



SECTION 6: RADIOGRAPHIC AND IMAGING PROCEDURES

6.2 Diagnostic Imaging

6.2.3 Cardiac Catheterisation and Angiography

Aims

To care for the child/adolescent undergoing a cardiac catheterisation or angiography procedure so as to maintain safety and minimise complications.

Background:

Cardiac catheterisation is performed for diagnostic or interventional purposes and involves the insertion of a catheter into a vein or artery (usually the femoral) which is then guided into the heart. Occasionally access may be gained via a vein or artery in the arm or neck.

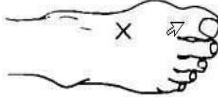
Diagnostic catheterisation: is used to deliver radiographic contrast medium (angiography) to delineate anatomical structures and to measure pressure within the chambers of the heart and cardiac output.¹

Interventional catheterisation: is used as a therapeutic measure and as an alternative to surgery, for example but not limited to, balloon septostomy, pulmonary valvuloplasty, closure of Patent Ductus Arteriosus (PDA).¹

Key Points:

- Consent is required for this procedure (MR840.02) and should be obtained by the proceduralist where possible.
- The procedure may take 2 to 4 hours, longer in some cases. Implement pressure injury prevention measures -refer to [Operating Theatre Practice Manual](#) Section 1 Pressure Care Guidelines.
- Inform the Diagnostic Imaging staff of any history of allergies, renal impairment, or the use of oral hypoglycaemic agents as the use of contrast medium may be affected in these cases.
- The following procedures require the patient to stay in hospital overnight for observation:
 - Aortic valvuloplasty
 - ASD device closure
 - Coarctation dilation
 - VSD device closure
 - Aortic stent placement
 - PA stent placement
 - PA angioplasty
 - Any country patient under 6 months of age

Cardiac Catheter preparation

Steps	Additional Information
1. Admit/prepare patient as per routine admission and preoperative preparation.	For day cases refer to SDPU Care pathway.
2. On admission record baseline observations: <ul style="list-style-type: none"> – Vital signs on the CEWT chart (a full CEWT) – Neurovascular status: locate and mark the <i>dorsalis pedis</i> pulses on both feet – Record inability to locate the pulse/s on the neurovascular observation chart and patients' medical record. 	 <p>Refer to PNPM 13.1 Neurovascular Observations</p>
3. Pre-op Blood Tests: <ul style="list-style-type: none"> • Cross Match or Group & Hold is usually required for children undergoing interventional procedures: <ul style="list-style-type: none"> – All neonates/infants < 5kg one unit cross match – All children > 5kg undergoing interventional procedure require Group and Hold – Children > 5kg considered at high risk of bleeding or undergoing high risk interventions may require cross-match and will be determined by the cardiologist. 	<p>Interventional procedures requiring cross-match include: coil, PDA closure, valvuloplasty.</p>
4. Ensure the groin area is clean. Encourage bathing evening before or morning of the procedure.	Note: Pubescent children should be made aware the groin area may have to be clipped in theatre/radiology - do not shave the area on the ward.
5. Where applicable, apply topical anaesthetic to right and left groin as instructed by cardiologist if the procedure is to be performed under local anaesthetic.	<p>Check for contraindications/allergies /sensitivities to cream and dressing.</p> <p>Refer to Acute Pain Service Protocol for use of EMLA and LMX4.</p>

Post Cardiac Catheter Care

Key points

- Serious complications following diagnostic catheterisation are uncommon; however vigilant monitoring of the patient is fundamental for early identification and management should complications arise.
- Patients undergoing some interventional catheterisation procedures may require prophylactic anticoagulant therapy post procedure. Refer to pharmacy protocol: [Heparin Low-dose \(prophylactic\) Infusion](#).
- Patient is to remain on bed rest² with bed head elevated no more than 30 degrees for:³
 - 4 hours post diagnostic catheterisation
 - 6 hours post interventional catheterisation

Steps	Additional Information
<p>1. From arrival in the PACU unit commence:</p> <ul style="list-style-type: none"> • 10 minutely observations including BP and neurovascular observations, • continuous monitoring of wound site • If bleeding observed apply pressure dressing and contact cardiologist 	
<p>2. On return to the ward commence continuous pulse oximetry and record:</p> <ul style="list-style-type: none"> • Pulse/Respirations • Neurovascular observations • Puncture sites for bleeding/haematoma, infection <p>Every:</p> <ul style="list-style-type: none"> – 15 minutes for 2 hours – 30 minutes for next 2 hours – Hourly for next 6 hours or until discharge – If stable continue 4 hourly thereafter for inpatients <ul style="list-style-type: none"> • BP: one hourly for 4 hours then if stable 4 hourly thereafter • Temperature: 4 hourly • Record and monitor fluid balance 	<p>Notify cardiologist of any change in neurovascular status.</p> <p>Subsequent to each assessment, review nursing care to meet the individual needs of the child.</p>

