# Management of Pediatric Chest Pain: How to Make the Patient and the Pediatrician Happy

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Cardiology 2024: Annual Update on Pediatric and Congenital Cardiovascular Disease Conference

# Objectives

- Foundational principles of managing chest pain referrals
- What do referring pediatricians want?
- How about patients and families

# Evaluation and management of chest pain

- Using appropriate “red flags” allows near perfect prediction of pediatric patients with (and without) cardiac–related chest pain
- Even in patients with “red flags” the likelihood of cardiac-related causes for chest pain is very low (<0.5%)

Harahsheh, et al (2017)

- Providing referring physicians with education and a support tool to help triage referrals can be effective

Harahsheh, et al (2020)

Patient History

- Chest pain with exertion
- Exertional syncope
- Chest pain that radiates to back, jaw, left arm, or left shoulder
- Chest pain that increases with supine position
- Chest pain temporally associated with fever (>38.4oC)

Past Medical History*

- Hypercoagulable state
- Arthritis/Vasculitis
- Immobilization

Family History

- Sudden unexplained death
- Cardiomyopathy
- Hypercoagulable state

Physical Examination

- RR> 40
- Temperature > 38.4° C
- Ill-appearing
- Painful/swollen extremities
- Non-innocent murmur
- Distant heart sounds
- Gallop
- Pulmonic component of S2
- Pericardial friction rub
- Peripheral edema

# Evaluation and management of chest pain

<u>Quality Metrics</u>

- Current and past medical history
  - Fever, associated symptoms (syncope), Kawasaki disease
- Family history
  - Cardiomyopathy, early (<55yo) coronary disease, sudden death
- Exam
  - Cardiac exam, palpation of the chest wall
- Testing
  - Electrocardiogram
  - Echocardiogram if exertional chest pain


Adult Congenital & Pediatric Quality Network

Lu et al. (2017)

https://cvquality.acc.org/initiatives/acpc-quality-network

# Evidence in the literature on making patients and pediatricians happy…

Summary: there is no needle.

# Interactions with pediatricians (Methods)

- Survey of local referring pediatricians (~250)
- Conjoint analysis to understand most important parts of the interaction to pediatricians

# Pediatrician survey

- How often do you refer for chest pain?
- How satisfied are you with your experience when you refer?

- Do you use your experience or prefer a “support tool” to help you manage pediatric chest pain?
- Would you prefer an asynchronous email exchange with a pediatric cardiologist or an actual referral for patients with chest pain?
- In your interaction with a pediatric cardiologist for a patient with chest pain would you prefer a “brief response” or a more detailed response that explains the thought process of the specialist?

# Cincinnati Children's support tool

COMMUNITY PRACTICE SUPPORT TOOL / August 2023

## Chest Pain

Cincinnati Children's

**FAST FACTS**

**15%**
of new patient referrals to cardiology clinics at Cincinnati Children's Heart Institute are for episodes of chest pain

**44%**
of teens with chest pain believe they are having a heart attack

**<1%**
of pediatric patients seen for chest pain have a cardiac etiology for that pain

Chest pain is a common symptom in children and teens. Most pediatric chest pain is caused by anxiety, muscle strain, acid reflux, or inflammation of the ribs and cartilage of the chest wall. In a well-appearing pediatric patient with a reassuring history and exam, chest pain is usually benign.

### ASSESSMENT

Perform a standard health history and physical exam (HPE) with probing questions around the episodes of chest pain to determine whether the chest pain may be related to a cardiac issue.

