

## APPENDIX A

### MMCC CASE LAW

#### GENERAL COMMUNITY AND COHORT SURVEILLANCE RULES

##### Final Classification Rules

1. When the death certificate is the only available document, and the ICD code for the underlying cause of death is compatible with CHD (I11, I20, I21, I22, I23, I24, I25, I46, I51.6, I51.9) then final ARIC classification of cause of death is usually “Possible CHD,” unless there is (I) a demonstrable coding error, or (II) an explicit non-CHD probable cause of death (such as malignant hypertension with renal failure). When a non-CHD ICD code is the underlying cause and is the only diagnosis on the death certificate, the classification of cause of death is usually “Non-CHD”. When the underlying ICD code is not compatible with CHD, but there is evidence for CHD among the listed diagnoses, then “Possible CHD” may be chosen as the ARIC classification.
2. The classification “Diagnosis Unclassifiable” will be reserved for cases not meeting ARIC criteria for CHD diagnosis, but in whom a specific non-atherosclerotic or non-cardiac atherosclerotic process cannot be identified.
3. In the case of conflicting information, the more inclusive cause of death (e.g., Definite CHD rather than Definite MI) is preferred.
4. Stroke qualifies as a “yes” answer to “a non-atherosclerotic or non-cardiac atherosclerotic process,” if judged to be the probably cause of death.
5. If the decedent was debilitated from a potentially lethal non-atherosclerotic or non-cardiac process and had a related downhill course, with no symptomatic evidence of a recent coronary event, the death is classified a non-CHD.
6. In cases of “Definite” or “Probable MI,” treated or aborted with TPA or similar clot-dissolving therapy, in which the patient dies of a direct complication or adverse effect of this therapy (i.e., hemorrhage), a final death classification of “Definite fatal CHD” should usually be assigned.
7. If a patient having an elective CABG dies as a complication of surgery, a final death classification of “Definite fatal CHD” should usually be assigned.
8. Generally, “hypertensive heart disease” (I11), “hypertensive heart disease *without* congestive heart failure” (I11.9), and e.g. “hypertensive cardiovascular disease” will not be considered “non-atherosclerotic causes of death” and may not be used as the sole basis for affirmative answers to question C8.
9. If the ICD code for the underlying cause of death is “diabetes,” the answer for Question 8 can be “a non-atherosclerotic cause of death” if diabetes is the only diagnosis listed on the death certificate. If, however, diabetes is the underlying

cause, but CHD is listed on the death certificate, the classification of cause of death can be “CHD” (see rule 1).

10. If the ICD code for the underlying cause of death is “heart failure” (I50), the answer to question C8 can be affirmative (“non-atherosclerotic cause of death”). Typically, this occurs when other information leading to the classification of a death as A, B or C in question C13 is absent, as in the case of an isolated death certificate listing CHF as the cause of death. In this situation,

Question C8 = “Y”  
Reason = “Heart Failure”  
Question C13 = “D”, “Non-CHD Death”.

If the accompanying clinical history or one of the other listed ICD10 codes (I20, I21, I22, I23, I24, I25) suggests an ischemic etiology, the “Non-CHD Death” classification can be overridden, as follows:

Question C14a = “N”  
Reason = “Heart Failure Likely to Have an Atherosclerotic Etiology”  
Cite = “Case Law 10”  
Question 14b = “C”, “Possible Fatal CHD”

11. If an underlying cause of death (UCOD) code is compatible with acute CHD, but the death clearly was precipitated by another acute medical / surgical event (e.g., gastrointestinal bleeding or sepsis causing MI, etc.), then the precipitating medical / surgical event should generally be chosen as the ARIC cause of death, rather than the UCOD.

### Chronology

12. Death is assumed to have occurred at the time the patient stops breathing on his/her own and does not recover.
13. Symptoms are assumed to begin when the patient changes his/her activity. If symptoms come and go, the onset of symptoms is the time when they crescendo, leading to death.
14. In cases where timing of symptoms or death is unknown, the best estimate of the chronology is to be made.
15. Symptoms of CHD leading to a hospital admission for CHD are usually considered to be related to a subsequent death from CHD, which occurs either before discharge or within 28 days of admission, whichever occurs first. Deaths of doubtful chronology admitted for the investigation or treatment of CHD are classified as deaths occurring in > 24 hours if admitted for at least 24 hours.
16. Unknown chronology of death in an institutionalized patient is usually considered to be < 24 hours, but in hospice cases, chronic symptoms and a downhill course are expected. Question 15b regarding time to death from onset of acute symptoms is therefore answered as, “More than 24 hours” (Option E).

