NACB Recommendations – Logistics (Administrative, Cost-effectiveness, Point-of-care, what are the rules?)

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NACB Recommendations – Administrative

I. Overview

A. Definition of Terms

ED = emergency department
ACS = acute coronary syndrome, including both unstable angina (UA) and myocardial infarction (MI)
AMI = acute myocardial infarction
NACB = National Academy of Clinical Biochemistry

B. Description

The disposition of patients with chest pain from the emergency department (ED) is one of the most difficult challenges that face emergency physicians today. Admission of patients with a low probability of acute coronary artery disease often leads to excessive hospital costs.[1] A strategy that is too liberal with regard to ED discharges may lead to higher numbers of patients released with acute myocardial infarction (AMI). Inappropriate discharge of ED patients who have AMI has been estimated to occur in 2–5% of patients and is the single most common cause of malpractice lawsuits against ED physicians.[2,3]

II. Recommendations

Recommendation 1: Members of emergency departments, primary care physicians, divisions of cardiology, hospital administrations, and clinical laboratories should work collectively to develop an accelerated protocol for the use of biochemical markers in the evaluation of patients with possible acute coronary syndromes.

Strength/consensus of recommendation: Class Ib.

Recommendation 2: For simplicity, this protocol should apply to either the facilitated diagnosis or the rule-out of AMI in the ED or to routine diagnosis from other areas of the hospital, should a patient develop symptoms consistent with acute coronary syndromes while hospitalized.

Strength/consensus of recommendation: Class IIb.

Recommendation 3: Members of emergency departments, divisions of cardiology, primary care physicians, hospital administrations, and clinical laboratories should work collectively to use quality assurance measures, evidence-based guidelines, and monitoring to reduce medical error and improve the treatment of patients with possible acute coronary syndromes.

Strength/consensus of recommendation: Class Ib.

Although the recommendation that laboratorians should work with ED physicians, primary care physicians, cardiologists, and hospital administration may appear obvious,[4] in actual practice decisions on testing protocols are often made without input from the laboratory. Laboratory directors must be aggressive in requesting that qualified personnel be part of organizational and operating committees when such discussions are being conducted, or should initiate the discussions themselves.

Many hospitals today have a dedicated area within the ED for the rapid rule-out of AMI. These areas have been designated as "chest pain centers", "heart emergency rooms", or some other term to indicate that the efficient evaluation and management of chest pain patients is a major objective of that center.[5-8] Essential for early AMI rule-out is frequent electrocardiographic testing and blood collections for the measurement of cardiac markers. Patients with negative results for these tests most likely do not have an AMI. They may, however, have UA or other forms of acute cardiovascular disease. For these patients, it is appropriate to perform additional studies such as a stress test, echocardiogram, or radionuclide ventriculogram for risk stratification. Establishment of a clinical practice guideline for the evaluation of patients with chest pain will reduce the variability of practices among physicians and institutions, and at the same time improve the accuracy of disposition decisions.[9] The NACB Committee felt that for "routine AMI diagnosis" of patients who are already hospitalized for other reasons, the same criteria should apply as are used in the ED.

Some physicians or administrators may believe that rapid AMI rule-out of hospitalized patients may not be as important as rapid evaluation and disposition of ED patients. Nevertheless, the NACB Committee felt that the same protocol used in the ED is appropriate for routine AMI diagnosis because new therapies for acute coronary syndromes are available, and, when appropriate, should be delivered rapidly.[2] The use of a rapid AMI rule-out protocol will simplify the steps needed from the laboratory's perspective and provide clinicians optimum diagnostic measures for all patients.

Recommendation 4: For routine clinical practice, blood collections should be referenced relative to the time of presentation to the ED and (when available) the reported time of chest pain onset.

Strength/consensus of recommendation: Class Ib.

Although the time of onset of chest pain for AMI patients is sometimes known, this information is less available or reliable for those with unstable angina and other cardiac diseases. It is common for these patients to report multiple episodes of chest pain over the hours and days before ED presentation. Intermittent closure and spontaneous reperfusion of coronary arteries with ruptured atherosclerotic plaques reflect the dynamic nature of acute coronary syndromes. In the elderly or in patients with insulin-dependent diabetes mellitus type I, there may be altered thresholds or a blunted response to pain. Indeed, there are many patients with acute coronary syndromes who experience silent ischemia and infarction (i.e., no pain during occlusive episodes).[10]

Many reviewers felt it important to also note the time of onset of chest pain, especially when there is a history of a single chest pain event (and not several events over many days), and when the time of onset as reported by the patient or family is deemed to be reliable. It may also provide an explanation as to why some clinical studies fail to document a consistent rise in the concentration of the marker, e.g., at 6 h, whereas other studies indicate that the markers were increased at this time point in all patients (e.g., when the majority of enrolled patients in the study present beyond 6 h of chest pain).

