CT Children's CLASP Guideline
Chest Pain

INTRODUCTION	Chest pain is a frequent complaint in children and adolescents, and may lead to school absences and restriction of activities, often causing significant anxiety in the patient and family. The etiology of chest pain in children is not typically due to a serious organic cause without positive history and physical exam findings in the cardiac or respiratory systems. Good history taking skills and a thorough physical exam can point you in the direction of non-cardiac causes including GI, psychogenic, and other rare causes (see **Appendix A**). A study performed by the New England Congenital Cardiology Association (NECCA) identified 1016 ambulatory patients, ages 7 to 21 years, who were referred to a cardiologist for chest pain. Only two patients (< 0.2%) had chest pain due to an underlying cardiac condition, 1 with pericarditis and 1 with an anomalous coronary artery origin. Therefore, the vast majority of patients presenting to primary care settings with chest pain have a benign etiology. With careful screening, the patients at highest risk can be accurately identified and referred for evaluation by a Pediatric Cardiologist.
INITIAL EVALUATION AND MANAGEMENT	**INITIAL EVALUATION:** Focused on excluding rare, but serious, abnormalities associated with sudden cardiac death or cardiac anomalies by obtaining the targeted clinical history and exam below, which is the most important part of the evaluation (see **Red Flags**): ▪ Concerning Pain Characteristics (see ***Appendix B***) ▪ Concerning Past Medical History (see ***Appendix B***) ▪ Concerning Family History (see ***Appendix B***) ▪ Physical exam: – Blood pressure abnormalities (obtain with manual cuff, in sitting position, right arm) – Non-innocent murmurs ▪ Obtain ECG if available and clinically indicated by history and/or PE: – ECG's can be obtained at CT Children's main campus and satellites locations daily (Hartford, Danbury, Glastonbury, Shelton). To schedule call (860) 545-9400. **INITIAL MANAGEMENT:** ▪ For chest pain without concerning history or abnormal cardiac exam (see **Red Flags**), provide family with reassurance. ▪ For presumed musculoskeletal pain (with or without reproducible tenderness to palpation over chest), consider 3-4 day trial of ibuprofen [10 mg/kg Q6-8 hours; Max dose 40 mg/kg/day] in patients without contradiction to NSAID usage. For pain consistent with Precordial Catch Syndrome (episodic, random, brief, stabbing or sharp, non-exertional pain, worse with inspiration), no further testing or treatment is needed.

WHEN TO REFER	▪ Concerning history or exam, with one or more **Red Flags** ▪ Abnormal screening ECG ▪ Chest pain not responsive to Ibuprofen or rest ▪ Any abnormality during cardiac portion of exam other than an innocent murmur *(see **Concerning Physical Exam in Appendix B**)* ▪ If pain suggestive of aortic dissection, send emergently to ED (see **Red Flags**) ▪ If pain suggestive of pericarditis, call cardiology to determine urgency of evaluation (see **Red Flags**)
HOW TO REFER	**Referral to Cardiology via CT Children's One Call Access Center** **Phone:** 833.733.7669 **Fax:** 833.226.2329 For more information on how to place referrals to Connecticut Children's, click **here.** ***Information to be included with the referral:*** ▪ Last visit note with relevant findings on history and physical exam ▪ ECG, if obtained
WHAT TO EXPECT	**What to expect from CT Children's Visit:** ▪ Meet with cardiologist to review the history of events, past medical history, and family history ▪ Physical exam ▪ Possible echocardiogram at the visit, if the cardiologist thinks it would be helpful ▪ If indicated, home ECG monitoring may be arranged during the visit ▪ When necessary, exercise stress testing may be scheduled

APPENDIX A: Differential Diagnoses

System	Differential Diagnoses	System	Differential Diagnoses
Cardiac	• Hypertrophic cardiomyopathy, aortic stenosis • Coronary disease: Kawasaki Disease, anomalous coronary, s/p surgical re-implantation of coronary artery • Myocardial ischemia/infarction • Pericarditis/myocarditis • Arrhythmia • Aortic dissection • Pulmonary hypertension	***Musculoskeletal***	• Costochondritis • Rib fracture • Muscle strain • Trauma
Gastrointestinal	• Gastroesophageal reflux • Esophagitis • Gastric ulcer	***Psychogenic***	• Panic attack • Anxiety
Miscellaneous	• Precordial Catch Syndrome • Pulmonary embolus • Cocaine use • Acute chest syndrome	***Pulmonary***	• Asthma • Pneumonia • Pleuritis • Pneumothorax

APPENDIX B: Red Flags

History	Red Flags
Concerning Pain Characteristics	• Classic anginal pain – retrosternal pain/pressure accompanied by nausea, sweating, SOB, typically with exertion, may radiate • Severe, tearing pain radiating to the back (concern for aortic dissection) • Exertional pain or exertional syncope • Exercise intolerance • Sharp retrosternal pain exacerbated by lying down or presence of fever (suggests pericarditis) • Pain in the setting of illicit drug use • Pain associated with palpitations • Presence of fever • Heart failure symptoms - dyspnea, orthopnea, edema
Concerning Past Medical History	• Congenital or acquired heart disease • Kawasaki Disease • Sickle Cell Disease • Predisposition to pericarditis: rheumatologic disease, malignancy, recent cardiac surgery, mediastinal radiation, TB, HIV, renal failure • Risk for aortic dissection : Marfan Syndrome, Loeys-Dietz Syndrome, Type V Ehlers-Danlos Syndrome, Turner Syndrome
Concerning Family History	• Hypertrophic cardiomyopathy or sudden unexplained death < 50 years old • Marfan Syndrome • Loeys-Dietz Syndrome • Type V Ehlers-Danlos Syndrome • Family history of thoracic aneurysms
Concerning Physical Exam	• Tachycardia, warrants ECG • Tachypnea, gallop, friction rub, distant heart sounds, or peripheral edema concerning for heart failure • Hypertension or hypotension • Presence of non-innocent murmur