

The Chest Pain Unit: Doing it Right or Overdoing it?

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Acute chest pain is a common presenting symptom in the emergency department. It encompasses several life-threatening diagnoses and accounts for a substantial portion of hospitalizations. The most common serious diagnosis to confirm or exclude is coronary artery disease, which in the context of acute chest pain manifests as an acute coronary syndrome.

The initial assessment of patients with suspected ACS includes history and physical examination, ECG and cardiac biomarkers. Despite its established value, this approach is limited since up to 20% of patients with ACS have atypical chest pain and/or a non-diagnostic electrocardiogram, and cardiac biomarkers may be negative, at least on presentation. This group of patients offers the greatest diagnostic challenge – namely, the wish to avoid unnecessary hospitalizations on the one hand and inappropriate discharge of patients with active myocardial ischemia on the other. The need for a definitive and rapid evaluation of patients with indeterminate acute chest pain has led to the concept of chest pain units.

In short, chest pain units are designated to indicate or to rule out acute myocardial ischemia by using several protocols and non-invasive modalities.

CPU protocols are constructed with the aim to reach a decision within a limited time, which is usually 6–12 hours but may extend up to 24 hours. At first, the patient undergoes an observation period with continuous ST monitoring, serial cardiac biomarkers and ECGs. Patients with recurrent chest pain suggestive of ACS, positive biomarkers or significant ECG changes are admitted for further evaluation while others, the majority, are referred for functional cardiac testing (e.g., a perfusion or an echo stress test) or non-invasive coronary imaging (multidetector computed tomography). A positive result on any of those studies generally mandates hospitalization.

Since the late 1990s, accumulating data from multiple studies showed CPUs to be a safe and cost-effective alternative to routine hospitalization in order to rule out ACS [1-3]. In this issue of *IMAJ*, Beigel et al. [4] present the first large-scale CPU experience in Israel. They report on 1055 consecutive patients who presented to the ED with chest pain and were evaluated in the CPU. Implementing current ACC/AHA guidelines (American College of Cardiology/American Heart Association), patients were observed for approximately 12 hours with continuous ECG monitoring and repeated cardiac biomarkers. A decision for further non-invasive cardiac testing was undertaken in 90% of patients, utilizing mostly myocardial perfusion scintigraphy or MDCT. Over 90% of those tested did not have significant coronary artery disease on MDCT or significant ischemia on MPS and most were discharged. Fewer than 10% of patients who underwent MPS or

MDCT had findings suggestive of significant CAD; most of them underwent coronary angiography, which confirmed significant CAD in approximately 60% of cases. Readmission rates due to ischemic chest pain were infrequent. The authors conclude that "Utilization of the CPU enabled patients to receive a rapid, thorough, and complete evaluation for their primary complaint, thus saving precious hospitalization costs and occupancy on one hand and avoiding misdiagnosis in discharged patients on the other."

Non-invasive imaging has been shown to be a very useful tool to improve triage in this group of patients. According to Goldstein and colleagues [5], MDCT can definitively establish or exclude coronary disease as the cause of chest pain. In their trial that compared MDCT with standard diagnostic evaluation of low risk acute chest pain patients, MDCT evaluation reduced diagnostic time and lowered costs. In addition, MDCT patients required fewer repeat evaluations for recurrent chest pain. Rubinshtein et al. [6] referred 58 intermediate risk patients with possible ACS to 64-slice MDCT in the ED. A definitive diagnosis of ACS was made in 20 of 23 MDCT-positive patients. Among 35 patients who were MDCT negative and discharged from the ED, no deaths or myocardial infarctions occurred during follow-up. Conti and co-authors [7] used MPS to study 231 consecutive patients with a recent-onset (< 24 hours) first episode of chest pain and at low risk for ACS. They found that exercise MPS was an efficient screening test with high negative predictive value (99%) in low risk patients.

ACS = acute coronary syndrome

CPU = chest pain unit

MDCT = multidetector computed tomography

MPS = myocardial perfusion scintigraphy

CAD = coronary artery disease

Recently published ACC/AHA appropriateness criteria for cardiac radionuclide imaging define the use of RNI in low risk patients with possible ACS as highly appropriate [8]. The relative merits of MDCT and MPS in this context deserve further study. Berman et al. [9] suggest combining anatomic (MDCT) and functional (MPS) assessment in non-diagnostic cases to enhance diagnostic accuracy.

Beigel and coworkers definitely deserve to be congratulated for their pioneering effort to create an Israeli CPU and collect the data prospectively. Their excellent results are in keeping with those reported in the literature. An important limitation of this report, however, is that 86 patients were lost to follow-up and for whom only vital status was available. We do not know how many of these patients had recurrent symptoms or admissions. We also are not given the number of patients seen in the ED for chest pain during the study period and cannot assess what proportion of patients were admitted to the CPU and how they differed from those admitted.

More importantly, however, are two major questions arising from the present study that must be answered *in Israel* in order to assess the applicability of the CPU to this country. First, did the introduction of the CPU improve patient outcome? In the absence of a control group this question cannot be answered. It is intuitively clear that patients presenting with chest pain will be more satisfied

if they undergo evaluation in a small, dedicated unit according to a protocol that includes rapid sophisticated testing, rather than in a busy department of medicine. But do patients evaluated by the CPU fare better than those triaged traditionally? This remains to be proven in the Israeli setting. Second, the strongest drive in the evolution of the CPU concept in the United States was the desire for cost containment. Most patients evaluated by Beigel and co-researchers had an expensive evaluation, including coronary CT or a perfusion study. Was this effort cost saving or wasteful as compared to traditional management? Again, answers obtained in the U.S. are hardly relevant to the Israeli health system. If it was not cost saving – was it at least cost effective? Can we employ the expensive tests used in this study more selectively, possibly with a higher utilization of the much cheaper ECG stress test when appropriate? How many of the patients admitted by the authors to the CPU and eventually found to have non-cardiac symptoms would have otherwise been discharged from the ED with the same conclusion but without the expensive workup?

In conclusion, the CPU facilitates a "fast track" for evaluating low risk patients for ACS. By demonstrating their CPU experience and capabilities, Beigel et al. consolidate our knowledge of CPUs and highlight the importance and necessity of such units. However, critical questions need to be answered in the Israeli setting before other centers can make an informed decision as to whether this concept should be adopted.

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ACC/AHA = American College of Cardiology/
American Heart Association
RNI = radionuclide imaging

“The human mind is inspired enough when it comes to inventing horrors; it is when it tries to invent a heaven that it shows itself cloddish”

Evelyn Waugh (1903-1966), English novelist, whose works depict British aristocracy and high society, which he satirizes but to which he was also strongly attracted

“Only by going alone in silence, without baggage, can one truly get into the heart of the wilderness. All other travel is mere dust and hotels and baggage and chatter”

John Muir (1838-1914), Scottish born American naturalist, explorer and writer