

Pre-Operative Cardiac assessment and echocardiogram guideline

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Key Amendment

Date	Amendment	Approved by
21 st January 2019	Inclusion of advice for edoxaban. Additional information for the management of medicines for diabetes	Medicines Safety Committee
25 th June 2020	Document extended for 6 months during COVID-19 period.	QGC
4 th January 2021	Pre-operative assessment Key Documents approved for 3 years	Pre-op Directorate Governance Meeting
27 th December 2023	Extended document for 6 months whilst under review. Updated owner details.	Dr Harsha Mistry
12 th November 2024	Document extended for 12 months whilst awaiting National Guidelines to inform if changes are required	Dr Harsha Mistry

Introduction & Purpose

Introduction

Cardiac complications can occur in patients with documented or asymptomatic ischaemic heart disease, left ventricular dysfunction and valvular heart disease who undergo procedures associated with prolonged haemodynamic and cardiac stress. Major non-cardiac surgery is associated with an incidence of cardiac death of 0.5-1.5%, and of major cardiac complications of 2-3.5%. Clearly with an aging population and a high prevalence of cardiovascular disease we are treating increasing numbers of patients at higher risk of cardiac complications.

Pre-operative transthoracic echocardiogram is performed to assess valvular abnormalities and ventricular function. The information gained combined with clinical assessment of patients can be useful in order to:

1. Risk stratify and alter intra-operative management and post-operative care provision
2. Plan appropriate location/site for surgery
3. Allow informed discussion and counselling of risk with the patient
4. Predict peri-operative complications

Purpose

The purpose of the guideline is to outline the indications for routine pre-operative transthoracic echocardiogram request within this trust. They are based on guidelines published by British Society of Echocardiography, European Society of Cardiology and American College of Cardiology/American Heart Association. The guideline is applicable for elective adult patients.

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Pre-operative investigations should only be done if they are going to add information leading to an alteration in the patient's management. Unnecessary requests lead to delays in surgery, inconvenience to patients and a waste of valuable resources.

Functional Capacity Assessment

Determination of functional capacity is pivotal in pre-operative cardiac risk assessment. It is measured in metabolic equivalents (METs) with one MET equalling basal metabolic rate. Exercise testing provides an objective measure but an accurate estimation can be made from the ability to perform activities of daily living. The importance of good history taking is vital in making this assessment. Table 1 illustrates requirements for various activities. The inability to climb two flights of stairs or run a short distance (<4 METs) indicates poor functional capacity and is associated with an increased incidence of post-operative cardiac events. Poor functional capacity not explained by musculoskeletal problems (i.e. Hip/knee pain) in patients undergoing intermediate to high risk surgery should prompt consideration of referral to the anaesthetic risk management clinic.



1 MET	Breathing?	4 METs	Climb 2 flights of stairs?
	Eat, dress and use toilet?		Walk up a hill?
	Walk around the house?		Run short distance?
	Walk on the flat slowly?		Heavy work around the house?
4 METs	Light housework?	>10 METs	Golf, bowling, doubles tennis?
			Swimming, singles tennis, skiing?

Table 1. Modified from ACC/AHA 2007 Perioperative Guideline

Risk Stratification

Cardiac complications after non-cardiac surgery depend not only on patient factors, but also surgical factors and circumstances of surgery. Urgency, magnitude, type and duration of procedure all influence cardiac risk. Every operation elicits a stress response but the magnitude of this is proportionate to the extent and duration of the surgery. With regard to cardiac risk, surgical interventions can be divided into risk groups with associated 30-day cardiac event rates (cardiac death and MI) as shown in table 2.

Low risk < 1%	Intermediate risk 1-5%	High risk >5%
<ul style="list-style-type: none"> Breast Dental Endocrine Eye Gynaecological Reconstructive Ortho-minor (knee surgery) Urological-minor 	<ul style="list-style-type: none"> Abdominal (including major gynaecological) Carotid Peripheral arterial angioplasty Endovasc AAA Head and Neck Ortho-major (hip and spine) Urological-major 	<ul style="list-style-type: none"> Open AAA Peripheral vascular surgery

Table 2. Surgical risk estimate (modified from Boersma et al)