### HPE (HISTORY AND PHYSICAL EXAM) RED FLAGS

**History of present illness (HPI):**
- Chest pain is exertional
  - Only occurs at peak exercise
  - Does NOT occur at low-level exercise
  - Same pain does NOT occur at rest
  - Is NOT reproducible to palpation
- Exertional syncope
- Chest pain is positional—worse when patient is lying down

**Past medical history (PMHx):**
- Hypercoagulable state
  - Inflammatory disorder
  - Malignancy
  - Thrombophilia
- Past history of cardiac disease

**Family history:**
First degree family history of:
- Cardiomyopathy
- Sudden death under 50 years of age
- Pulmonary hypertension
- Pacemaker or defibrillator
- Channelopathy
- Coronary anomaly

**Physical exam:**
- Pathologic murmur
- Hepatosplenomegaly
- Loud S2
- Obvious respiratory distress and/or abnormal vital signs requires urgent evaluation

### MANAGEMENT/TREATMENT

A thorough and focused HPE is the most important aspect of treating pediatric chest pain. The HPE will often reveal the likely cause (musculoskeletal, respiratory, GI, anxiety) of chest pain in an otherwise well-appearing child with no red flags.

Reassure and educate the patient/patient's family that the chest pain is not being caused by a heart attack or other cardiac issue.

Most pediatric chest pain is consistent with a musculoskeletal cause. In this situation, a trial of NSAIDS around the clock for three days is reasonable.

### WHEN TO REFER

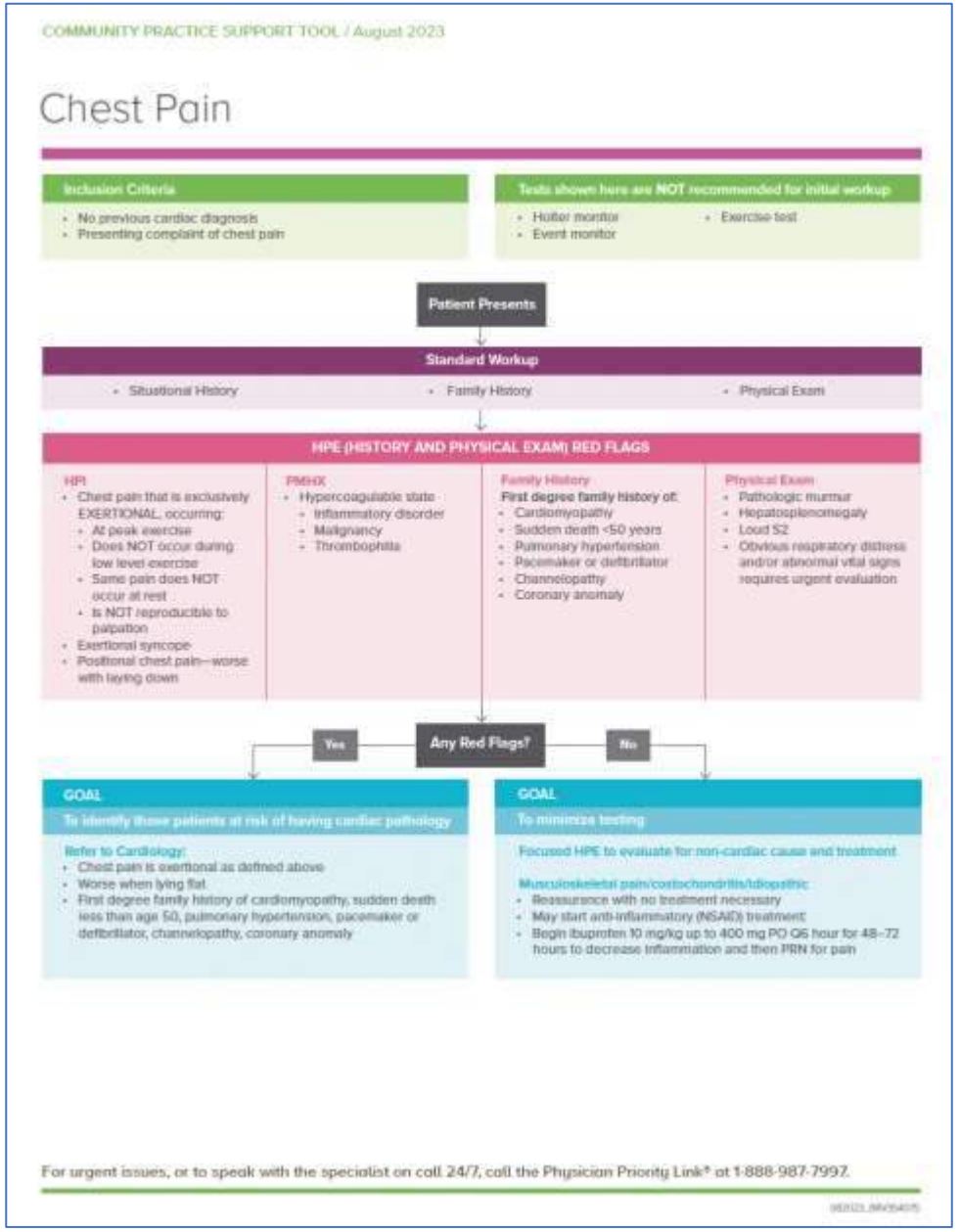
If history red flags (see above) are present upon HPE, the patient should be referred to see a pediatric cardiologist at Cincinnati Children's.

