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Research Article

ADHERENCE TO ACC/AHA GUIDELINES ON PRE-OPERATIVE ASSESSMENT OF CARDIAC PATIENTS FOR NON-CARDIAC SURGERY: AN AUDIT OF 100 CONSECUTIVE CASES

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ABSTRACT

Background and Aims: American College of Cardiology (ACC) and American Heart Association (AHA) have issued revised guidelines in 2007 for pre operative assessment of cardiac patients before non-cardiac surgery. We studied the pattern of practice for assessment of cardiac patients for non-cardiac surgery at our centre to find gap in existing practice from the ACC/AHA 2007 peri-operative guidelines.

Methods: We evaluated 100 consecutive case records of patients undergoing non-cardiac surgery referred to department of Medicine for preoperative assessment of cardiac problem. We analyzed clinical notes of anaesthesiologists and physicians to identify pattern of practice and analyze if the surgical team proceeded for surgery or physician requested further investigations like ECG, Echocardiography or TMT (Tread Mill Test) before proceeding to surgery.

Results: We observed that emergency surgeries, active cardiac conditions and major cardiac risk factors were identified in all patients (100%) as per guidelines. All surgeries (100%) were not categorised according to risk. ECG was not necessary but advised in 13(13%) out of 100 patients and echocardiography was advised in 49 patients, out of which 40(81.6%) were not necessary. From the kappa statistic calculation, there was poor agreement between the guidelines and actual practice of advising Echocardiography (kappa value = 0.167).

Conclusion: We found that there is significant gap in actual clinical practice and the recommendations of ACC/AHA 2007 guidelines on preoperative assessment of cardiac patients for non-cardiac surgery at our institute. We recommend development and application of guidelines on preoperative assessment of cardiac patients for non-cardiac surgery appropriate for our setting.

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INTRODUCTION

A common clinical problem for physicians is to evaluate cardiac patients before non-cardiac surgery. Most non cardiac surgical procedures are performed for patients of advanced age and same patients have an increased prevalence of cardio vascular disease, which is the primary cause of peri-operative morbidity and mortality associated with non-cardiac surgery.

The risk of peri-operative complications depends on the condition of the patients prior to surgery, the prevalence of co-morbidities, and the magnitude and duration of the surgical procedures. Cardiac complications can arise in patients with documented or asymptomatic ischemic heart disease (IHD), left ventricular dysfunction, and valvular heart disease who undergo procedures that are associated with prolonged hemodynamic and cardiac stress.¹

Cardiovascular complications that may arise, following non-cardiac surgery, include perioperative myocardial infarction

(MI), congestive heart failure (CHF), cardiac death, unstable cardiac rhythms and strokes.

American College of Cardiology (ACC) and American Heart Association (AHA) have issued revised guidelines in 2007 for pre operative assessment of cardiac patients before non-cardiac surgery.² In India, professional associations like Association of Physician of India (API) and Indian Society of Anaesthesiologists (ISA) have not issued guidelines for the same. In absence of clear guidelines, physicians may use varied approach to pre-operative assessment and patients may undergo inappropriate investigations.

Therefore we studied the pattern of practice for assessment of cardiac patients for non-cardiac surgery at our hospital to find gap in existing practice from the ACC/AHA 2007 perioperative guidelines.

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MATERIALS AND METHODOLOGY

This study was approved by Human Research Ethics Committee of H. M. Patel Centre for Medical Care & Education. Study design was Retrospective Non-experimental.

Inclusion Criteria: All adult patients (Age more than 18 years) undergoing pre-operative assessment prior to non-cardiac surgery, with history of any one or combination of the cardiac problems such as hypertension, ischemic heart disease, valvular heart disease, cardiomyopathy, congestive heart failure, arrhythmias and patients referred for screening of ischemic heart disease. There were no exclusion criteria.

