Local Guideline

M

NSW GOVERNMENT Health
Hunter New England
Local Health District

# Referral for Preoperative Cardiopulmonary Exercise Testing

| | |
|---|---|
| **Sites where Local Guideline applies** | |
| **This Local Guideline applies to:** | John Hunter Hospital |
| **1. Adults** | Yes |
| **2. Children up to 16 years** | No |
| **3. Neonates – less than 29 days** | No |
| **Target audience** | Respiratory scientists, anaesthetic doctors, surgeons, perioperative nurses. |
| **Description** | This document provides guidance to nurses and doctors in the perioperative setting when assessing patients before major elective surgery. |

Go to Guideline

| | |
|---|---|
| **Keywords** | CPET, cardiopulmonary exercise testing, anaesthetic, perioperative. |
| **Document registration number** | |
| **Replaces existing document?** | No |

**Related Legislation, Australian Standard, NSW Ministry of Health Policy Directive or Guideline, National Safety and Quality Health Service Standard (NSQHSS) and/or other, HNE Health Document, Professional Guideline, Code of Practice or Ethics:**

- See reference list on page 6.

| | |
|---|---|
| **Prerequisites (if required)** | Patients undergoing major elective surgery should be reviewed by a doctor in the perioperative clinic to determine if they meet the criteria for preoperative cardiopulmonary exercise testing. |
| **Local Guideline note** | This document reflects what is currently regarded as safe and appropriate practice. This guideline does not replace the need for the application of clinical judgment in respect to each individual patient. If staff believe that the guideline should not apply in a particular clinical situation they must seek advice from their unit manager/delegate and document the variance in the patient's health record.<br>Cardiopulmonary Exercise Testing is a specialized and limited resource which is only available at JHH (within HNELHD). As such, this guideline is not suitable for use outside of this setting. |
| **Position responsible for the Local Guideline and authorised by** | JHH Perioperative Service Executive Committee |
| **Contact person** | Dr Paul Healey, Staff Specialist Anaesthetist, Co-Director of Perioperative Service, JHH |
| **Contact details** | Paul.Healey@health.nsw.gov.au |
| **Date authorised** | October 2021 |
| **This document contains advice on therapeutics** | No |
| **Issue date** | December 2021 |
| **Review date** | December 2024 |

Note: Over time links in this document may cease working. Where this occurs please source the document in the PPG Directory at: http://ppg.hne.health.nsw.gov.au/

## PURPOSE AND RISKS

Major surgery can invoke significant physiological stress resulting in increased global oxygen consumption. Prolonged open surgery can more than double oxygen consumption, with complications possibly raising demand further. Patients unable to sustain increased oxygen demand, can develop oxygen debt and 'functional heart failure' where kidneys, lungs and healing may be compromised.

CPET can be useful as an *objective measure* that aims to test how patients cope with raised oxygen demand. It stresses the cardiovascular and respiratory systems, hence is a multisystem examination, able to differentiate a myriad of causes for exercise intolerance.

The patient exercises, on a cycle ergometer or treadmill, and resistance (or work done) is increased through several levels. Expired gases, electrocardiogram, blood pressure and oxygen saturations are all measured and recorded throughout the test.

**The test is most useful for:**

1. **Major Surgery** such as major open intraabdominal surgery (e.g. cystectomy), major open vascular surgery (e.g. abdominal aortic aneurysm surgery), and major intrathoracic surgery (e.g. oesophagectomy)
2. **Unexplained breathlessness** to differentiate cardiac or respiratory causes
3. **Intermediate-risk surgery, for risk stratification**, adding to discussions regarding appropriateness and invasiveness of surgery, and level of postoperative care.

The test is *not* useful for patients having low risk surgery, or if contraindications exist (see Appendix A - Respiratory Investigations Form)

**Risk Category*:*** Clinical Care & Patient Safety

## GLOSSARY

| Acronym or Term | Definition |
|---|---|
| CPET | Cardiopulmonary Exercise Testing |
| MDT | Multidisciplinary Team |

## GUIDELINE

This Guideline does not replace the need for the application of clinical judgment in respect to each individual patient.