**If referral is made:**
Have the patient complete a diary of symptoms, including the day, time, and activity they were doing when they experienced symptoms—and instruct them to bring the diary with them to the cardiology clinic visit.

If you have clinical questions about patients with chest pain, email cardiology@cchmc.org.

If you would like additional copies of this tool, or would like more information, please contact the Physician Outreach and Engagement team at Cincinnati Children's.

Tool developed by Cincinnati Children's physician-hospital organization known as Tri-State Child Health Services, Inc.) and staff in the James M. Anderson Center for Health Systems Excellence. Developed using expert consensus and informed by Best Evidence Statements, Care Practice Guidelines, and other evidence-based documents as available. For Evidence-Based Care Guidelines and references, see www.cincinnatichildrens.org/evidence.



COMMUNITY PRACTICE SUPPORT TOOL / August 2023

## Chest Pain

**Inclusion Criteria**
- No previous cardiac diagnosis
- Presenting complaint of chest pain

**Tests shown here are NOT recommended for initial workup**
- Holter monitor
- Event monitor
- Exercise test

**Patient Presents**

**Standard Workup**
- Situational History
- Family History
- Physical Exam

**HPE (HISTORY AND PHYSICAL EXAM) RED FLAGS**

**HPI**
- Chest pain that is exclusively EXERTIONAL, occurring:
  - At peak exercise
  - Does NOT occur during low level exercise
  - Same pain does NOT occur at rest
  - Is NOT reproducible to palpation
- Exertional syncope
- Positional chest pain—worse with laying down

**PMHX**
- Hypercoagulable state
  - Inflammatory disorder
  - Malignancy
  - Thrombophilia

**Family History**
**First degree family history of:**
- Cardiomyopathy
- Sudden death <50 years
- Pulmonary hypertension
- Pacemaker or defibrillator
- Channelopathy
- Coronary anomaly

**Physical Exam**
- Pathologic murmur
- Hepatosplenomegaly
- Loud S2
- Obvious respiratory distress and/or abnormal vital signs requires urgent evaluation

**Any Red Flags?** — Yes / No

**GOAL**
**To identify those patients at risk of having cardiac pathology**

Refer to Cardiology:
- Chest pain is exertional as defined above
- Worse when lying flat
- First degree family history of cardiomyopathy, sudden death less than age 50, pulmonary hypertension, pacemaker or defibrillator, channelopathy, coronary anomaly

