

# Guideline

## Differentials of Paediatric Chest Pain

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Author/custodian	Director, Paediatric Emergency Department			Review date	05/09/2026
Supersedes	1.0				
Applicable to	All CHQ staff involved in the care and emergency management of children with chest pain.				
Authorisation	Executive Director Clinical Services				

### Purpose

This guideline provides clinical practice advice for clinicians involved in the emergency management of children presenting with chest pain.

### Scope

This guideline applies to all staff involved in the care and emergency management of children with chest pain.

### Guideline

#### Introduction

The paediatric presentation of chest pain causes significant anxiety. Clinical extrapolation of adult disease states and the potential of cardiac pathology may lead to inappropriate resource allocation due to investigation and referral <sup>(1,2)</sup>. Contrary to adults, this level of concern is not congruent with the spectrum of disease that occurs in the paediatric population. Less than 1% of paediatric patients with chest pain have a cardiac diagnosis. Less than 2% of patients referred from the Emergency Department (ED) to cardiologist outpatient clinic for chest pain have a cardiac cause <sup>(3)</sup>. The challenge for clinicians is to distinguish cardiac causes from much more likely benign entities.

Chest pain accounts for 0.6% of presentations to paediatric emergency per year in up to 18-year old's <sup>(4)</sup>. The spectrum of illness has a large variation in presentation and cardiac diagnoses form the smallest group by far.

A summary table and figures below describe the differential diagnosis (DDx) for paediatric chest pain (PCP) in the emergency department.

TABLE 1: Causes of chest pain in children

DDX for PCP in ED: Aetiology and Epidemiology			
Non Cardiac Causes 98-99%		Cardiac Causes 0.6-2%	
Musculoskeletal (50-68%)	Costochondritis, Muscle Strain, Trauma	Arrhythmia (37-48%)	SVT/VT, LQTc, Palpitations, ARVD/ACM
		Infection/Carditis (17-29%)	Myocarditis, Pericarditis, Perimyocarditis
Respiratory (3-12%)	Asthma, Pneumonia, Bronchitis, Pleuritis, PE	Myocardial Ischaemia (13%)	Anomalous Coronary Artery, Kawasaki Disease with Aneurysms, Myocardial infarction, Coronary Artery Origin Stenosis
Gastrointestinal (2-8%)	GORD, Esophagitis, Gastritis, Pancreatitis, Gastric Ulcer, Biliary Disease	Cardiomyopathy (7%)	HCM, HOCM, DCM
		Inflammatory (2-8%)	Takayasu Arteritis, Coronary Arteritis
		Anatomical (rare)	Dissection/Transection/Rupture, Mitral Valve Prolapse, Severe LVOTO
Psychogenic (10-30%)	Anxiety, Panic attack, Conversion disorder, Somatisation, Mood disorder	Rare (rare)	Pulmonary Hypertension
Other (<10%)	Chest crisis (Sickle Cell), Skin infection		

Table adapted from (5,6)

Abbreviations: PCP = Primary Chest Pain, PE = Pulmonary Embolus, GORD = Gastroesophageal reflux, SVT= supraventricular tachycardia, VT = ventricular tachycardia, ARVD = arrhythmogenic right ventricular dysplasia, ACM= arrhythmogenic cardiomyopathy, SCM= hypertrophic cardiomyopathy, HOCM = hypertrophic obstructive cardiomyopathy, DCM= dilated cardiomyopathy

## Explanatory Counselling as part of Assessment

The paediatric presentation of chest pain causes significant anxiety in both the patient and the clinician group – so reassurance is key from the very beginning. Begin consultation with counselling to set a collaborative environment for the consultation and improve overall satisfaction for all involved in the presentation.

Consider using the following phrases:

- Unlike adults, less than 1% of children with chest pain have a serious cardiac cause/condition.
- The chest pain is real for your child, but 99% of the time it is not their heart and it isn't life-threatening.
- There is a large range of causes for chest pain in children, most of them are benign.
- A thorough history and examination is most important for us to do together to work out what is going on.
- Further investigation is not often necessary and will not be helpful for their child unless key red flags are identified or there has been a recent COVID vaccination or illness.
- Most children have NO clear diagnosis by the time they leave ED, but almost certainly will have critical-life-threatening causes ruled out from a good history and examination.



- Do not recommend exercise restriction or repeated withdrawal from school unless specifically instructed by a medical professional.
- Nearly half of children with chest pain have ongoing symptoms 6 months later without evidence of serious organic disease <sup>(7)</sup>.