**CPET Referral and Review Process:**

**Identify possible CPET candidates**

- By surgeons, oncologists or perioperative clinic doctors
- In the perioperative clinic, potential patients should be discussed with, or identified by, a consultant anaesthetist.
- If doubt remains about the utility of the test, it may be discussed with Dr Healey (Speed Dial 67441) or Dr Eissa (Speed Dial 66695).
- If surgery date needs to be delayed for testing, this MUST be discussion with the surgeon.
- Note, tests are performed every Wednesday.

**Identify possible barriers to CPET**

- Acute, severe, or unstable cardiorespiratory disease – if concerns, discuss with Dr. Eissa, Dr Healey or John Brannan (respiratory scientist, 64472).
- Musculoskeletal dysfunction or pain which may limit cycling ability (e.g. inability to flex the knee >90 degrees). Discuss with John Brannan as treadmill test may be appropriate.

**Refer the patient for CPET**

- Fill out the Respiratory Investigation Referral form (Appendix A)
- Request formal spirometry, TLCO, CPET and Maximal Respiratory Pressures.

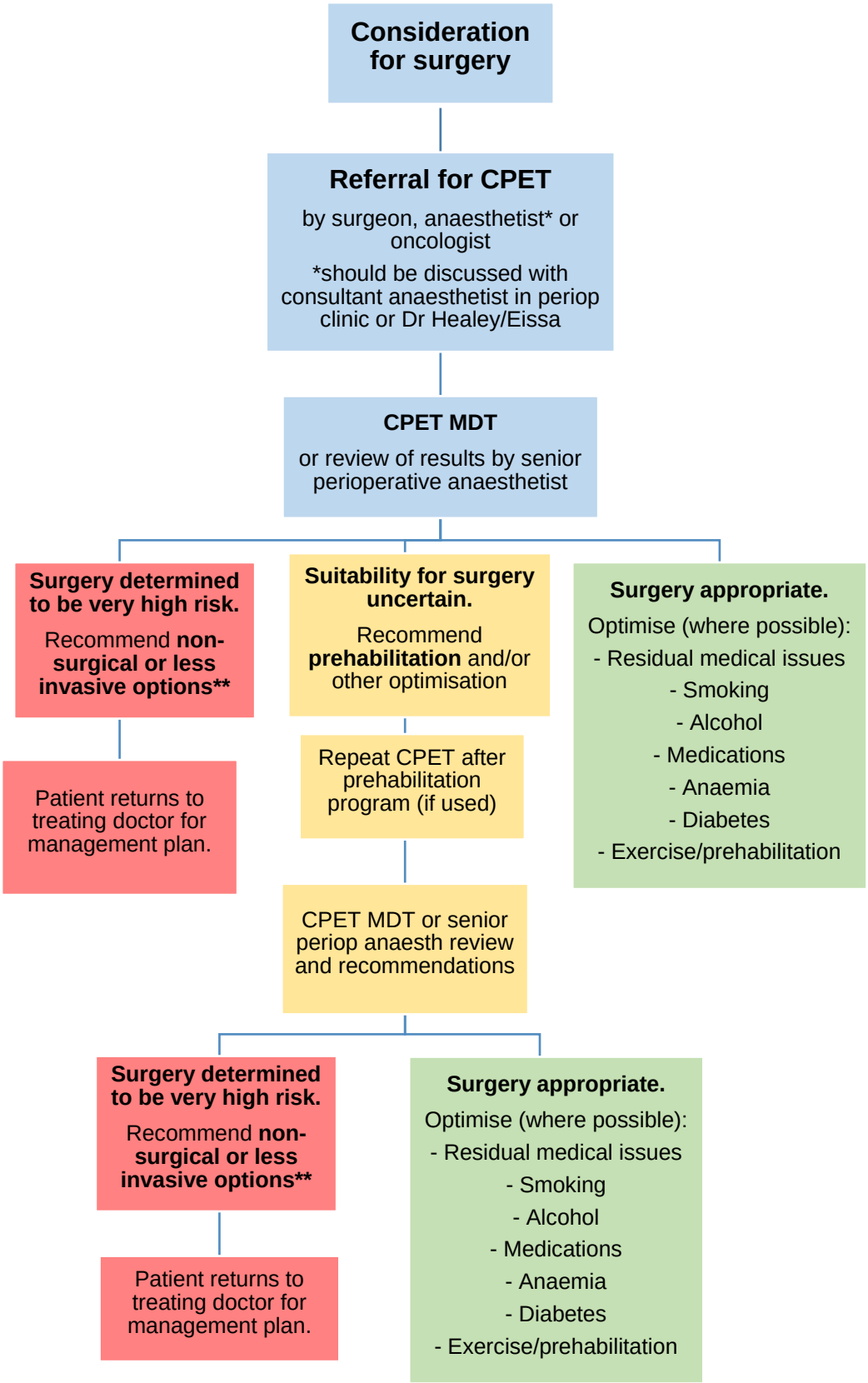
**Perioperative Nursing Role**

- Fax the referral form to the Respiratory CSU 13469 and notify John Brannan, via email john.brannan@health.nsw.gov.au, that a CPET request has been submitted, including patient's name, DOB, surgery type, and surgery date.

**Review CPET results**

- The formal report will be discussed at the fortnightly CPET MDT.
- If this is not possible, e.g. due to time constraints preoperatively, the results should be discussed with a senior perioperative anaesthetist with CPET expertise.
- Results may also be discussed at the weekly Perioperative Interest Group meeting as part of the patient's perioperative planning or as a teaching opportunity.
- Letters summarising the recommendations of the CPET MDT are completed by the Chairperson of the meeting and are sent to the referring surgeon, the patient's GP and other healthcare professionals as deemed appropriate. These letters are stored in the patients' electronic health records.
- Any deferrals to surgery MUST be discussed with the surgeon
- See Appendix B for basic interpretation of results.

**Patient perioperative pathway**




All time points must be documented in the patient's notes.
