

Exercise Tolerance Test UHL Childrens Medical Guideline

1. Introduction

This guideline is for use by the medical team within UHL paediatric cardiology. For Congenital Exercise Tests looking for ischaemic heart disease refer to the adult Exercise Test protocol

PAEDIATRIC EXERCISE TESTING

Indications/Contra-indications

Indications for Exercise Test in Paediatric patients

- To evaluate specific symptoms or signs that may be induced or aggravated by exercise
- To identify abnormal adaptive responses occurring in children with cardiac and other diseases
- To assess the effectiveness of specific medical and surgical treatments
- To estimate levels of functional capacity and to improve the safety of vocational, recreational and athletic recommendations
- To estimate prognosis
- To evaluate fitness levels
- To establish baseline data and follow up effectiveness of cardiac rehabilitation

Contra-indications (risk) for Exercise Test in paediatric patients

- Severe pulmonary vascular disease
- Poorly compensated congestive heart failure
- Recent myocardial infarction
- Active rheumatic fever with carditis
- Acute myocarditis or pericarditis
- Severe mitral stenosis
- Unstable arrhythmia
- Marfans with aortic dissection
- Uncontrolled severe hypertension
- Evidence of hypertrophic cardiomyopathy with history of syncope

2. Guideline Standards and Procedures

Doing a Paediatric Exercise Test . Doctors led

1. Before collecting the patient check defib and resuscitation equipment. Connect appropriate defib paddles
2. Ensure the request card is filled out correctly being signed and dated and the patient's case notes available in the room.
3. Document the patient's details in the exercise test book and fill out the appropriate forms needed.
4. Collect the patient from the waiting area and confirm with them their details i.e. name, address, date of birth.
5. Weigh the patient, if not already done, and print out a crash sheet
6. Prepare patient using the correct chest positions for the patient's age
7. Hook up the patient to the ECG cable on the treadmill and record a resting 12 lead ECG
8. Place the correct size blood pressure cuff around the patients arm and measure the BP (if the patient has a history of coarctation of the aorta and then the cuff should be placed on the right arm). The bladder of the cuff should completely encircle the arm and the width of the cuff should be at least two-thirds the length of the upper arm.
9. If indicated by the ordering physician use the pulse oximeter during the Exercise Test, ensuring good contact
10. Medically supervised test should have a Senior House Officer or above present at all times during the test. Medically supervised congenital exercise test should have a paediatric SpR present at all times
11. Explain fully to the patient and parent the test, also demonstrating how to walk on the treadmill.
12. Ensure patient/parent signs the consent form before the test.
13. Use the Bruce protocol unless otherwise stated. Ensure safety of the patient at all times.
14. Allow patient to hold onto the bar in front lightly.
15. Monitor ECG cautiously and record ECG, measure BP and O₂ sats (if required) every 3 minutes (at the end of each stage).
16. Paediatric patients should be exercised to their maximum endurance, encouraging them as necessary. Carry out the appropriate resuscitation according to paediatric guidelines.

	Bruce	Sheffield or Mod. Bruce
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	Speed mph	Incline %	Speed mph	Incline %
Stage 1	1.7	1.0	1.7	0
Stage 2	2.5	12	1.7	5
Stage 3	3.4	14	1.7	10
Stage 4	4.2	16	2.5	12
Stage 5	5.0	18	3.4	14
Stage 6	5.5	20	4.2	16
Stage 7	-	-	5.0	18
Stage 8	-	-	5.5	20

INDICATIONS FOR TERMINATING PAEDIATRIC EXERCISE TESTS

- When diagnostic findings have been established or a predetermined end point has been reached

- Equipment failure i.e. monitoring
- When signs or symptoms indicate a potential hazard to the patient that may result in injury
- Warning symptoms may include
 - Pain
 - Headache
 - Dizziness
 - Syncope
 - Excessive dyspnoea
 - Fatigue
- Warning signs:
 - ST segmental depression or elevation greater than 3mm.
 - Significant arrhythmia precipitated or aggravated by exercise testing i.e. premature ventricular contractions increasing frequency, SVT, VT, atrioventricular conduction block.
 - Progressive decrease in BP
 - (See exercise test findings in patients with cardiac abnormalities).

1. At the end of the test, monitor ECG and BP. Record ECG and BP immediately post exercise and every 3 minutes after.
2. Ensure supervising doctor/ technician fills in the report form.
3. Providing ECG and BP are back to normal and the patient feels ok they may be unhooked from the treadmill and sat in the waiting room for at least 10 minutes before leaving.
4. Make sure the room is tidy and clean for the next patient.
5. Staple the report together and enter it onto the computer. The patient's report is placed into the notes. The notes should be returned to appropriate location.