Participant recruitment procedure: We evaluated 100 consecutive case records of patients undergoing non-cardiac surgery referred to Department of Medicine for preoperative assessment of cardiac problem. The clinical notes of anesthesiologists and physicians were analyzed to identify pattern of practice with emphasis on past medical history, active cardiac conditions, risk of surgery, functional capacity, cardiac risk factors and investigations advised to patients like ECG, ECHO or TMT.

Records were reviewed for the following practices

Active cardiac conditions of patients identified or not	Unstable or severe angina, recent myocardial infarction, Decompensated Heart Failure, Significant Arrhythmia, Severe Valvular Disease
Functional capacity of the patients assessed on the basis of metabolic equivalent (MET) or not	If the patient can walk 4 blocks without stopping or climbs a flight of stairs without stopping, his MET will be 4 ^{2,4}
Cardiac risk of the patients stratified or not	Major cardiac risk factors ² : Ischemic heart disease, cerebrovascular accident, compensated or prior congestive heart failure, renal insufficiency, diabetes mellitus. Minor cardiac risk factors: Advanced age (more than 75), abnormal electrocardiogram, heart rhythm other than sinus rhythm, uncontrolled hypertension Emergency surgery done promptly to save life, limb or functional capacity. ⁵ High risk surgery ⁶ such as Aortic and other major vascular surgery, peripheral vascular surgery, Emergent major operation, particularly in elderly, anticipated prolong surgical procedures, associated with large fluid shift and or blood loss
surgeries categorized as follow or not	Intermediate risk surgery such as intra peritoneal and intra thoracic surgery, carotid end arterectomy, head and neck surgery, orthopaedic surgery, prostate surgery Low risk surgery such as endoscopic procedure, superficial procedure, cataract surgery, breast surgery, ambulatory surgery

We then analyzed if the surgical team proceeded for surgery or physician requested further investigations like ECG, ECHO or TMT before proceeding to surgery. We analyzed above mentioned observations to calculate frequency of deviations from the ACA/AHA 2007 guidelines² (which is mentioned as an algorithm in figure no.1).

RESULTS

On review of 100 consecutive case records of patients undergoing non-cardiac surgery following observations were noted.

Table 1 Patient Characteristics

AGE/SEX	LESS THEN 75	MORE THEN 75	TOTAL
MALE	50	6	56
FEMALE	39	5	44
TOTAL	89	11	100

Age more then 75 is a minor cardiac risk factor for surgery. The frequency of cardiac conditions for which patients were referred to physicians for cardiac evaluation before proceeding to surgery were following out of 100: hypertension 66(66%),

ECG changes without overt cardiac condition 19(19%), Ischemic heart disease 12(12%), Valvular heart disease 2(2%), Congestive cardiac failure 2(2%), Arrhythmia 1(1%).

Out of 100 surgeries, there were 4 emergency surgeries. The surgical teams proceeded for surgeries immediately after initial focused clinical and laboratory assessment by anesthetist in all four cases (100%).

Out of 100 patients, only two patients had active cardiac conditions in form of significant arrhythmias. Surgical team deferred surgeries in both of these two patients until ventricular rate was controlled with medications (100%).

Out of 100 surgeries, 9 were high risk surgeries, 73 were intermediate risk surgeries and 18 were low risk surgeries. Anaesthesiologists at our hospital follow the tradition of categorizing surgeries as per ASA grading. Neither of 100 surgeries were categorised as per risk stratification (0%). We analyzed records to categorize surgeries into high, intermediate or low risk. Out of 100 patients, 19 patients (19%) had good functional capacity, 63 patients (63%) had average functional capacity, while 18 patients (18%) had poor functional capacity.

Anaesthesiologists had evaluated and documented functional capacity in all 100 patients (100%).

Frequency of major cardiac risk factors were as follows among all patients: Ischemic Heart Disease (12%), Cerebro-Vascular Accident (8%), Congestive Cardiac Failure (2%), Diabetes Mellitus (28%), Renal Insufficiency (3%). Major cardiac risk factors come into play in decisions to proceed for surgery only in patients with poor functional capacity. There were total 53 major cardiac risk factors among all patients and they were identified in all patients properly (100%).