## Assessment

The history of the nature of the pain and associated features is vital in making an accurate diagnosis. Well documented red flags on history increase the likelihood of a cardiac origin for chest pain. See [Appendix 1](#).

TABLE 2: Red Flags

Red Flags for Paediatric Chest Pain	
History	Examination
<ul style="list-style-type: none"> <li>• Exertional Syncope</li> <li>• Collapse or chest pain at Maximal Exertion</li> <li>• Previous Cardiac Arrest</li> <li>• Congenital/Acquired Heart Disease/Surgery</li> <li>• Palpitations</li> <li>• First degree relative with Sudden Unexplained Cardiac Death/Cardiomyopathy/Arrhythmia</li> <li>• Recent Surgery</li> <li>• Implantable cardioverter defibrillator Insitu</li> <li>• Connective Tissue Disorder</li> <li>• Systemic Inflammatory Condition (ie Kawasaki)</li> <li>• Hypercoagulable State</li> <li>• Recent or history of cocaine/amphetaime abuse</li> <li>• Haemoptysis (foreign body/infection)</li> <li>• Sickle Cell Disease</li> </ul>	<ul style="list-style-type: none"> <li>• Pathological/ new Murmur</li> <li>• Signs of Cardiac Failure</li> <li>• Pericardial Rub</li> <li>• Decreased Heart Sounds</li> <li>• Fever &gt; 38.5 with no clear cause</li> <li>• Haemodynamic Instability/compromise</li> <li>• Syndromic appearances</li> <li>• ECG changes/abnormalities</li> </ul>

Adapted from (3,6,8)

Abnormal vital observations are more indicative of underlying pathology <sup>(8)</sup>. The majority of children can be differentiated with a thorough history and examination without need for further investigations <sup>(2,9)</sup>.



### ALERT

**Your initial diagnostic impression of “Non-Cardiac Chest Pain” is adequate and safe for the exclusion of most serious cardiac pathology. Your assessment on history and exam will support this if correct.**

## Investigations

Few investigations are required for the assessment of chest pain and should be steered by the presenting history. Potential adjuncts include:

- ECG- Electrocardiogram is the most valuable tool to aid in cardiac diagnoses of chest pain <sup>(5)</sup>. Paediatric emergency physicians have good specificity for the evaluation of ECGs of low or high risk patients for an acute cardiac presentation in ED <sup>(11)</sup>. Paediatric emergency demonstrates high PPV (88.3%) and extremely high NPV (96.3%) in interpreting ECGs for cardiac causes of chest pain <sup>(12)</sup>. Be aware that the precordial T-wave configuration changes over time. V1-2 T waves are inverted after the first week of life and usually remain so until around age 8. However, the juvenile T-wave pattern can persist into adolescence and early adulthood (persistent juvenile T waves) and is often shallow asymmetric inversion of V1-3 with no ST changes <sup>(13,14)</sup>. See [Appendix 2: Juvenile T Waves](#).
- CXR- Chest x-ray is indicated for shortness of breath, pleuritic chest pain, palpitations, respiratory or cardiac comorbidities, abnormal vitals, trauma or focal signs are indications for CXR <sup>(9)</sup>.
- Bloods- These are of low utility. Serum troponin levels may have some use in patients with myocarditis or myocardial infarct as the cause of their chest pain (post COVID infection or vaccination makes this risk marginally higher). See document [Guidance on Myocarditis and Pericarditis after mRNA COVID-19 vaccinations](#) for a decision-making algorithm. In other cases, however, they are not useful as a screening tool to determine if chest pain is of cardiac origin <sup>(15)</sup>.
- Echo- Echocardiography is indicated after discussion with cardiology in those patients with an abnormal cardiac exam, abnormal ECG, significant family history or exertional chest pain <sup>(16)</sup>.
- Holter and exercise stress test are rarely useful in determining cause of chest pain and should only be organised on the advice of the cardiologist.



