Clinical Practice and Referral Guidelines—Cardiology

Chest Pain

The following guidelines are intended to assist primary care providers in determining the need for cardiovascular evaluation for pediatric patients (<=18 years of age) presenting with chest pain. They are based on review of the current literature and clinical experience and are intended to provide a consistent, uniform approach to the evaluation of pediatric chest pain in Greater Metropolitan Atlanta, Georgia.

History

Detailed history is paramount in determining the likelihood of cardiovascular etiology for pediatric chest pain. Description of the pain—including nature, onset, timing, alleviating and exacerbating factors, as well as associated symptoms can suggest or eliminate the possibility of a cardiovascular cause. The majority of patients with chest pain can be appropriately diagnosed with a detailed history and physical and need limited further testing. Sibley Heart Center Cardiology has created, and uniformly utilizes, a chest pain questionnaire (attachment I) which assists in history-taking and determining need for possible further evaluation. Grayed areas on the questionnaire represent pain features which can be more concerning for possible, although rare, cardiovascular cause and may indicate a need for formal cardiovascular evaluation. Possible cardiovascular etiology is suggested by pain that is acute in onset, constant, pressure-like in nature, exacerbated by exercise or when lying down, or when it is associated with fever. Patients with a known history of Kawasaki disease should be evaluated by cardiology when they present with new-onset chest pain.

Additionally available is the Pediatric Cardiac Risk Assessment Form (attachment II) which provides further assistance in assessing a pediatric patient’s likelihood for underlying cardiovascular disease. Specific factors which suggest a possibility of cardiovascular disease include the following:

- Syncope during or after exercise, startle or emotion
- Excessive fatigue or shortness of breath with exercise
- Associated palpitations

Obtaining a detailed cardiovascular family history screens for inherited disease and assists in the determination of risk of cardiac etiology. The family history portion of the Pediatric Cardiac Risk Assessment Form addresses diagnoses within a family which may put a pediatric patient at risk for significant cardiac disease. We recommend utilization of the form in its entirety to evaluate for the presence of any of the following within the family:
• Sudden, unexpected, unexplained death before the age of 50...including SIDS, unexplained car accidents, drownings, passing away in their sleep, stillbirth.
• Sudden death from “heart problems” before the age of 50
• Cardiomyopathy
• Unexplained fainting or seizures
• Disability related to heart problems under the age of 50
• A pacemaker or defibrillator
• Congenital deafness
• Long QT syndrome or Brugada syndrome

Physical Exam
A focused and detailed cardiovascular exam can signal the presence of significant cardiac disease. Pertinent positives requiring evaluation on the physical exam include the following:
• Stigmata of Marfan’s Syndrome*
• Pathologic murmur
• Friction rub
• Valve clicks
• Signs of heart failure
• Criteria for Kawasaki
• Xanthomas (may indicate familial hyperlipidemia)

Laboratory Evaluation
Routine laboratory evaluation is generally not helpful in the outpatient evaluation of pediatric chest pain.

Electrocardiogram
Electrocardiograms can be very useful as part of the overall evaluation of pediatric patients presenting with chest pain. Unfortunately, a normal electrocardiogram does not eliminate the possibility of cardiovascular etiology. Knowledge of age-related changes, abnormal findings, and common normal variations is essential for effective interpretation. With a reliable interpretation, a normal ECG significantly diminishes, but does not eliminate, the possibility of cardiovascular cause. The best interpretation of the ECG is done with a full understanding of the history and presentation of the patient.

Echocardiogram
Echocardiograms are used when there is a suspicion for possible cardiovascular etiology. In general, echocardiograms are performed to evaluate for structural or functional heart disease when these are suggested by an abnormal ECG, physical exam, or when the history is suggestive of cardiovascular etiology.
Who may not need evaluation by a cardiologist

Patients with reassuring family history and otherwise normal physical exam may not need further cardiac evaluation when they present with the following:

- Sedentary chest pain which is reproducible on exam
- Chest pain attributable to reflux which resolves with reflux treatment
- Chest pain attributable to reactive airway disease which resolves with asthma treatment

Pediatric chest pain is a common presenting complaint to both general pediatric and pediatric cardiology offices. It very rarely has a cardiovascular cause. Cautious, detailed, history-taking with attention to risk factors for cardiovascular disease and close attention to salient physical exam features can help direct those patients who are at risk for cardiovascular etiology to further, more intensive evaluation by a pediatric cardiologist. Please feel free to utilize our questionnaires to help with screening of your patients.

