Cardiopulmonary Exercise Testing: Contraindications & Exemptions To The Rule?

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CPETs: When to not perform them

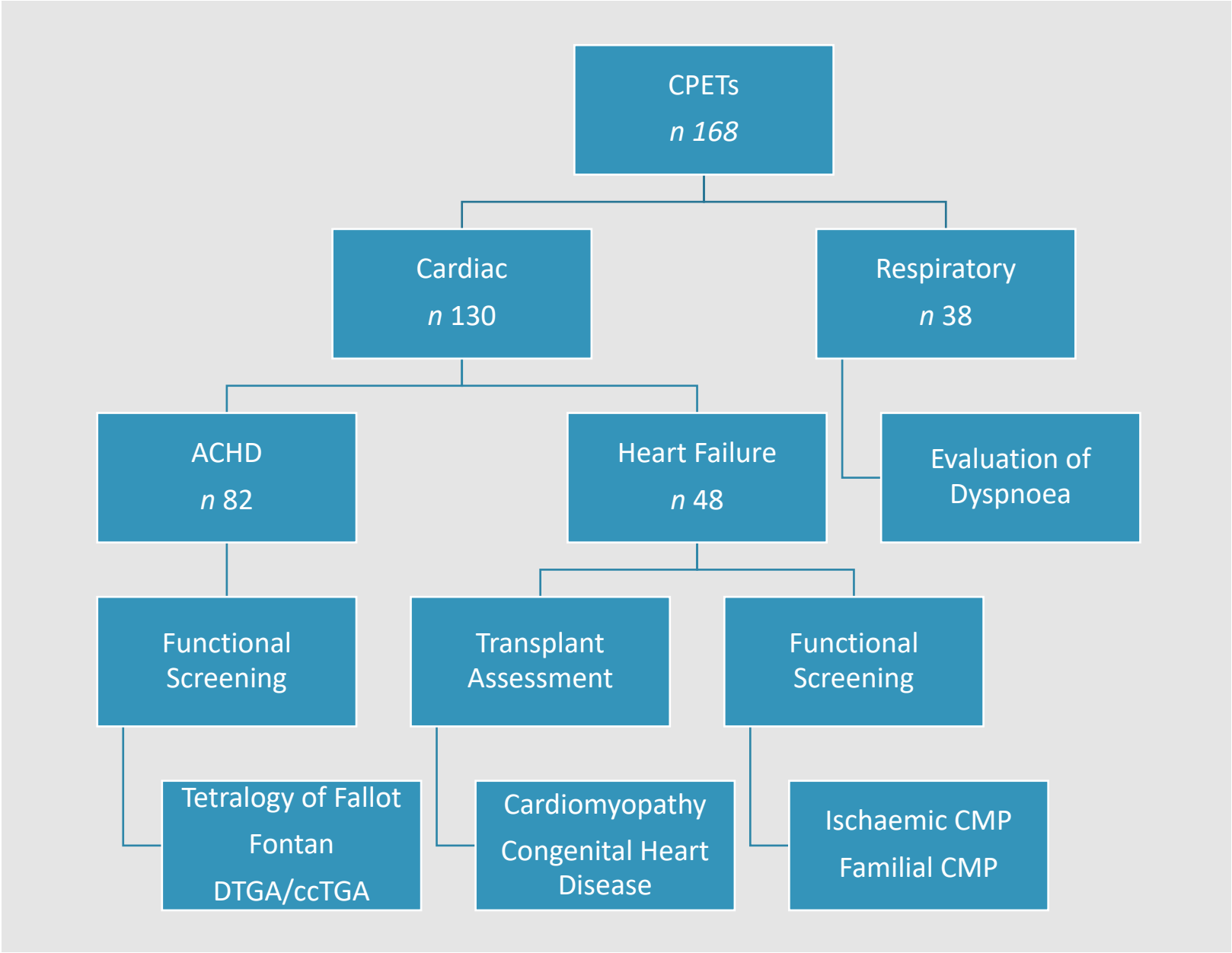
Table 1 Absolute and relative contraindications for CPET (adapted from American Thoracic Society[3]). Patients with relative contraindications should be discussed with an appropriate clinician and the risks and benefits of testing evaluated. Patients with relative contraindications should be directly supervised by a physician

