation Procedure (2)*** | Patient is symptomatic and requires emergency PCI or CABG.<br><br>The patient's clinical status includes any of the following:<br><br>A. Ischemic dysfunction (any of the following)<br><br>1. Ongoing ischemia including rest angina despite maximal medical therapy (medical and/or intra-aortic balloon pump [IABP]<br><br>2. Acute evolving MI within 24 hours before intervention<br>3. Pulmonary oedema requiring intubation<br><br>B. Mechanical dysfunction (either of the following):<br><br>1. Shock with circulatory support |

| | 2. Shock without circulatory support |
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| **Urgent Revascularisation Procedure (2)*** | All of the following conditions are met:<br>1. Not elective<br>2. Not emergency<br>3. Procedure required during the same hospitalization to minimize chance of further clinical deterioration |
| **Elective Revascularisation Procedure (2)*** | The procedure could be deferred without increased risk of compromised cardiac outcome. |
| **Unstable Angina** | Unstable angina pectoris(1)<br>1. New cardiac symptoms and positive ECG findings with normal biomarkers<br>2. Changing symptom pattern and positive ECG findings with normal biomarkers<br><br>Patients with clinical history consistent with the diagnosis of unstable angina as described above, in whom ischemia has been confirmed by the presence of ST-segment changes on the initial ECG or in association with recurrent rest pain, or by a positive objective test (e.g. stress test). |
| **Heart Failure Requiring Intervention** | When a physician has diagnosed congestive heart failure (CHF) by one of the following:<br>a. Paroxysmal nocturnal dyspnoea (PND);<br>b. Dyspnoea on exertion (DOE) due to heart failure;<br>c. Chest X-ray (CXR) showing pulmonary congestion,<br>**AND**<br>Patient has received treatment for this – e.g. ACE inhibition, diuretics, |

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| | carvedilol or digoxin. |
| **Patient Refused to Comply with Medical Advice/Treatment** | Documented evidence in clinical notes or supplementary paperwork that patient has decided not to follow medical management recommended by the responsible clinical team. |
| **Stable CAD (2)** | The patient has a clinical diagnosis of prior history of CAD, but after evaluation in the hospital, the episode of discomfort was not thought to have represented unstable angina. |
| **Other Cardiovascular Problem** | Any other cardiovascular disease not stated above. Specify diagnosis. |
| **Non-cardiovascular Problem** | Any condition not better described as cardiovascular. Specify diagnosis. |

## Legend:

**(1)** Luepker RV, Apple FS, Christenson RH, et al. Case definitions for acute coronary heart disease in epidemiology and clinical research studies: a statement from the AHA Council on Epidemiology and Prevention; AHA Statistics Committee; World Heart Federation Council on Epidemiology and Prevention; the European Society of Cardiology Working Group on Epidemiology and Prevention; Centers for Disease Control and Prevention; and the National Heart, Lung, and Blood Institute. *Circulation*. 2003 Nov 18;108(20):2543-9.

**(2)** Cannon CP, Battler A, Brindis RG, et al. American College of Cardiology key data elements and definitions for measuring the clinical management and outcomes of patients with acute coronary syndromes. A report of the American College of Cardiology Task Force on Clinical Data Standards (Acute Coronary Syndromes Writing Committee). *J Am Coll Cardiol*. 2001 Dec;38(7):2114-30.

**(3)** Hollander JE, Blomkalns AL, Brogan GX, et al. Standardized reporting guidelines for studies evaluating risk stratification of ED patients with potential acute coronary syndromes. *Acad Emerg Med*. 2004 Dec;11(12):1331-40.

**(4)** Thygesen K, Alpert JS, White HD, et al. Universal definition of myocardial infarction. *Circulation*. 2007 Nov 27;116(22):2634-53.

***** Indicates a modification was made to an original data element