Frequency of minor cardiac risk factors were as follows among all patients: Advanced Age- more than 75 (11%), ECG Changes (44%), Arrhythmias (2%), Hypertension (74%). Presence of Minor cardiac risk factors does not come into play in consideration for decision of proceeding to surgery. There were total 144 minor cardiac risk factors among all patients and they were identified in all patients properly (100%).

Out of 100 case records analyzed, we observed that anaesthesiologists had advised ECG in all patients (100%) before proceeding to surgery. ECG was not required in 13 patients (13%) as these patients were asymptomatic and they were to undergo low risk surgery.

Table 2 Request for Echo and Its Appropriateness

ECHO		Echo actually needed		Total
		YES	NO	
Echo advised	YES	9	40	49
	NO	1	50	51
TOTAL		10	90	100

Physicians advised echocardiography in 40 patients (81.63%) although was not necessary. ($\kappa = 0.167$). These patients were either posted for low risk surgery or they had good to average functional capacity or they had poor functional capacity with no major cardiac risk factor and as per the guideline these patient should be proceeded for surgery. We also observed that in one patient echocardiography was necessary, but it was not advised by physician. This patient was posted for intermediate risk surgery on background of poor functional capacity with one major cardiac risk factor.

Physicians did not advised TMT in any of the 100 patients and none of patients had any recommended indications for TMT (100% appropriate).

DISCUSSION

Combined Task Force on Practice Guidelines of the ACC/AHA reviewed and synthesized literature regarding preoperative cardiovascular screening and testing.³ The ACC in association with the AHA has published evidence-based guidelines for peri-operative cardiac evaluation. The guidelines were first published in 1996 and revised in 2002 and 2007. These guidelines have been endorsed by the American Society of Anaesthesiologists and adopted by the Agency for Healthcare Research and Quality. The 2007 ACC/AHA guidelines stated that relatively few patients benefit from advanced preoperative testing. However, implementation of these guidelines has been unsatisfactory. There are no Indian guidelines on preoperative cardiac evaluation for non-cardiac surgery.

The core of the ACC/AHA guidelines is an algorithm that summarizes the stepwise process leading to practical recommendations as performing noninvasive cardiac testing.

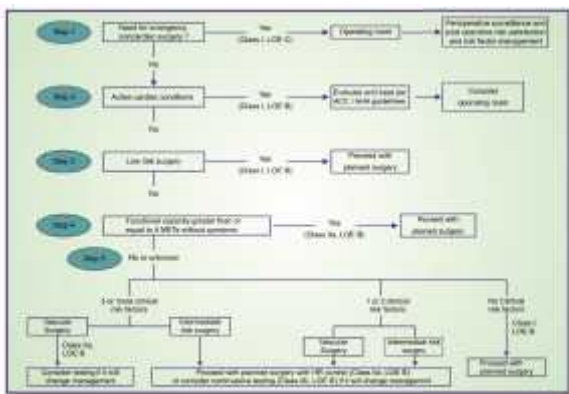


Figure 1 Algorithm for Pre-operative evaluation of cardiac patients for non-cardiac surgery as per ACC/AHA guidelines²

Although it is well known that cardiac complications are more likely to occur with emergency surgical procedures, a comprehensive cardiac evaluation is not possible.⁶ The surgical team has to weigh the risk of delaying surgery in such situations. The presence of active cardiac conditions usually mandates intensive management and may result in delay or cancellation of surgery until the cardiac problem has been clarified and treated appropriately. Procedures with different level of stress are associated with different levels of morbidity and mortality. Superficial and ophthalmologic procedures represent the lowest risk and are rarely associated with excess morbidity and mortality. Major vascular surgery represents the highest risk procedures and preoperative interventions should be considered before these surgeries. With intermediate risk surgery, morbidity and mortality vary depending on the surgery location and extent of procedures.