Paediatric and congenital exercise test protocol Physiologist led

- All exercise tests are to be carried out on clinic days within the department when a paediatric cardiology consultant or paediatric cardiology registrar is present within the clinic.
- Exercise test is to be performed with one supervising qualified cardiac physiologist with ILS and relevant experience and one assistant which may be a senior cardiographer or student cardiac physiologist with ILS cover and relevant training.
- Medically supervised stress tests include:
 - Tests for Provocation of any arrhythmia
 - Severe Aortic stenosis
 - History of sustained VT
 - Hypertrophic cardiomyopathy with history of syncope.
 - Uncontrolled hypertension.
 - Medically supervised Paediatric test require a paediatric SHO or above, Medically supervised adult congenital test requires a Paediatric SpR to be present throughout the entire test.

- Before collecting the patient Defib and resuscitation equipment should be checked and tested
- Ensure request card is filled out correctly, signed and dated and is present with patients notes within the room.
- Collect patient from waiting room, check name, DOB, address. Weigh the patient if they are under 16 and print out a crash sheet.
- If patient is under 16 then a consent form from the patient's parent / guardian needs to be signed.
- Fill in all the details on the computer and exercise test book.
- Prepare patient using the correct chest positions hook up the patient and printout a resting 12 lead ECG.
- Place the correct size BP cuff on the patient and measure BP.
- If indicated by ordering physician use the pulse oximeter during the test, ensuring good contact.
- Explain the procedure to the patient clearly and demonstrate how to walk on the treadmill.
- Always use the Bruce protocol unless otherwise stated. Ensure patient safety at all times through the duration of the test.
- New referral patient for LQTS should be exercised on a modified Bruce protocol for a maximum of 12 minutes, a 12 lead ECG should then be recorded at one minute, three minutes, six minutes, and nine minutes in the recovery stage.

	Bruce		Sheffield Modified Bruce	
	Mph	Incline %	Mph	Incline%
Stage 1	1.7	10	1.7	0
Stage 2	2.5	12	1.7	5
Stage 3	3.4	14	1.7	10
Stage 4	4.2	16	2.5	12
Stage 5	5.0	18	3.4	14

- Monitor ECG cautiously and record ECG, Measure BP Every 3 minutes or as the test requires.
- Paediatric patients should be exercised to their maximum endurance, encouraging them as necessary.

Indications for terminating test

When diagnostic findings have been established or a predetermined end point has been reached

Equipment failure e.g. – monitoring

When signs or symptoms indicate a potential hazard to the patient which may result in injury.

Warning Symptoms may include

- Pain
- Headache
- Dizziness
- Syncope
- Excessive dyspnoea
- Fatigue

Warning signs may include

- ST segmental depression or elevation greater than 3mm
 - Significant ventricular arrhythmia precipitated or aggravated by exercise, i.e VE's, SVT, VT, AV block.
 - Progressive fall in systolic blood pressure.
- Target heart rate attained for >1 minute
 - Extreme elevation in BP
 - At the end of the test monitor the ECG and BP. Recordings should be made immediately post exercise then every 3 minutes during the recovery period (1 minute recovery needs to be recorded in LQTS patients)
 - Report form to be written by supervising cardiac physiologist

Reporting an exercise test

The following information must be included in the report

- Date of Test
- Indication for test
- Duration of exercise
- Exercise protocol used
- Percentage of maximum heart rate achieved
- Reason for terminating test
- Symptoms reported by patient
- ECG changes noted
- Blood pressure response to exercise
- Events during the recovery period
- Conclusions.

When ECG and BP is back to normal and the patient feels well then they may be unhooked from the treadmill and sat in the waiting room for 10 minutes before leaving.

Make sure the room is left clean and tidy ready for the next patient.

3. Education and Training

None

4. Monitoring Compliance

None identified

What will be measured to monitor compliance	How will compliance be monitored	Monitoring Lead	Frequency	Reporting arrangements

5. Supporting References

None

6. Key Words

Cardiac, Bruce protocol, Paediatric Congenital Exercise Tolerance

The Trust recognises the diversity of the local community it serves. Our aim therefore is to provide a safe environment free from discrimination and treat all individuals fairly with dignity and appropriately according to their needs.

As part of its development, this policy and its impact on equality have been reviewed and no detriment was identified.

CONTACT AND REVIEW DETAILS	
Written By: Carla Blunt – Cardiac Physiologist Guideline Lead (Name and Title): Suhair Shebani - Consultant	Executive Lead: Chief medical officer
REVIEW RECORD	
Description Of Changes (If Any) No changes	