NACB Recommendations – Cost-effectiveness

I. Overview

A. Description

Biomarker testing cannot be justified if the laboratory or hospital cannot receive reasonable reimbursement for the service.

II. Recommendations

Recommendation 1: The multidisciplinary team must include personnel knowledgeable about local reimbursement. Vendors should work with customers to help optimize cost-effective provision of biomarker testing.

Strength/consensus of recommendation: Class Ib.

An important issue that must be resolved at each institution is reimbursement for testing. For example, the Health Care Finance Administration announced that "it is not necessary to use troponin in addition to creatine kinase (CPT codes 82550-82554) (which includes the MB isoenzyme) in the management of patients with myocardial infarctions", suggesting that reimbursement will not be given when both tests are ordered.[11] Private insurance companies may also limit reimbursements for cardiac markers. Although the Guidelines recommend the use of troponin as the new standard for myocardial injury, the NACB Committee recognizes that it is unrealistic for a hospital or medical center to completely change over to cardiac troponin without a "transition period", during which both CK-MB and cardiac troponin assays are offered. The length of the transition period could be 3–6 months, depending on the acceptance and understanding of the use cardiac troponin results by the medical staff and the degree of continuing education available. After the trial period, the data should be reviewed and a decision made as to whether to *(a)* continue the trial period, *(b)* keep CK-MB, *(c)* replace it with one of the cardiac troponins, or *(d)* make routine use of both CK-MB and cardiac troponin.

NACB Recommendations - Use of Cardiac Markers in Point-of-Care Testing

I. Overview

A. Definition of Terms

POC = point-of-care
POCT = point-of-care testing. POCT is testing at or near the site of patient care.
TAT = turnaround time
LOS = length of stay

B. Description

AMI patients with ST-segment elevations on the ECG can be effectively treated with thrombolytic therapy, particularly if therapy is initiated within 12 h after the onset of chest pain. Delays in implementation will reduce the success of this treatment. As such, the National Heart Attack Alert Program has made a recommendation to physicians to treat all AMI patients within 60 min of their arrival in the ED.[12] Results for serum cardiac markers are not needed in making this therapeutic decision.

However, rapid testing and reporting of cardiac marker concentrations may produce other benefits for cardiac patients. Identification of the high-risk patient by rapid troponin testing has been suggested to improve outcome in those patients eligible for advanced therapies.[2,13] It is presumed that providing stat testing will lead to more time-efficient disposition decisions.

The factors that affect TATs include the delay in the delivery of the sample to the laboratory, the preanalytical steps necessary to prepare the sample, the analysis time itself, and the effort it takes to deliver results to the ordering physician. The NACB Committee understands that the time taken for the delivery of samples to the laboratory is not always under the control of the laboratory. Nevertheless, laboratory personnel should work closely with hospital administrators and nursing staffs to minimize delays. TATs can be improved with the implementation of pneumatic tubes that deliver samples directly and rapidly to the central laboratory. The use of satellite laboratories is another mechanism to reduce delivery and, therefore, reporting turnaround times.

II. Recommendations

Recommendation 1: The laboratory should perform cardiac marker testing with a turnaround time (TAT) of 1 hour, optimally 30 minutes, or less. The TAT is defined as the time from blood collection to the reporting of results.

Strength/consensus of recommendation: IIb

It is unlikely that a laboratory will be able to consistently (>90%) deliver stat cardiac marker results in <30 min, using laboratory-based serum or plasma assays. Results of stat cardiac marker testing will not be used to determine the need for thrombolytic therapy. Moreover, rule-out of AMI from the ED does require results of serial sampling, which further diminishes the need for a very rapid TAT on any single sample.

Recommendation 2: Institutions that cannot consistently deliver cardiac marker turnaround times of approximately 1 hour should implement point-of-care (POC) testing devices.