In highly functional asymptomatic patients, management will rarely be changed based on the results of any further cardiovascular testing. Peri-operative myocardial ischemia and cardiovascular events are more common in patients with poor exercise tolerance. Major cardiac risk factors come into play in decisions to proceed for surgery only in patients with poor functional capacity. If patients have no clinical risk factors, it is appropriate to proceed with the planned surgery. If the patients have 1 or 2 cardiac risk factors, it is reasonable to either proceed with surgery with heart rate control with beta blockade or consider testing if it will change management. In patients with 3 or more cardiac risk factors, testing should be considered if it will change the management.

The 12 lead ECG contains important prognostic information related to long term mortality and morbidity in patients with established coronary disease. However, resting 12-lead ECG does not identify increased peri-operative risk in patients undergoing low risk surgery.

Patients who are posted for low risk surgery, who had good to average functional capacity or patients with poor functional capacity with no major cardiac risk factor did not require echocardiography before proceeding to surgery. We could have avoided echocardiography in around 80 percent patients in our setup if physicians would have follow the guidelines. This observation suggests unwarranted use of resources during preoperative assessment in our setting and underscores the potential of preventing the same by implementing appropriate guidelines. There is a positive relation between decreased preoperative ejection fraction and post operative mortality and morbidity. However, a resting LV function is not found to be a consistent predictor of peri-operative ischemic events.

Patients with active cardiac conditions in whom non cardiac surgery is planned should be evaluated and undergo non-invasive stress testing. Non-invasive stress testing of patients with 3 or more cardiac risk factors and poor functional capacity is reasonable if it will change management.

Cinello M *et al*, evaluated the impact of strict application of ACC/AHA guidelines 2002 for cardiac risk assessment of patients undergoing elective non-cardiac vascular surgery in a consultant anaesthesiologist led preoperative clinic. They found that guidelines implementation reduced preoperative non-invasive diagnostic testing by 11% (P=0.01) and preserved a low rate of peri-operative cardiac complications.⁷ **Almanaseer**

Y *et al*, evaluated the impact of ACC/AHA 2002 guidelines implementation for cardiac risk assessment in a general internal medicine preoperative clinic. They found that guidelines implementation led to a reduction in exercise stress testing ($p < 0.001$) and preoperative test appropriateness improved ($p < 0.001$).⁸ Hoeks S E conducted a survey to determine adherence to the ACC/AHA guidelines 2002 on peri-operative care in daily clinical practice. This survey showed poor agreement between ACC/AHA guideline recommendations and daily clinical practice.⁹ Vigoda M M *et al*, estimated the percentage of residents in USA who correctly applied suggested testing algorithms from the ACC/AHA 2007 guidelines when they evaluated simulated patients in common clinical scenarios. They found that fewer than half of anaesthesiology residents nationwide correctly demonstrated the approach considered the standard of care for preoperative cardiac evaluation.¹⁰

Given the striking practice variation and high costs associated with many evaluation strategies, the development of practice guidelines based on currently available knowledge can serve to provide more efficient approaches to peri-operative evaluation. As we already know that we have very limited resources available with us in developing countries. So if we can make guidelines for low resource situation that can further help in reducing the cost and that can reduce further burden on patients and can give more uniformity in pattern of practice.

In view of our findings, we recommend that professional bodies of anaesthesiologists and physicians in India should develop and implement guidelines for preoperative assessment of cardiac patients for non-cardiac surgery. We also recommend educational programs for practitioners and audit of implementation of guidelines.

CONCLUSION

In conclusion, we found that there is gap in clinical practice and the recommendations of ACC/AHA 2007 guidelines on preoperative assessment of cardiac patients for non-cardiac surgery at our hospital. We found that lack of application of guidelines has resulted in unnecessary preoperative diagnostic testing before proceeding to surgery. We recommend development and application of guidelines on preoperative assessment of cardiac patients for non-cardiac surgery appropriate for our setting.

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