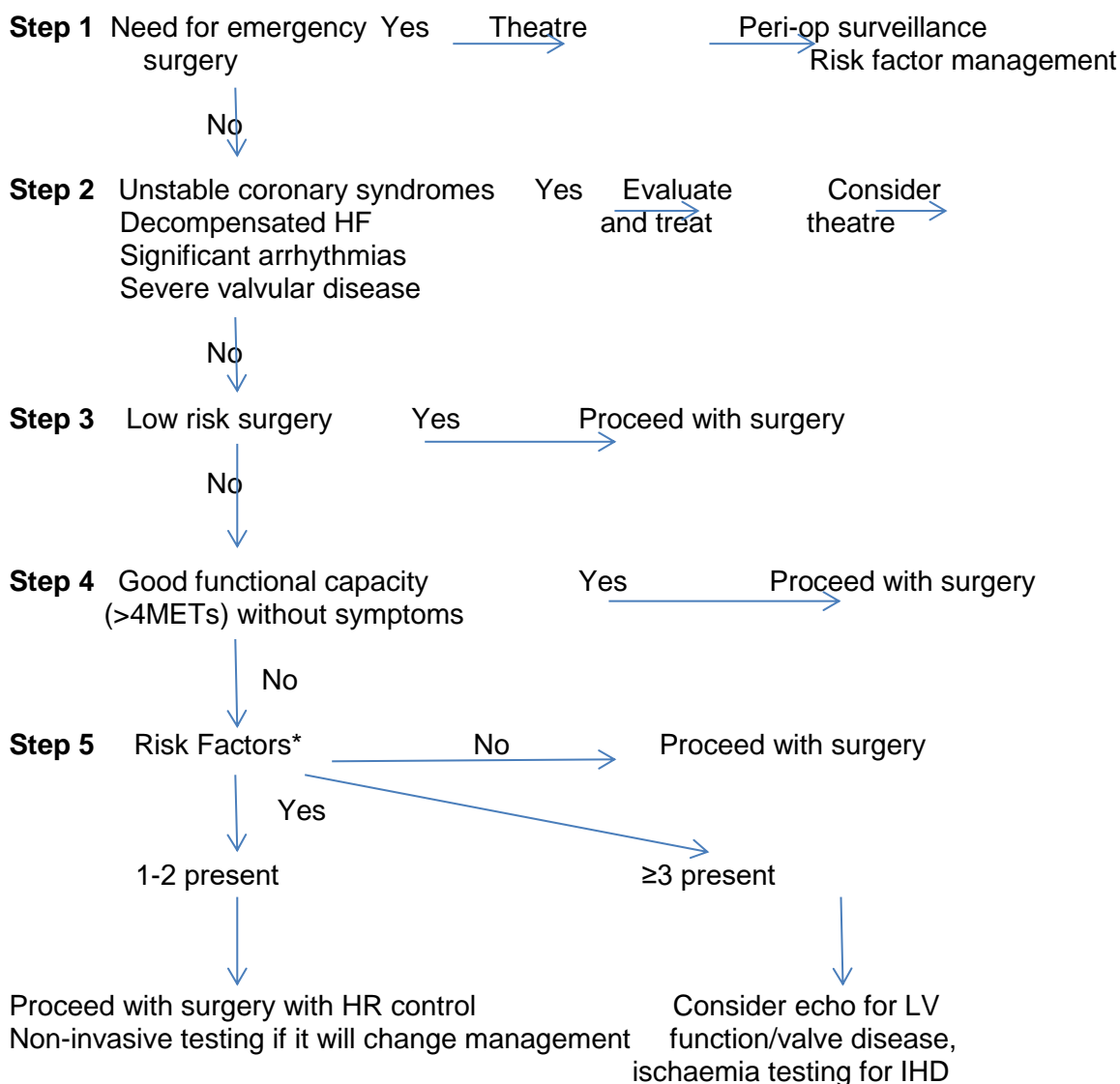
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Laparoscopic procedures cause less tissue damage, less incisional pain and reduced peri-operative fluid shifts. However the pneumoperitoneum results in elevated intra-abdominal pressure and reduced venous return. This results in a reduced cardiac output and increased systemic vascular resistance. Consequently laparoscopic procedures demonstrate a cardiac stress similar to open procedures and patients should be screened accordingly (level 1A evidence).

Biomarkers may now also have a role in prognosticating in high risk patients undergoing major surgery. They may be especially useful in patients where functional assessment is difficult. Brain natriuretic peptide is produced in cardiac myocytes in response to increases in myocardial wall stress. Currently the main evidence is for prognostic value for long term mortality and for cardiac events after non cardiac major vascular surgery. Research is on-going to clarify usefulness in other major surgery. Their use should currently only be considered in conjunction with specialist advice.

Cardiac Evaluation and Care Algorithm

The following algorithm is adapted from the AACC/AHA 2007 Perioperative guideline and applicable to patients aged 50 years or greater.



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*Risk factors: Hx of IHD Hx of CCF Diabetes mellitus	Hx of cerebrovascular disease Renal insufficiency
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Pre-Operative Echocardiography for Elective Surgery Indications

Pre-operatively echocardiography can be used to assess valvular heart disease and ventricular function. It should be remember standard echocardiography will only give a measure of function at rest. Patients undergoing minor procedures have a combined morbidity and mortality of less than 1%, even in high risk patients. Echocardiogram in stable patients will rarely result in change in management. As such echocardiogram is rarely indicated in high risk stable patients undergoing low risk procedures.

The following are indications for echocardiography pre-operatively and can be used in conjunction with the algorithm as a guide. This is not a protocol and there may be occasions where patients in these groups do not require a pre-operative echocardiogram. Likewise there may be circumstances not covered by this guideline where an echocardiogram may be required.

Procedure Specific:

- High risk surgery (AAA)

Ventricular function:

- Dyspnoea of unknown origin where there is a suspicion of cardiac component or known IHD with poor functional capacity
- Known cardiac failure, no echo in the last 2 years
- Known cardiac failure with worsening symptoms

Valvular function:

- Undiagnosed systolic murmur with signs suggestive of aortic stenosis
- Known significant valvular disease, no echo in the last 2 years
- Moderate to severe aortic stenosis, no echo within 1 year
- Known valvular disease with worsening symptoms
- Known valve replacement with worsening symptoms
- Bioprosthetic valve replacement if no echo in the last 5 years