Absolute contraindications	Relative contraindications
• Acute myocardial infarction (3–5 days) • Unstable angina • Uncontrolled arrhythmia causing symptoms or haemodynamic compromise • Syncope • Active endocarditis • Acute myocarditis or pericarditis • Symptomatic severe aortic stenosis • Uncontrolled heart failure • Suspected dissecting or leaking aortic aneurysm • Uncontrolled asthma • Arterial desaturation at rest on room air <85%	• Untreated left main stem coronary stenosis • Asymptomatic severe aortic stenosis • Severe untreated arterial hypertension at rest (>200 mm Hg systolic, >120 mm Hg diastolic) • Tachyarrhythmias or bradyarrhythmias • Hypertrophic cardiomyopathy • Significant pulmonary hypertension • Thrombosis of the lower extremity until treated for a minimum of 2 weeks • Within 2 weeks of acute symptomatic pulmonary embolus • Abdominal aortic aneurysm >8.0 cm • Electrolyte abnormalities • Advanced or complicated pregnancy

Table 3 Indications for the premature termination of an exercise test (adapted from American Thoracic Society[3])

Angina • >2 mm ST depression if symptomatic or 4 mm if asymptomatic or >1 mm ST elevation • Significant arrhythmias causing symptoms or haemodynamic compromise • Fall in systolic blood pressure >20 mm Hg from the highest value during the test • Hypertension >250 mm Hg systolic; >120 mm Hg diastolic • Severe desaturation: SpO_2 <80% (lower may be accepted in patients with known underlying lung disease) • Loss of coordination • Mental confusion • Dizziness or faintness