**Table 3: Utility and Indications for Testing**

	Indication for test	Usefulness	Conditions diagnosed
<b>ECG</b>	Abnormal physical exam, exertional chest pain, cardiac red flags or palpitations	All patients with concern of cardiac cause of pain	Cardiomyopathy, myocarditis, pericarditis, with or without pulmonary hypertension
<b>CXR</b>	Abnormal observations, cough, history of choke, haemoptysis, weight loss	All patients with concern of respiratory cause of pain, trauma or signs of cardiac failure	Chest infections, foreign bodies, mediastinal masses, cardiomyopathy, pneumothorax
<b>ECHO</b>	Abnormal physical exam, ECG, family history, or exertional chest pain	Selected patients as determined by Cardiology fellow	Anomalous coronary artery origins, cardiomyopathy, myocarditis, pericarditis, pulmonary hypertension, left ventricular outflow obstruction
<b>Troponins</b>	Suspected myocarditis or pericarditis OR high suspicion of myocardial ischaemia	Selected patients	Myocarditis, pericarditis, coronary ischemia

## Management

Management of chest pain in children involves simple analgesics (ibuprofen or paracetamol) for the pain and then focussing on treating the underlying cause.



### ALERT

**Please be safe. This is a guideline only. Please speak to your senior to get useful advice or call Cardiology Fellow on-call for advice**

## Disposition

If the pain is non-specific and the child is discharged, ensure appropriate follow up is arranged with the GP in the next week.

A large single centre retrospective decade long review in America of paediatric patients assessed and discharged from cardiology outpatient clinic after referral from ED with chest pain, revealed that there were no deaths from cardiac causes. <sup>(3)</sup>

The Queensland Children's Hospital cardiology department has done extensive follow-up of patients discharged with a diagnosis of non-cardiac chest pain and the audit has shown there has been no subsequent cardiac deaths on median follow-up of 4.4-10 years (17,886 cumulative patient years). Despite this 20% will represent to ED and 10% will be referred for additional cardiac opinion in OPD.

Referral for further cardiology outpatient assessment is only warranted if the pain is assessed as being cardiac in origin after the identification of cardiac red flags. Referrals should be made to the local Cardiology service or if required to the Cardiology team at QCH with a Specialist outpatient clinic referral form sent to QCH through the normal processes.

The referral form can be found at [Referral forms, GPs and private health care providers](#).



## When to escalate care

Follow your local facility escalation protocols for children of concern. Transfer is recommended if the child requires care beyond the level of comfort of the treating hospital. Clinicians can contact the services outlined below to escalate the care of a paediatric patient.



Contact specialist teams via CATCH depending on indication

Service	Reason for contact by clinician	Contact
<b>Local Paediatric service</b>	For specialist paediatric advice and assistance with local transfers as per local arrangements.	As per local arrangements
<b>Children's Advice and Transport Coordination Hub (CATCH)</b>	For access to specialist paediatric advice and assistance with inter-hospital transfer of non-critical patients into and out of Queensland Children's Hospital. For assistance with decision making regarding safe and appropriate inter-hospital transfer of children in Queensland. For Queensland Health (QH) staff, <a href="#">click here</a> for the QH Inter-hospital transfer request form (access via intranet).	13 CATCH (13 22 82) 24 hours <a href="#">CATCH website</a>
<b>Telehealth Emergency Management Support Unit (TEMSU)</b>	For access to generalist and specialist acute support and advice via videoconferencing, as per locally agreed pathways, in regional, rural and remote areas in Queensland.	<a href="#">TEMSU QHEPS website</a> 24 hours
<b>Retrieval Services Queensland (RSQ)</b>	For access to telehealth support for, and to notify of, critically unwell patients requiring retrieval in Queensland. For any patients potentially requiring aeromedical retrieval or transfer in Queensland.	<a href="#">RSQ QHEPS website</a> 24 hours

## Consultation

Key stakeholders who reviewed this version:

- QCH ED SMO
- Cardiology Fellow QCH

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## Guideline revision and approval history