Strength/consensus of recommendation: IIb

Some laboratories do not have automated immunoassay analyzers, rapid tube delivery systems, or staffing to deliver results within 1 h on a continuous basis. It has been suggested laboratory based TATs for myocardial injury do not meet the expectations of either laboratory personnel or emergency physicians.[4]

Qualitative as well as quantitative POC testing devices are now available for myoglobin, CK-MB, cTnT, and cTnI,[14-21] many in multimarker formats. These assays make use of anticoagulated whole blood, and have analyzer times of <20

minutes. Eliminating the need to deliver samples to the central laboratory and centrifugation enables TATs of <30 min. Results obtained with POC cardiac marker testing, compared with central laboratories, have universally suggested significant decreases in TAT.[4,22-26]

Although outcome studies have shown that stat testing and reporting of results for cardiac markers, as well as b-type natriuretic peptide, reduces hospital length of stay and laboratory costs for cardiac patients,[27-29] there are no outcome studies to validate the specific need for a 1 hour TAT.

However, earlier treatment of high-risk ACS with GP IIb/IIIa inhibitors improves outcome,[13] as well as early intervention with PCI.[30] With the development of new therapeutic strategies for unstable angina and non-Q-wave AMI,[2] the NACB Committee anticipates that early detection of any myocardial injury will also be beneficial in the management of these patients. For those patients who are ruled out for acute coronary syndromes, it is expected that fast TATs for laboratory data will lead to faster patient discharges and a reduction in overall hospital costs. The NACB Committee encourages prospective outcome studies to examine the putative advantage of reporting TATs within 1 h.

In addition, it is not clear what impact POC cardiac marker testing might have on patient satisfaction, a notoriously multifactorial issue.[31] However, a shorter LOS in the ED clearly improves patient satisfaction. Whether such satisfaction is a function of POC testing remains to be investigated.

Recommendation 3: Performance characteristics should not be different between central laboratory and POC platforms.

Strength/consensus of recommendation: IIb

Recommendation 4: Laboratory personnel must be involved in the selection of devices, the training of individuals to perform the analysis, the maintenance of POC equipment, the verification of the proficiency of operators on a regular basis, and the compliance of documentation with requirements by regulatory agencies.

Strength/consensus of recommendation: Class Ib

Recommendation 5: While it is recognized that qualitative systems do provide useful information, it is recommended that POC systems provide quantitative results.

Strength/consensus of recommendation: Class IIa

POC devices are designed for testing to be performed at or near the bedside by primary caregivers. However, the responsibility for such testing must reside with the laboratory; involvement must include selection of POC devices, education, training, maintenance, and quality assurance.[32] The success of POC testing programs will depend on cooperation and the acknowledgment of the laboratory's responsibility by hospital administrations, nursing staffs, and the appropriate units within the hospital.

When the laboratory staff recognizes a situation of noncompliance, they should have the authority to remove POC testing devices and suspend testing from the area of the hospital where the testing was conducted until the deficiencies have been satisfactorily corrected.

NACB: Recommendations – What are the rules?

New markers will continue to be developed and examined for patients with acute coronary syndromes. When a marker such as cardiac troponin demonstrates major advantages over existing markers, there is an urgency of manufacturers to develop and market commercial assays. In the specific cases of CK-MB mass and cTnI assays, there were no cooperative attempts to develop reference materials or to standardize results.

The NACB Committee acknowledges that the exclusive release of new markers may be in the manufacturer's best interests in terms of profitability, and therefore, they may be reluctant to share ideas and needs with their colleagues. Nevertheless, the implementation of new tests is more easily integrated into the laboratory when these markers are available on a wide spectrum of analyzers, and it is in the best interests of the medical community and the in vitro diagnostic industry that assays correlate to one another.

Recommendation 1: Early in the process, manufacturers should seek assistance and provide support to professional organizations such as the AACC or IFCC to develop committees for the standardization of new analytes. These organizations will determine the need for analyte standardization based on the potential clinical importance of the marker and gather the necessary scientific expertise for the formation of a standardization committee.

Strength/consensus of recommendation: Class Ib.

Assays for cardiac markers for early diagnosis, rule-out, triaging of patients from the ED, or for determination of successful reperfusion require markers that have a short assay TAT. Irrespective of how the testing is performed (i.e., laboratory-based or POC testing), assays must meet minimum precision requirements. Imprecise assays at or near cutoff concentrations will adversely affect the clinical performance of the test.

The NACB Committee understands the importance of establishing objective analytical goals for assays for new cardiac markers. This will assist manufacturers in the construction of new assays.

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