

#### 4.1 Wall Motion Abnormalities as a Test for Myocardial Ischemia

Consider a study of the accuracy of regional wall motion abnormalities on the emergency department (ED) echocardiogram as a test for acute cardiac ischemia (ACI; the heart not getting enough blood flow). The index test is a yes/no reading of regional wall motion abnormalities by the performing clinician. The gold standard for ACI is the final ED/hospital diagnosis, e.g., “unstable angina.” [1, 2] The test result and the final diagnosis were recorded as part of clinical care and abstracted for the study from the hospital chart by trained reviewers using explicit criteria. All patients who received an ED echocardiogram were included in the study, regardless of whether they were hospitalized. If the patient was discharged from the ED, the final diagnosis was the diagnosis assigned on the basis of the ED evaluation.

- a. This study’s estimates of the sensitivity and specificity were probably biased because the final diagnosis of cardiac ischemia was based in part on the result of the echocardiogram. What is the name of this bias?

**Incorporation Bias. You could also call it “Review Bias” which is a subtype of incorporation bias.**

- b. How would this bias **sensitivity** (relative to a study in which the echocardiogram result was withheld from the clinicians)? Explain.

**Sensitivity in this study would be higher. A positive echocardiogram would cause borderline patients to be classified as D+ instead of D-. Thus, subjects who would otherwise be classified as false positives would get counted as true positives (which helps answer the next question).**

- c. How would this bias **specificity** (relative to a study in which the echocardiogram result was withheld from the clinicians)? Explain.

**Specificity would also be higher. A negative echocardiogram would make clinicians classify borderline patients as D- instead of D+. Thus, subjects who would otherwise be classified as false negatives would get counted as true negatives (which helps answer the previous question)..**

1. Lau J, Ioannidis JP, Balk EM, Milch C, Terrin N, Chew PW, et al. Diagnosing acute cardiac ischemia in the emergency department: a systematic review of the accuracy and clinical effect of current technologies. *Ann Emerg Med.* 2001;37(5):453-60.
2. Lau J, Ioannidis JP, United States. Agency for Healthcare Research and Quality., New England Medical Center Hospital. Evidence-based Practice Center. Evaluation of technologies for identifying acute cardiac ischemia in emergency departments. Rockville, MD: The Agency; 2001. ix, 315 p. p.