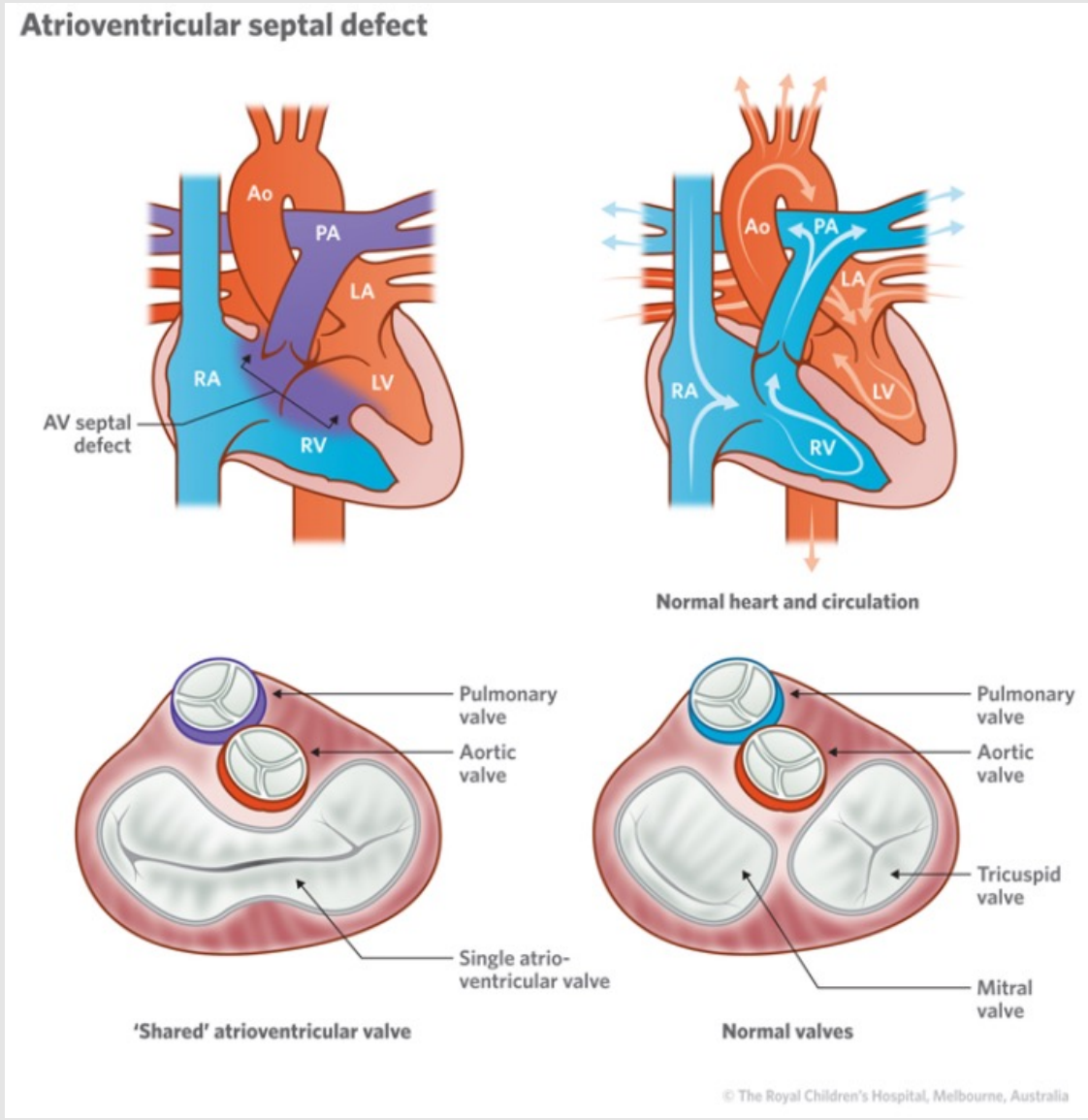
CPETs: The Prince Charles Experience



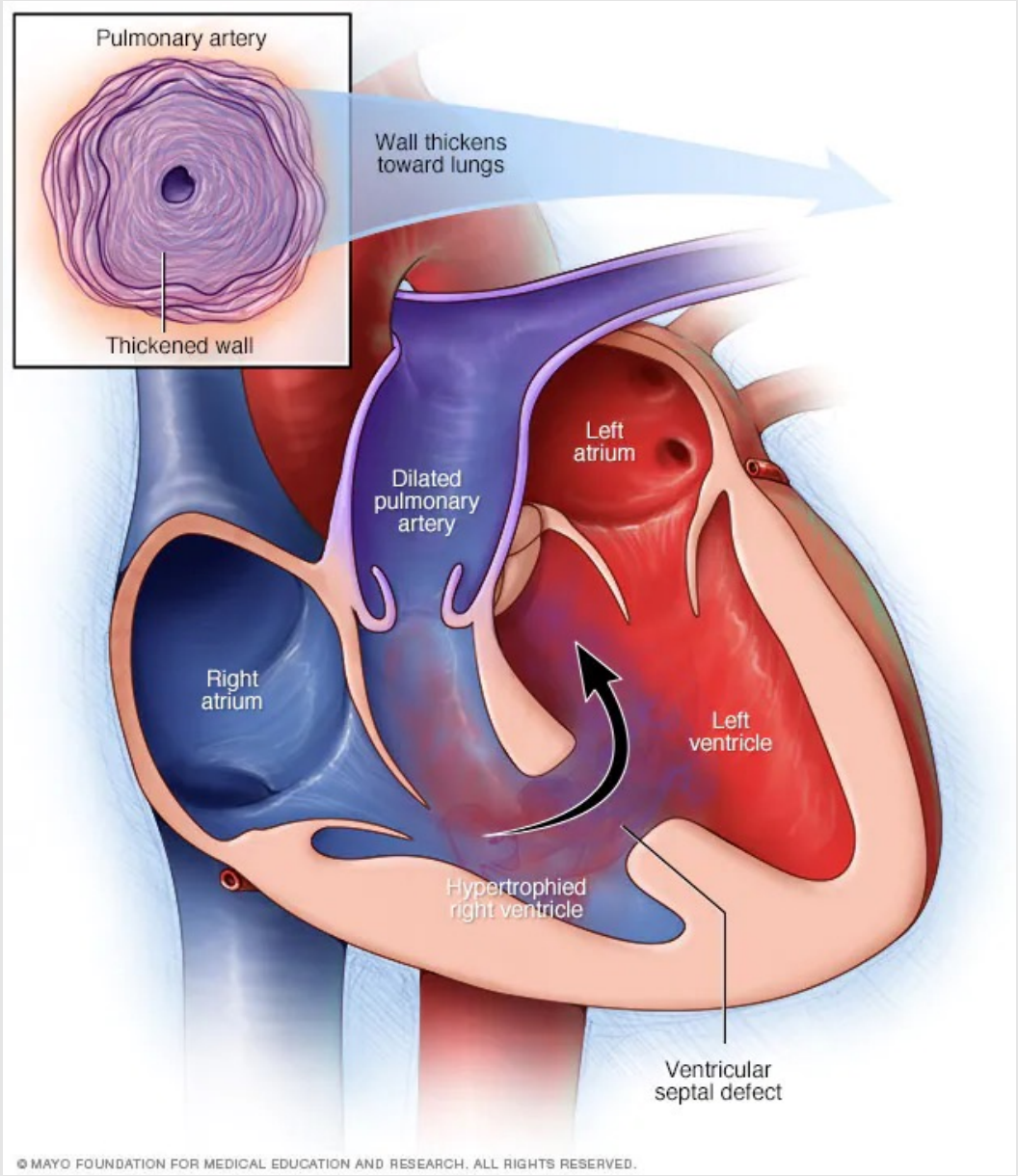
CPETs: The Case Study

- 52y Female
- Born with congenital heart disease
  - Complete AV Canal Defect → Eisenmengers → Pulmonary Hypertension
- ?Heart-Lung Transplant
  - Currently in the transplant ‘window’

CPETs: The Case Study – AV Canal Defect



CPETs: The Case Study - Eisenmengers



CPETs: The Case Study

- Currently in atrial tachycardia
  - Has been cardioverted 10 times prior, however reverts to atrial tachycardia
  - Resting SpO2 ~80%
- As per ATS/ACCP Statement
  - Absolute contraindications: Uncontrolled arrhythmias, SpO2 <85%
- Agree to proceed with CPET under the supervision of Adult CHD fellow

CPETs: The Case Study

Exercise Test Summary

Predicted equations: Hansen & Wasserman 2005 (VO2), Jones 1989 (Workload & HR)
Peak values obtained from maximum workload sustained for at least 30seconds.