**GOAL**
**To minimize testing**

Focused HPE to evaluate for non-cardiac cause and treatment

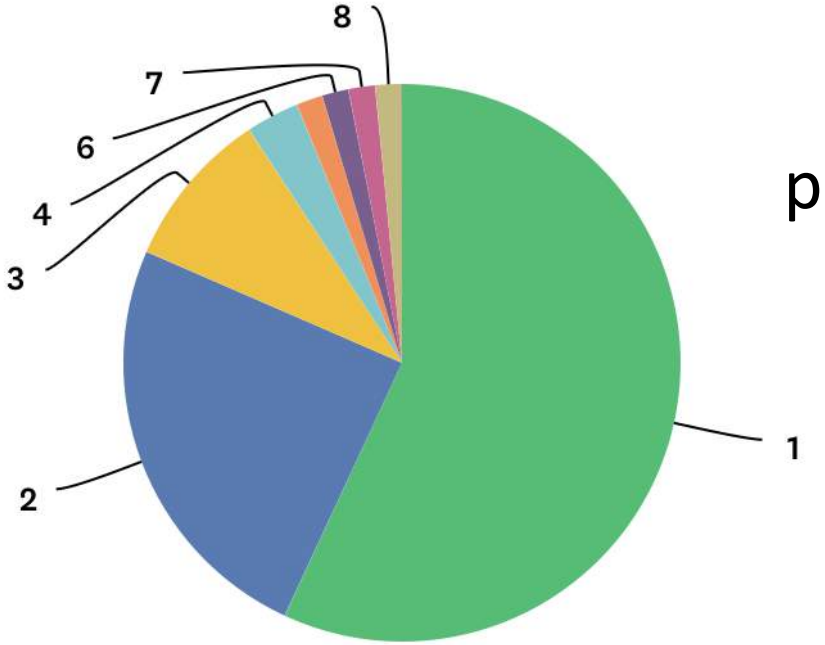
Musculoskeletal pain/costochondritis/idiopathic:
- Reassurance with no treatment necessary
- May start anti-inflammatory (NSAID) treatment
- Begin ibuprofen 10 mg/kg up to 400 mg PO Q6 hour for 48–72 hours to decrease inflammation and then PRN for pain

For urgent issues, or to speak with the specialist on call 24/7, call the Physician Priority Link® at 1-888-987-7997.

# Pediatrician survey: Conjoint analysis (n=65)

Out of every 10 patients who you see with the chief complaint of chest pain, how many would you say you refer to see a pediatric cardiologist?