## Evidence

17. The relative credibility of conflicting information is established from all the available evidence, i.e., there is no fixed hierarchy of credibility (such as physician overriding a lay informant). However, as a general rule:
  - a. A knowledgeable physician takes priority for medical history.
  - b. A witness takes priority for events around death and timing of death.
  - c. Within the Event Summary Form, *Parts C-Previous Cohort Diagnoses of (Definite or Probable) MI and B- History of Cardiac Procedures (36.xx)* take priority over *Part A- Visit and Follow-up* when answering question 11.
18. A clinical history of ASHD or CHD counts as evidence of previous manifestations of CHD. If the event under consideration is the first manifestation of CHD, it does not qualify as a “history” of CHD.
19. A history of CABG or coronary angioplasty at any time prior to death is equivalent to a positive history of CHD.
20. For community surveillance events, a coroner’s listing of causes of death (e.g. ASCVD) is interpreted only as findings at death and is not sufficient evidence, by itself, of past history. Other non-autopsy information, however, such as reported previous MI, may suffice as evidence of past history.
21. Autopsy evidence of old MI or other chronic CHD may not be used as evidence of a history of CHD in community surveillance events.
22. For out-of-hospital deaths, a single source indicating other chronic ischemic heart disease (“other chr. IHD” in Event Summary Form item C.1.i.) as the only evidence for CHD history is generally insufficient by itself to be called a history of CHD. Thus, to qualify as history of CHD, “other chr. IHD” must be mentioned by more than one source or be accompanied by other documentation of angina, MI, coronary revascularization, ischemic cardiomyopathy, or coronary insufficiency.

## Downgrading and Upgrading

23. The diagnosis of “Definite MI” based upon “Evolving Diagnostic” ECG may be downgraded to the algorithm diagnosis which would be obtained if the ECG were “Diagnostic,” and the diagnosis of “Probably MI,” based upon “Evolving ST-T” ECG may be downgraded to the algorithm diagnosis which would be obtained if the ECG were “Equivocal,” but only if:
  - a. the clinical history is compatible with the downgraded diagnosis, and
  - b. the “Evolving Diagnostic” or “Evolving ST-T” ECG is suspicious because (i) a non-MI cause of the ECG abnormality is identified, or (ii) a hospital ECG interpretation contradicts it.
24. Changes in hospital pain or enzyme classification are permitted only in restricted circumstances based on strong clinical judgment. When a change in

classification is made by a reviewer, the change should be reflected in the reviewer's answer to Item 7b (physician "preferred diagnosis"), not in the answers to Items 3, 5 or 6.

- a. The ARIC protocol, not individual hospital physician's judgement, determines what exact enzyme level qualified as "elevated."
  - b. Reviewers may downgrade enzyme classification on the basis of an identified non-cardiac or non-ischemic cause, but only if enzyme review has not already occurred. Such causes of e.g. low-level, but by ARIC criteria, "abnormal" troponin values include heart failure, atrial fibrillation, pulmonary embolism, end-stage renal disease, and sepsis presenting with little evidence of an acute coronary syndrome.
  - c. Reviewers may downgrade the pain classification on the basis of an identified non-cardiac or non-ischemic cause, but only if pain review has not already occurred.
  - d. Changes in pain, enzyme, or ECG classification are permitted when the narrative summary clearly contradicts the pain, enzyme, or ECG information abstracted and an ARIC abstractor's error appear probable. If the discharge summary clearly says there was ECG evidence of ST segment elevation, you may "upgrade" the ECG criterion to diagnostic.
  - e. An anginal equivalent (e.g. pulmonary edema, exhaustion, syncope) may be considered similar to chest pain in recording a "preferred diagnosis."
25. Upgrading the MI diagnosis in hospital deaths, e.g., from "No MI" to "Suspect" or "Definite MI," is not permitted on the basis of the judgement that had the patient lived, the enzymes or ECG would have provided sufficient evidence for the upgraded diagnosis.
26. Upgrading the MI diagnosis in cases of delayed hospitalization is not permitted on the basis of the judgement that had the patient been hospitalized earlier the enzymes or ECG would have provided sufficient evidence for the upgraded diagnosis.
27. When the discharge summary clearly indicates a perioperative MI and ARIC chest pain are "absent," a diagnosis of "Probable" (but not "Definite") "MI," may be assigned if the algorithm criteria for "probable" or "Definite MI" would have been met had chest pain been "present."
28. If a reviewer believes the ECG DX and the discharge summary were so discrepant as to suggest a missing ECG that might change the MI DX, the reviewer should not review the case and notify the Coordinating Center of the problem. The CSCC will check at the coding center as to whether the appropriate tracings were in the system. If this were done, and if the tracings were appropriately included and coded, then the procedures should mandate acceptance of the ECG criteria. On the other hand, if a request for a check should reveal missing ECG or a programming error, such could then be corrected as needed.

29. The diagnosis of “Definite” or “Probable” MI may be downgraded if there is evidence that the associated abnormalities are manifestations of stress cardiomyopathy (Takotsubo syndrome), e.g. a transient, modest troponin elevation in the context of a disproportionately large territory of ECG change or left ventricular dysfunction and normal to insufficiently explanatory angiographic findings following an intensely stressful trigger.

## **APPENDIX B**

### **RULES SPECIFIC TO MMCC COHORT REVIEWS**

1. For cohort surveillance events only, autopsy or unequivocal angiographic evidence of old MI or other chronic CHD counts as evidence of a history of CHD.
2. For cohort surveillance events only, autopsy reports may be used to judge cause of death and in most cases take precedence. Autopsy evidence of an acute MI or MI within 4 weeks may be used to answer "Yes" to "Was there a definite MI within 4 weeks of death." Such evidence includes acute coronary arterial thrombosis deemed sufficient to produce acute MI, even in the absence of evidence for acute myocardial tissue necrosis.