**Surgery deferral **MUST** be discussed with the surgeon.

## IMPLEMENTATION, MONITORING COMPLIANCE AND AUDIT

Education regarding the CPET referral pathway will be provided to the anaesthetic and perioperative staff via their Continuing Medical Education meetings. CPET assessors have accreditation with recognized expert bodies (eg Perioperative Exercise Testing and Training Society - POETTS). Compliance will be monitored through discussion of referrals, test results and patient surgical outcomes at the fortnightly CPET MDT meetings.

## APPENDICES

**Appendix A – Respiratory Investigations Request Form**
**Appendix B – Basic Interpretation of Results**

## REFERENCES

1. Anaesthesia Tutorial of the week 217. Cardiopulmonary exercise testing. Drury & Carlisle. https://www.wfsahq.org/resources/anaesthesia-tutorial-of-the-week
2. Introduction to Cardiopulmonary Exercise Testing. Robertson, Luks & Glenny. Springer 2013
3. Moran J, Wilson F, Guinan E, McCormick P, Hussey J, Moriarty J. Role of cardiopulmonary exercise testing as a risk-assessment method in patients undergoing intra-abdominal surgery: a systematic review. Br J Anaesth. 2016 Feb;116(2):177-91.
4. Older P, Levett D. Ann Am Thorac Soc Vol 14, Supplement 1, pp S74–S83, Jul 2017

## FEEDBACK

Any feedback on this document should be sent to the Contact Officer listed on the front page.

**Appendix A – Respiratory Investigations Request Form**

**Appendix B – Basic Interpretation of Results**

This table allows basic interpretation of CPET results as they pertain to perioperative risk based on objective fitness. Note, the patient may have other clinical sources of risk which are not represented here.

| | | |
|---|---|---|
| **Low Risk Category** | AT>11mls/Kg/min<br>Peak VO2 >15mls/Kg/min<br>VE/VCO2 @ AT <33 | - Likely lower risk of mortality or complications if all 3 present.<br>- Further testing unlikely to assist<br>- Optimisation may still be possible |
| **Caution** | AT 9-11mls/Kg/min<br>VE/VCO2 @ AT 33-40 | - Risk profile depends on surgery type<br>- Perioperative staff can advise:<br>• If further testing is required<br>• If optimisation possible/ necessary |
| **High Risk Category** | AT <9mls/Kg/min<br>Peak VO2 <14mls/kg/min<br>VE/VCO2 @ AT >40 | - Definite higher risk group for major surgery if any of these present<br>- MDT meeting advisable to discuss patient options, further testing and optimisation |