Answered: 65 Skipped: 0




>80% only refer 1-2 patients/every 10 patients they see

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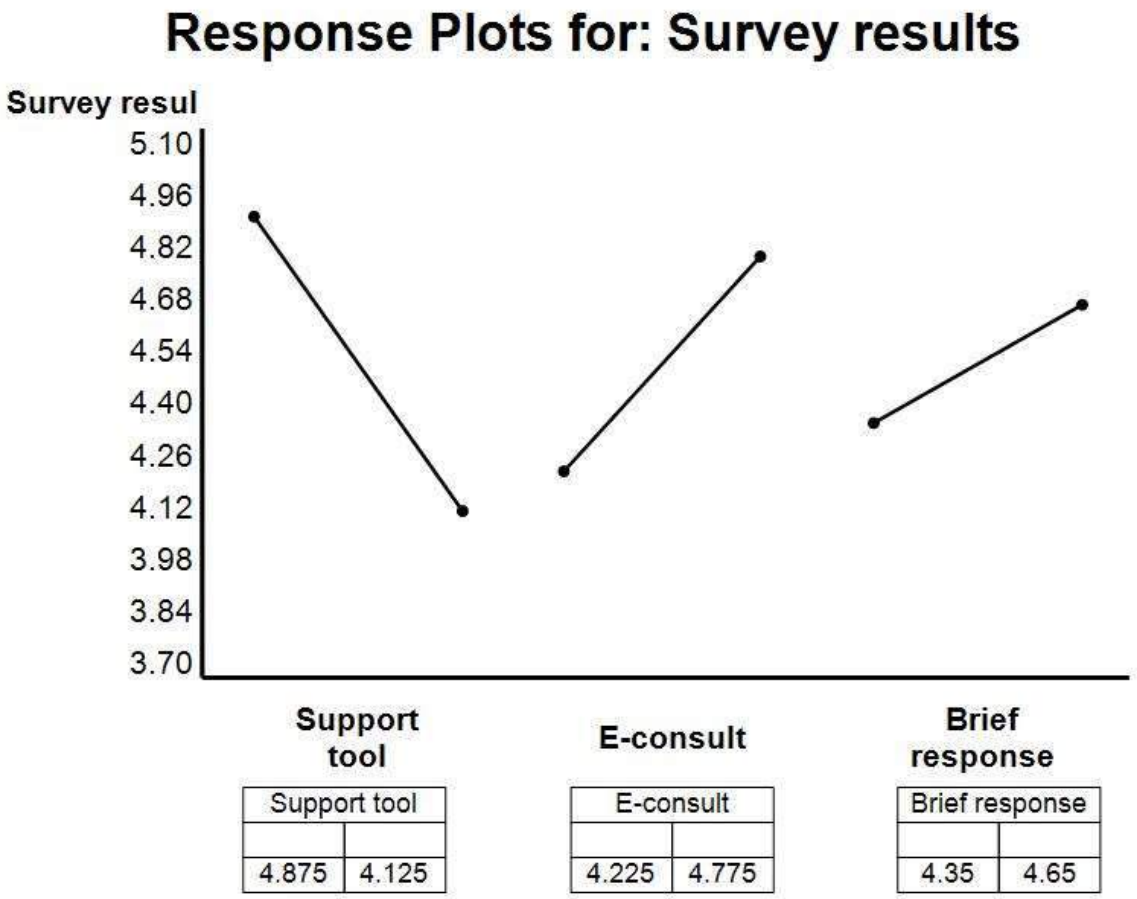
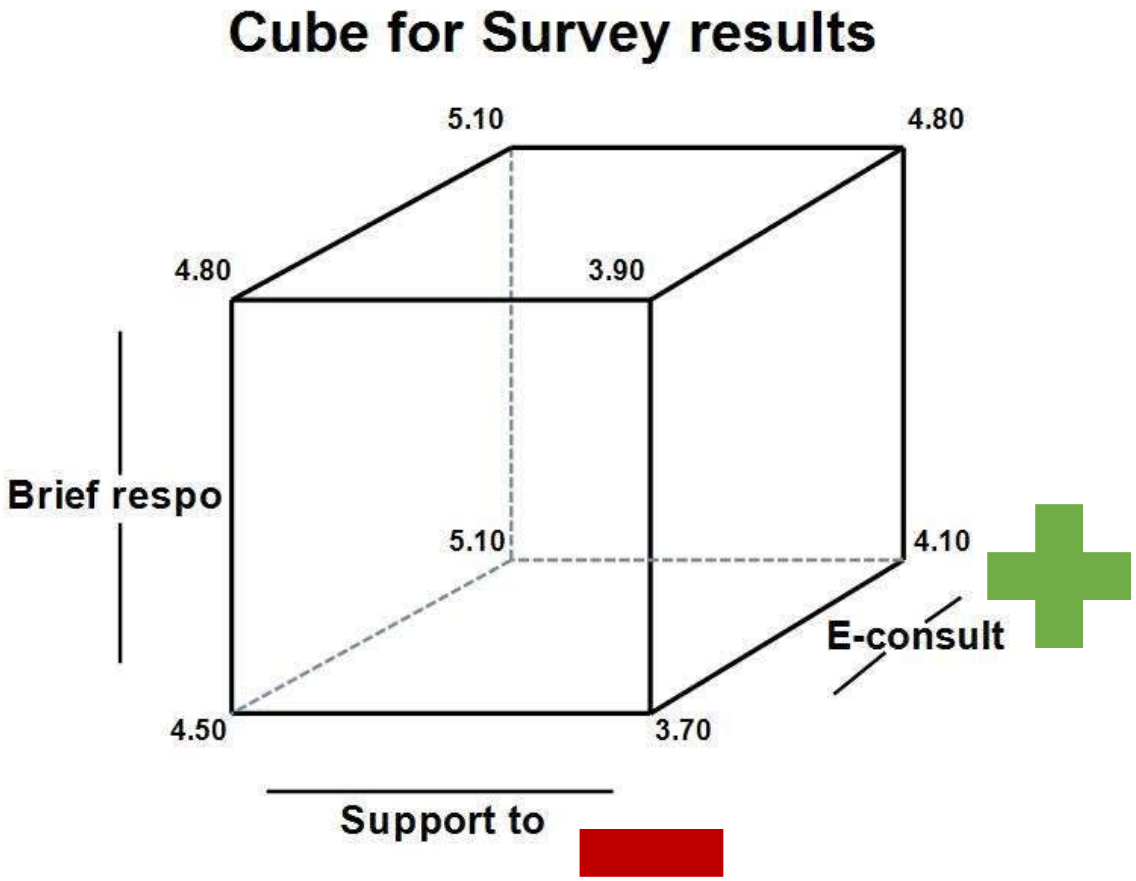
# Conjoint analysis: interactions