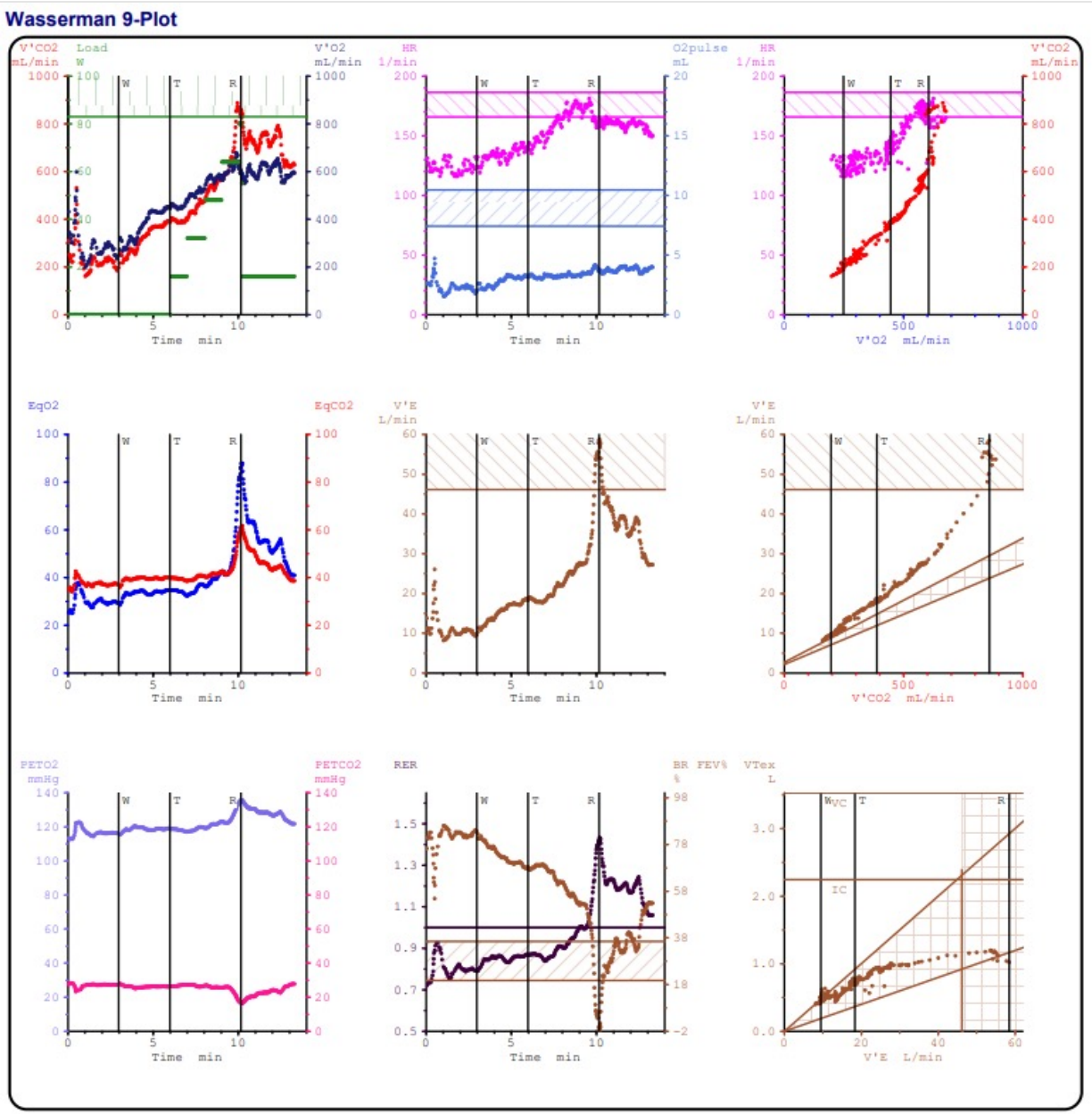
Metabolic Parameters		Pred	Resting	Peak	Peak %Pred
Load	[W]	118	0	64	54
V'O2/kg	[(mL/min)/kg]	23.1	4.2	9.7	42
V'O2	[mL/min]	1503	272	633	42
V'CO2	[mL/min]	-	216	739	-
RER		-	0.80	1.17	-
Pulmonary Parameters					
V'E	[L/min]	58*	10	40	69*
BF	[1/min]	42	21	37	89
VTex	[L]	-	0.497	1.075	-
SpO2	[%]	-	81	69	-
Cardiac Parameters					
HR	[1/min]	176	125	162	92
O2pulse	[mL]	8.9	2.2	3.9	44

Slope gradients

		Value
VO2/W slope	[(mL/min)/W]	3.03
HR/VO2 slope	[1/(mL/kg)]	15.07
VE/VCO2 slope		50.33

**Slope gradients determined from linear portion of test data.*

CPETs: The Case Study



CPETs: Annual Management

- Detailed session on CPET supervision with AT's
- Mock emergency CPET simulation
- Patient handling procedure for retrieving a patient from the bike in an emergency
- BLS mandatory training