If you have questions, visit www.choa.org/cardiology, call 1-800-542-2233, or email info@kidsheart.com.

*Non-cardiac stigmata of Marfan Syndrome include the following: Armspan greater than height, exceptionally tall, thin body habitus, pectus excavatum, kyphosis, scoliosis, pes planus, joint hypermobility, arachnodactyly, high arched palate, myopia, lens dislocation, retinal detachment, spontaneous pneumothorax, unexplained stretch marks.

Acknowledgement:

This Guideline was created by Sibley Heart Center in conjunction with the Atlanta based Quality Assurance Council (QAC). The QAC is composed of pediatric physicians representing Emory Children’s Center, Georgia Pediatric Subspecialists, Hughes Spalding, Kids Health First Pediatric Alliance, The Children’s Healthcare Network, and WellStar.

The recommendations in the above guideline do not indicate an exclusive course of treatment. The guideline’s intent is to build a consensus of care in the pediatric market and provide a framework for clinical decision-making.
Pediatric Chest Pain Evaluation Algorithm

To effectively and safely rule out cardiac etiology for chest pain

Sibley Heart Center would like to acknowledge the contribution of the collaborators on this project: Kids Health First, the Children’s Health Network, Georgia Pediatric Subspecialists, Emory Children’s Center and Wellstar Pediatrics. We are grateful to them for their hard work and insightful comments which were essential in bringing this project together.
Algorithm

• Based on a series of responses to questions regarding history and physical exam
• All “yes” answers in algorithm lead to a recommendation for cardiovascular evaluation
  – Activity restrictions while awaiting appointment Patients awaiting cardiovascular evaluation for chest pain should generally be restricted from competitive sports and vigorous exercise until evaluated by cardiology
  – Indications for the ER Patients who are toxic-appearing, have severe, sudden onset chest pain, and those who have significantly abnormal vital signs should be considered for evaluation in the emergency department
Algorithm

Pain Features

- Acute onset <48 hours
- Positional (worse supine, improved with leaning forward)
- With Exercise

Associated Symptoms

- Palpitations
- Syncope
- Unexplained shortness of breath

Additional Symptoms

- Syncope during exercise, emotion, or startle?
- Syncope after exercise?
- Extreme fatigue associated with exercise (different from others their age)?
- Unusual or extreme shortness of breath during exercise?

Obtain Cardiovascular Evaluation

Yes

No

Continue to page 4
Additional Medical History
- Congenital Heart Disease
- Kawasaki Disease
- Turner Syndrome

Family History
- Any family members who died suddenly of heart problems before age 50?
- Any family members who have unexplained fainting or seizures?
- Any relatives with the following conditions?
  - Hypertrophic cardiomyopathy
  - Dilated cardiomyopathy
  - Connective tissue disorder (Marfan or Ehlers-Danlos Syndrome)
  - Aortic Rupture, dissection, or aneurysm

Obtain Cardiovascular Evaluation

Physical Exam Features
- Unexplained fever
- Signs of connective tissue disease (Marfan)
- Pathologic Murmur
- Rub
- Click
- Kawasaki criteria
- Signs of heart failure
- Xanthomas

Chest Pain is non-cardiac, patient does not require cardiovascular evaluation
# Pediatric Cardiac Risk Assessment Form

Complete this form for each person under the age of 50, including children, periodically during well child visits including neonatal, preschool, before and during middle school, before and during high school, before college and every few years through adulthood. If you answer “Yes” or “Unsure” to any questions, read the back of this form.