Steps	Additional Information
<p>3. If heparin infusion in progress,</p> <ul style="list-style-type: none"> • Record hourly infusion on fluid balance chart • Monitor catheter insertion site for bleeding hourly • Monitor intravenous access site hourly. 	<p>Vigilant monitoring of catheter insertion site and BP is vital for early identification of bleeding/haemorrhagic events.</p> <p>As per PNPM 2.3.5 Monitoring and maintaining IV Access and IV Tubing Safety</p>
<p>4. Pain Assessment:</p> <ul style="list-style-type: none"> • On return to ward then at least 4 hourly/ as condition determines. • Report abdominal, groin and back pain. 	<p>Refer to Protocol for Assessment of Pain</p> <p>Can indicate a retroperitoneal haematoma.</p>
<p>5. Prior to discharge check if:</p> <ul style="list-style-type: none"> • Cardiologist has reviewed patient • chest X-ray, ECG and/or ECHO requested • discharge medications prescribed: antibiotics and/or thromboprophylaxis <p>Dressing:</p> <ul style="list-style-type: none"> • Remove just prior to discharge for medical review of the site. 	<p>For inpatients, dressing should be removed no later than 24 hours post procedure.</p>

Managing Complications


Steps	Additional Information
<p>Haemorrhage/Haematoma at puncture site:</p> <ul style="list-style-type: none"> • Apply continuous pressure above insertion site with gauze until haemostasis achieved.³⁻⁵ • Inform cardiologist. 	<p>Avoid excessive pressure as this risks stopping blood flow to the lower limb.⁵</p>
<p>Retroperitoneal haematoma:</p> <ul style="list-style-type: none"> • Should be suspected if unexplained hypotension and abdominal pain present. • Inform cardiologist immediately. • Commence continuous monitoring. 	

Steps	Additional Information
<p>Thrombus</p> <p>Faint or absent pedal pulses, swelling and increasing pain post procedure can indicate a venous thrombosis.³</p> <ul style="list-style-type: none"> • Inform cardiologist immediately • Elevate affected limb⁵ • Ultrasound may be required to confirm thrombus and anticoagulation therapy may be ordered 	
<p>Arrhythmia</p> <ul style="list-style-type: none"> • Report any irregular heart beat or change in cardiac rhythm to the cardiac team. • Monitor BP, capillary refill, colour and alertness. • Commence continuous cardiac monitoring if not already monitored. • If cardiac output compromised call for urgent medical assistance: MET or Code Blue. 	<p>Brief episodes of SVT in neonates/infants can occur as a result of mechanical irritation by the catheter to the heart tissue and are usually transient and self-resolving. Medical officer must be informed of episodes.⁵</p>

<p>Related policies, procedures and guidelines</p>
<p>PNPM 8.1.2 Preoperative Procedural Care (<i>pending updated version</i>)</p>
<p>Acute Pain Service Protocols and Guidelines</p>
<p>Operating Theatre Practice Manual (Section 1 Pressure Care Guidelines)</p>
<p>PNPM 13.1 Neurovascular Observations</p>
<p>CAHS High Risk Drug Policy (page 9 Heparin)</p>

References:

1. Feltes T, Bacha E, Beekman R et al Indications for Cardiac Catheterization and Intervention in Pediatric Cardiac Disease: A Scientific Statement From the American Heart Association. *Circulation*.123:22:2607-2652; 2011.
2. Shipton S (Interventional Congenital Cardiologist). Bed Rest [Personal Communication] Princess Margaret Hospital; 2014.
3. Royal Children's Hospital Melbourne. Care of the patient post cardiac catheterisation. Clinical Guidelines (Nursing). . 2014. Available from: http://www.rch.org.au/rchcpghospital_clinical_guideline_index/Care_of_the_patient_post_cardiac_catheterisation/. Accessed: 29 October 2014
4. The Children's Hospital Westmead. Cardiac Catheterisation: Interventional, Non-interventional and Electrophysiological Studies. Practice Guideline. 2014. Available from: <http://www.schn.health.nsw.gov.au/policies/pdf/2008-8029.pdf>. Accessed: 1 September 2014
5. King Edward Memorial Hospital. NCCU Clinical Guidelines: Care of the Infant post Cardiac Catheterisation. 2014. Available from: <http://www.kemh.health.wa.gov.au/services/nccu/guidelines/documents/7365.pdf>. Accessed: 29 October 2014

File Path:	Cardiac Catheterisation and Angiography https://healthpoint.hdwa.health.wa.gov.au/policies/Policies/CAHS/PNPM%2006.02.03%20Cardiac%20Catheterisation-Angiography.pdf		
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