CPETs: Standard Management

Standard care

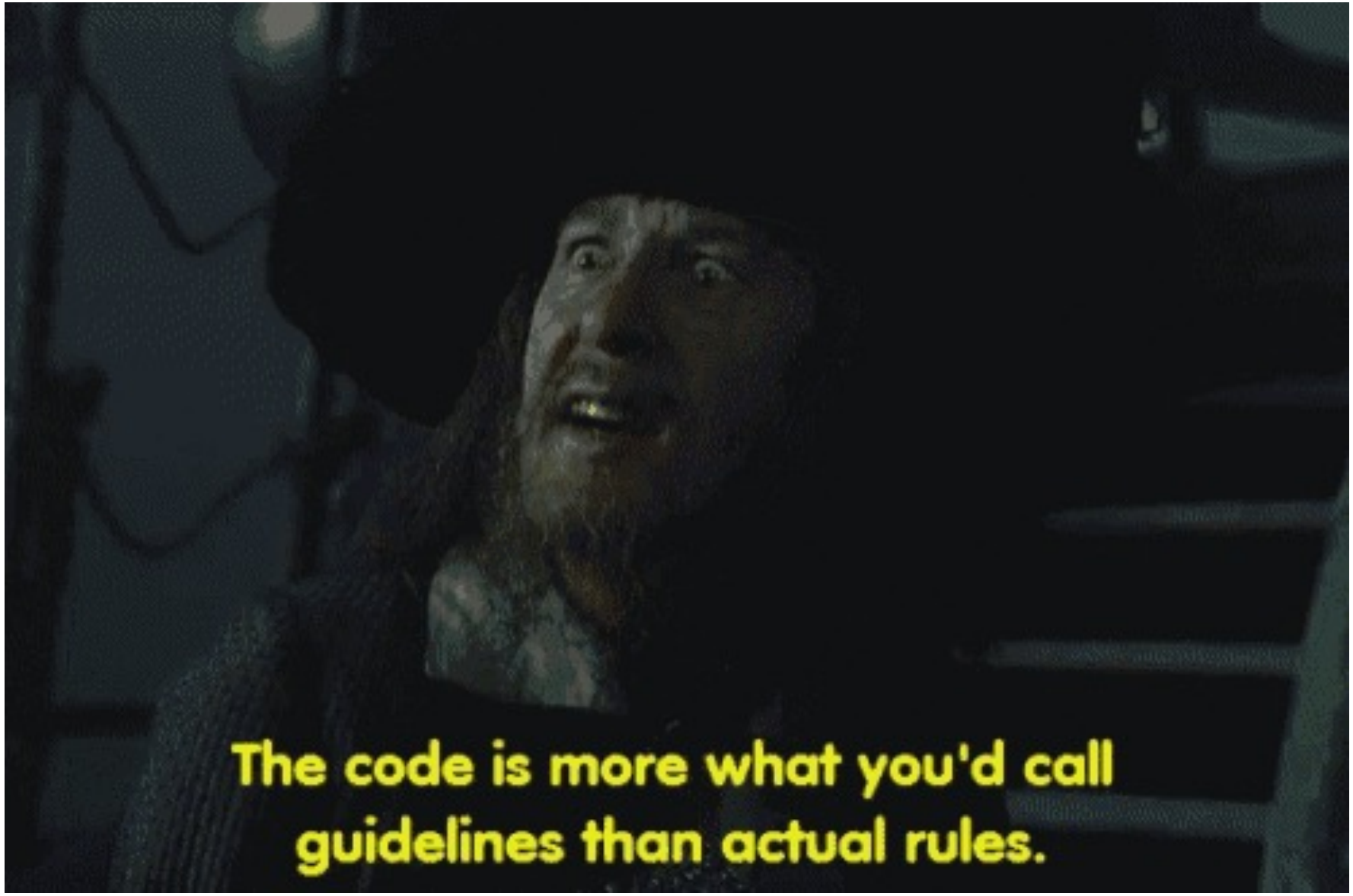
- CPET scientist also conducts RFT's
- Request and consent form, medications, RFT's, pre-exercise ECG and history reviewed by supervising doctor

Additional - *when contraindicated*

- Requesting team contacted before commencing CPET
- Second supervising doctor (Cardiology) present for CPET

CPETs: The Room Where It Happens

CPETs: Patient Handling


The code is more what you'd call
guidelines than actual rules.