Name: ______________________________________ Age: ________ Date: ________________________

<table>
<thead>
<tr>
<th>Individual History Questions:</th>
<th>Yes</th>
<th>No</th>
<th>Unsure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Has this person fainted or passed out DURING exercise, emotion or startle?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has this person fainted or passed out AFTER exercise?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has this person had extreme fatigue associated with exercise (different from others of similar age)?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has this person ever had unusual or extreme shortness of breath during exercise?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has this person ever had discomfort, pain or pressure in his chest during exercise, or complained of his heart “racing or skipping beats”?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has a doctor ever told this person they have: ☐ high blood pressure ☐ high cholesterol ☐ a heart murmur or ☐ a heart infection? (Check which one, if any.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has a doctor ever ordered a test for this person’s heart? If yes, what test and when?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has this person ever been diagnosed with an unexplained seizure disorder or exercise-induced asthma? If yes, which one and when?</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Has this person ever been diagnosed with any form of heart/cardiovascular disease? If yes, what was the diagnosis?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is this person adopted, or was an egg or sperm donor used for conception?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Family History Questions (think of grandparents, parents, aunts, uncles, cousins and siblings):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are there any family members who had a sudden, unexpected, unexplained death before age 50? (including SIDS, car accident, drowning, passing away in their sleep, or other)</td>
</tr>
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<td>Are there any family members who died suddenly of “heart problems” before age 50?</td>
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<tr>
<td>Are there any family members who have had unexplained fainting or seizures?</td>
</tr>
<tr>
<td>Are there any family members who are disabled due to “heart problems” under the age of 50?</td>
</tr>
</tbody>
</table>

| Are there any relatives with certain conditions such as:                                       |     |    |        |
| Check the appropriate box: ☐ Hypertrophic cardiomyopathy (HCM) ☐ Dilated cardiomyopathy (DCM) |     |    |        |
| Check the appropriate box: ☐ Arrhythmogenic right ventricular cardiomyopathy (ARVC), ☐ Long QT syndrome (LQTS), ☐ Short QT syndrome, ☐ Brugada syndrome, ☐ Catecholaminergic ventricular tachycardia |     |    |        |
| Coronary artery atherosclerotic disease (Heart attack, age 50 years or younger)               |     |    |        |
| Check the appropriate box: ☐ Aortic rupture or Marfan syndrome ☐ Ehlers-Danlos syndrome       |     |    |        |
| ☐ Primary pulmonary hypertension ☐ Congenital deafness (deaf at birth)                         |     |    |        |
| ☐ Pacemaker or ☐ implanted cardiac defibrillator (if yes, whom and at what age was it implanted?) |     |    |        |
| Other form of heart/cardiovascular disease or mitochondrial disease                           |     |    |        |
| Has anyone in the family had genetic testing for a heart disease? If yes, for what disease?  |     |    |        |
| _________________________________________________________________________________________ | YES/NO |

Explain more about any “yes” answers here:

Physician Signature _______________________________________ Patient Name: ____________________________

Nursing Signature ______________________________ Date of Birth ___________________________ Medic ____________

This form includes all items suggested in the American Heart Association Recommendations for Preparticipation Screening for Cardiovascular Abnormalities in Competitive Athletes—2007 Update Circulation 2007:115

For more information, visit www.choa.org/cardiology, email info@kidsheart.com or call 404-256-2593 (800-542-2233).

Updated 5/8/13 -PCP Initiative
CHEST PAIN QUESTIONNAIRE

NAME: (For staff use only)  
MRN:  
DOB:  
DATE  

1. Mark with an X on the diagram below the site of maximal pain, when present.
   
   ![Diagram of chest with areas for marking]

2. The chest pain is described as (Check any/all that apply):
   
   ___ Burning  ___ Itching  ___ Sharp
   ___ Dull ache  ___ Loss of breath  ___ Sticking
   ___ Fluttering  ___ Pressure  ___ Other: ____________________________
   ___ None of the above

3. How long have you noticed the chest pain to be present?
   
   ___ 48 hours or less  ___ 1 – 6 months
   ___ 2 -7 days  ___ More than 6 months
   ___ 1 week – 1 month  ___ Other: ____________________________