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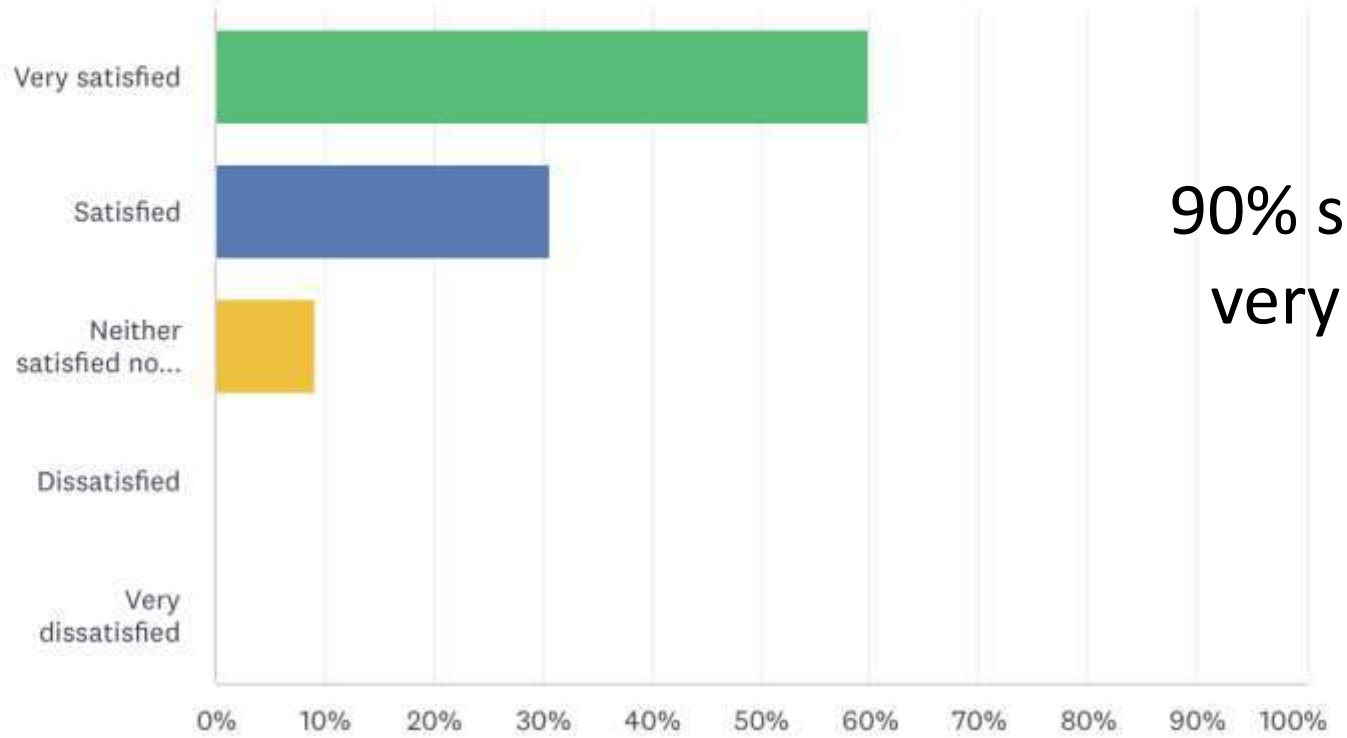
# Conjoint analysis: summary