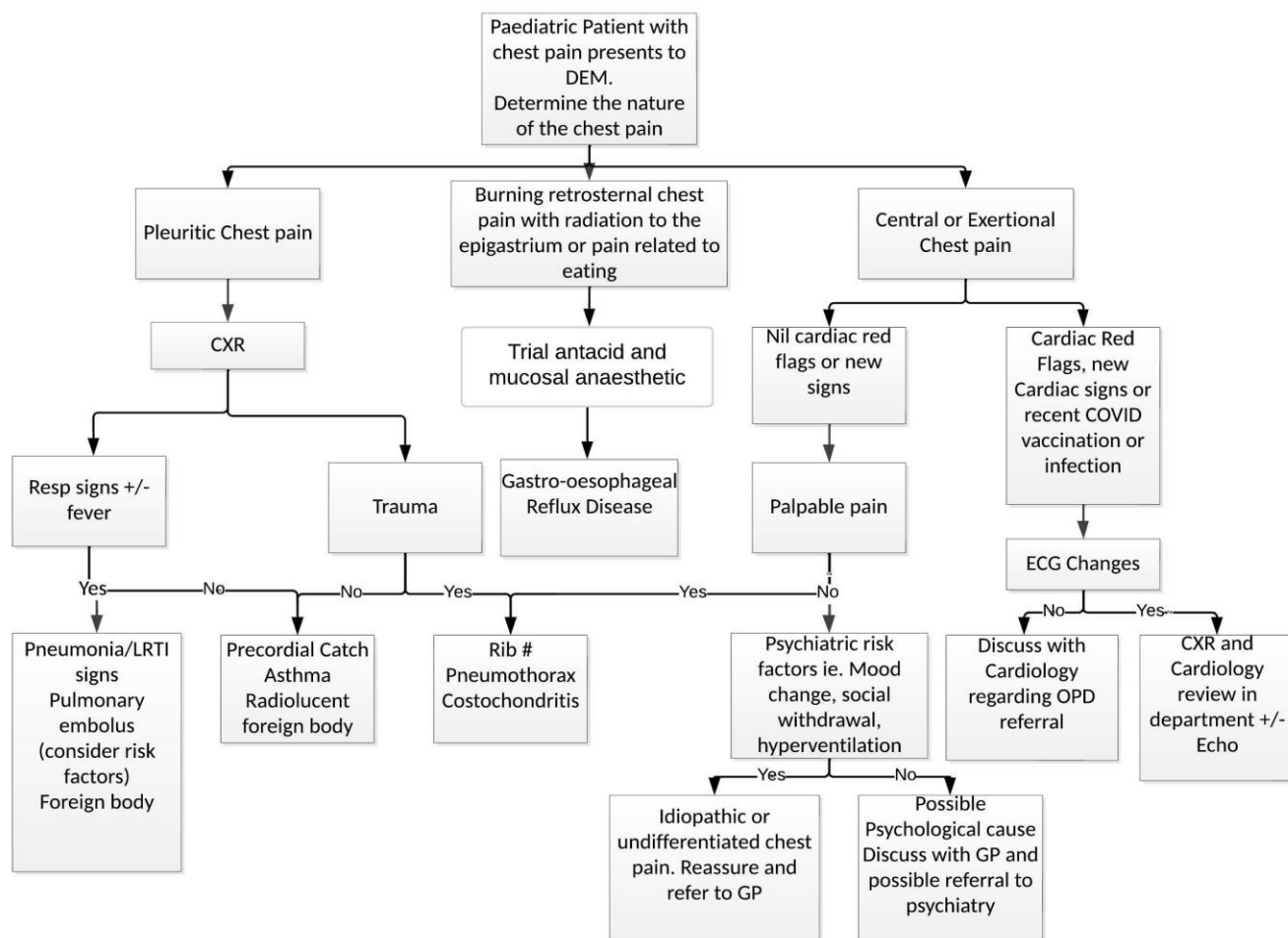
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## Appendix 1 : Chest Pain Flowchart



RED FLAGS OF PAEDIATRIC CHEST PAIN	
History	Examination/ECG
<ul style="list-style-type: none"> <li>Exertional Syncope</li> <li>Collapse or chest pain at Maximal Exertion</li> <li>History of Cardiac Arrest</li> <li>Congenital/Acquired Heart Disease/Surgery</li> <li>Palpitations</li> <li>First degree relative with Sudden Unexplained Cardiac Death</li> <li>First degree relative with Cardiomyopathy</li> <li>First degree relative with Arrhythmia</li> <li>Recent Surgery</li> <li>Implantable cardioverter defibrillator Insitu</li> <li>Connective Tissue Disorder</li> <li>Systemic Inflammatory Condition (Ie Kawasaki)</li> <li>Hypercoagulable State</li> <li>Recent or history of cocaine/amphetaime abuse</li> <li>Haemoptysis</li> <li>Sickle Cell Disease</li> </ul>	<ul style="list-style-type: none"> <li>Pathological Murmur</li> <li>Signs of Cardiac Failure</li> <li>Pericardial Rub</li> <li>Decreased Heart Sounds</li> <li>Fever &gt; 38.5 with no clear cause</li> <li>Haemodynamic Instability/compromise</li> <li>Syndromic appearances</li> <li>ECG changes/abnormalities</li> </ul>





## Appendix 2: Juvenile T waves<sup>14</sup>

This is an example of Juvenile T waves. Juvenile T-wave pattern is often shallow asymmetric inversion of V1-3 with no ST changes<sup>(13,14)</sup>.