4. How often do you experience the chest pain (Check one)?
   
   ___ Once daily  ___ Weekly
   ___ Several times daily  ___ Several times weekly
   ___ Less often than weekly

5. The pain usually lasts for (Check one):
   
   ___ Seconds  ___ Hours
   ___ Minutes

6. Circle a number from 1 – 10 that describes the severity of the chest pain. (1 = least; 10 = worst)

   LEAST 1 2 3 4 5 6 7 8 9 10
   MODERATE
   WORST
<table>
<thead>
<tr>
<th>NAME:</th>
<th>(For staff use only)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRN:</td>
<td></td>
</tr>
<tr>
<td>DOB:</td>
<td>DATE</td>
</tr>
</tbody>
</table>

7. **Check below when the chest pain occurs:**
   - ____ Rest
   - ____ Both
   - ____ Exercise

8. **Pain is made worse by (Check any that apply):**
   - ____ Exercise
   - ____ Lying down
   - ____ Eating
   - ____ Sitting
   - ____ Coughing
   - ____ Any type of movement
   - ____ Standing
   - ____ Pushing on chest
   - ____ Taking a deep breath
   - ____ None of the above

9. **When you have chest pain, do you also have / suffer from (check all that apply):**
   - ____ Palpitations / irregular heartbeat
   - ____ Nausea
   - ____ Lightheadedness
   - ____ Difficulty breathing
   - ____ Syncope (passing out)
   - ____ Other symptoms: _______________________
   - ____ None of the above

10. **Have you had any of the following (check all that apply):**
    - ____ Recent chest injury
    - ____ History of asthma
    - ____ Recent cough, wheeze, cold symptoms
    - ____ Kawasaki Disease
    - ____ Recent fever
    - ____ None of the above

11. **Does the chest pain ever wake you from sleep?**
    - □ Yes  □ No

12. **Has your child had wheezing or whistling in the chest at any time in the last 12 months?**
    - □ Yes  □ No

13. **Has your child awakened at night because of coughing in the last 12 months?**
    - □ Yes  □ No

14. **Has your child had coughing, wheezing, or shortness of breath with exercise or activity and had to stop because of these symptoms at any time in the last 12 months?**
    - □ Yes  □ No

15. **When your child has a cold, does the cough usually last more than 10 days?**
    - □ Yes  □ No
Order Form

Referring Provider: ____________________________________________

Please ask the patient or parent / guardian to bring this signed form at the time of the visit.

If necessary, generate a referral request from the patient’s insurance plan. Please fax the authorization to 404-252-7431.

Patient Name: ______________________________________________
Date of Birth: ______ / ______ / ______
Patient Phone: ______________

Provider Name: (please print) _____________________________
Provider Phone: ______________
Provider Fax: ______________

Provider Signature: _______________________________________
Date: ______________

Option 1:

Evaluate and Treat (Patient will see a cardiologist)

Diagnosis: (Check all that apply)

- Chest pain
- Syncope/lightheadedness
- Palpitations
- Tachycardia
- Cardiac Clearance
- Murmur
- Cyanotic episodes
- Hypertension (Need prior BP readings)
- Hyperlipidemia (Need most recent labs)
- Abnormal ECG (Need previous ECG)
- Other

(Need appropriate medical records)

-OR-

Option 1:

Test Only (Patient will not see a cardiologist)

Reason for Test ________________________________

- ECG (Need previous ECG if available
- Echocardiogram
- Holter Monitor
- Event Recorder

At Sibley Heart Center Cardiology we have a medical interpreter and language line available to assist all non-English speaking patients.

For a list of our physicians and locations please see other side of this form.

Please call us at 404-256-2593 or visit choa.org/orderpad to request more order pads be sent to your office.

CHOA/SHCC.RxPad.04/13
Sibley Heart Center Cardiology
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Pediatric Cardiologists

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Athens
Canton
Scottish Rite hospital
(Located next to Egleston hospital on the Emory University campus)
Columbus
Cumming
Dalton
Emory-Children’s Center
Gainesville
Hamilton Mill
Macon
Marietta
Newnan
Snellville
Stockbridge
Tifton
Villa Rica

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