- Most pediatricians do not use a chest pain support tool to decide whether to refer, even if one is provided
- Pediatricians do use (and like) an asynchronous method to ask questions of cardiologists regarding pediatric chest pain
- Pediatricians are ambivalent about having a detailed response in our notes about the chest pain visit

# Pediatrician survey: Satisfaction

As you think back on the patients you have referred to a pediatric cardiologist for chest pain over time, for most patients, how satisfied have you been with your experience interacting with the cardiologist?

Answered: 65 Skipped: 0




90% satisfied or very satisfied

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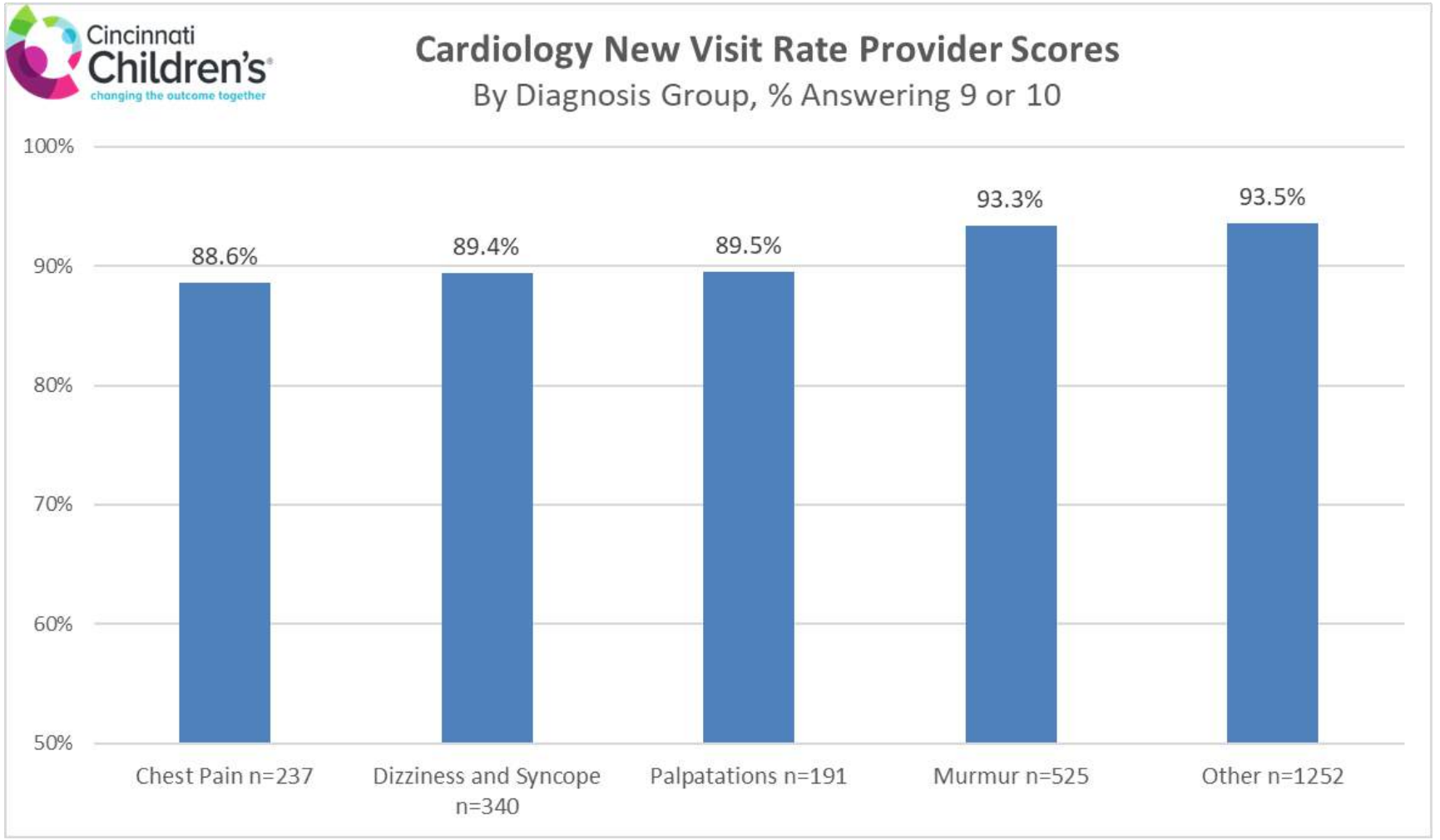
# Patient and family experience

- Methods:
  - Pulled all new visits in our division in 2022-2023
  - Patient and Family Experience scores
    - % of scores that rated the visit at 9-10/10
  - Comparison of those who came in for chest pain to other common reasons for a new visit

# Patient and family experience: results

- Total cardiology new visits: ~16,000
- Chest pain new visits: ~1,400 (8.8%)
- PFE responses: n=237, ~17% response rate



# Patient and family experience

**Recognition/Feedback:**

The nurses were great but I do not know how Cincinnati Children's can be ranked No. 1 in the US. My daughter has had INCREASING chest pain for three weeks. Costochondritis primarily impacts females. We have seen six different doctors at various location over the last three weeks trying to get relief. We saw three female doctors and three male. All three male doctors said she was fine

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implied it was in her head and Dr [redacted] looked straight at my 14 year old and told her she needed to see a behavior therapist so she could learn to live with the pain. NO ATTEMPT AT ALL TO HELP WITH THE PAIN OR TO TROUBLE SHOOT OR TO SUGGEST ANYTHING EXCEPT GO BACK TO PRIMARY DR AND TO LEARN TO LIVE WITH THE PAIN. He said he was a "silo" and after one EKG and one exam and that no one in our family had ever died young that he could assure me there was nothing wrong with her heart. There was no interest in trying to help with the pain or to see if

our heads or just live with it. I can understand allowing unknown chest pain that comes and goes to have time to resolve on its own. It is why we waited three weeks. But when we come in after three weeks of INCREASING PAIN and get told that the solution is to see behavior therapy to learn to live with it because her heart is perfectly fine after one exam that is not okay. What kind of message did my daughter, who is just now learning how to speak up for herself, receive? Your

# Summary/conclusions

- There are a few ways to partner with/support referring pediatricians with their patients presenting with chest pain
- Generally, pediatricians are happy with these interactions with us as cardiologists
- Patient/family experience scores mirror scores for patients seen with palpitations and dizziness but are lower than other new visit reasons
- This area could use additional analysis

# Thank you

# References

Harahsheh, et al. A Multi-Institutional Analysis From Standardized Clinical Assessment and Management Plans (SCAMPs®), the Pediatric Health Information Systems Database, and the National Ambulatory Medical Care Survey. Clin Pediatr (Phila). 2017 Nov; 56(13): 1201–1208.

Harahsheh, et al. Promoting Judicious Primary Care Referral of Patients with Chest Pain to Cardiology: A Quality Improvement Initiative. Med Decis Making 2021 Jul;41(5):559-572

Lu, et al. Development of quality metrics for ambulatory pediatric cardiology: Chest pain. Congenital Heart Disease. 2017;12:751–755.