

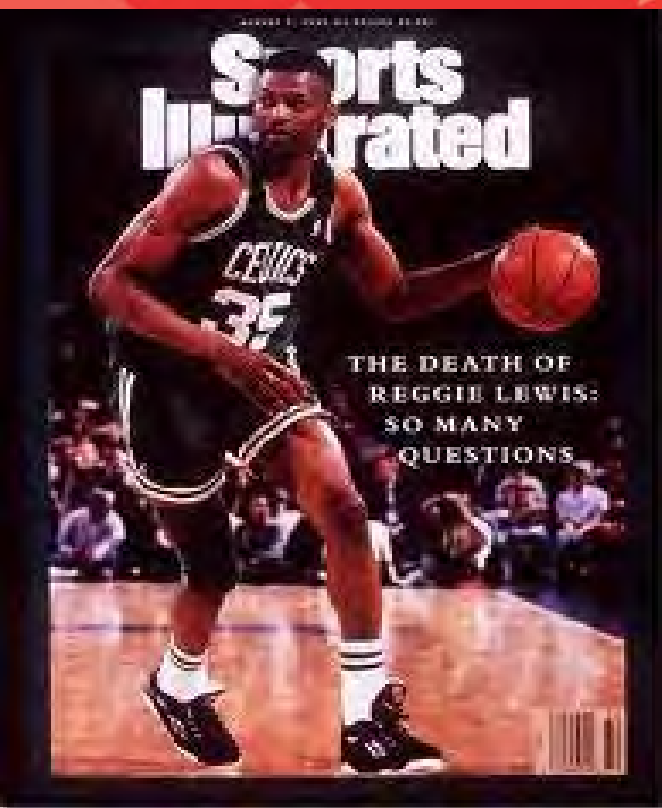
# Syncope and Chest Pain in Children: To Refer or not to Refer

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Children's National Health System

# Conflicts of Interest

No conflicts of interests or disclosures.



Girl, 17, killed by the sudden noise of her mobile phone

**THE DAY MY HEART STOPPED**

Girl died minutes after first kiss with boyfriend



# Aims

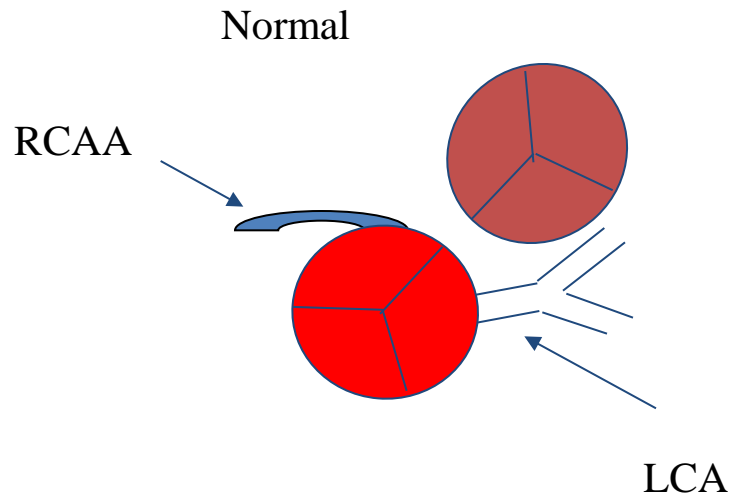
At the conclusion of this activity, participants will be able to

- identify when to refer a child presenting with chest pain or syncope to cardiology
- recognize the potential charge implications of low probability referrals and testing
- identify the need for new quality improvement initiatives surrounding referral and consultation

## Case 1

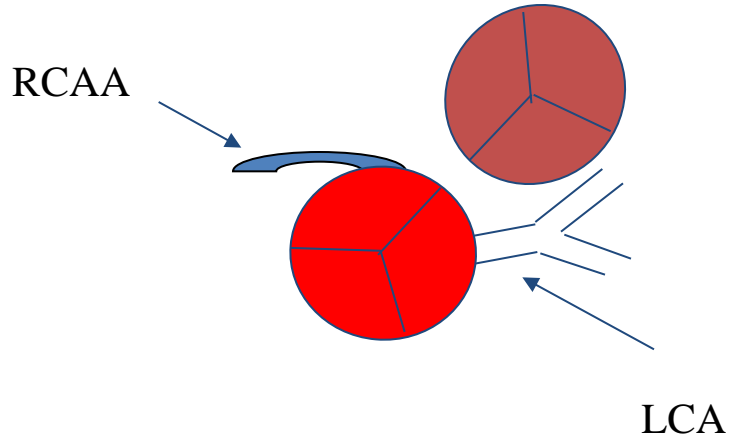
- 15 year old complained of dizziness during activity
- Mother: depression, MGF: heart attack at 52 years
- Normal examination

# Coronary artery anomalies

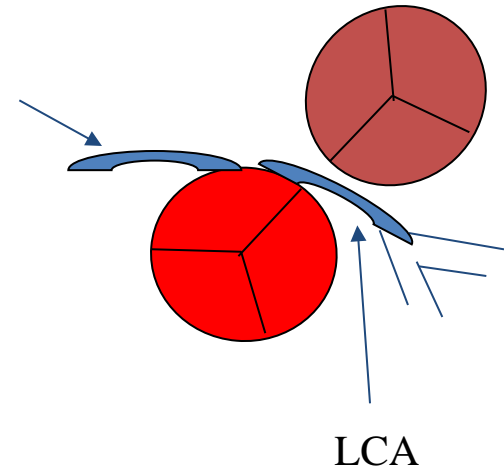


# Coronary artery anomalies

Normal

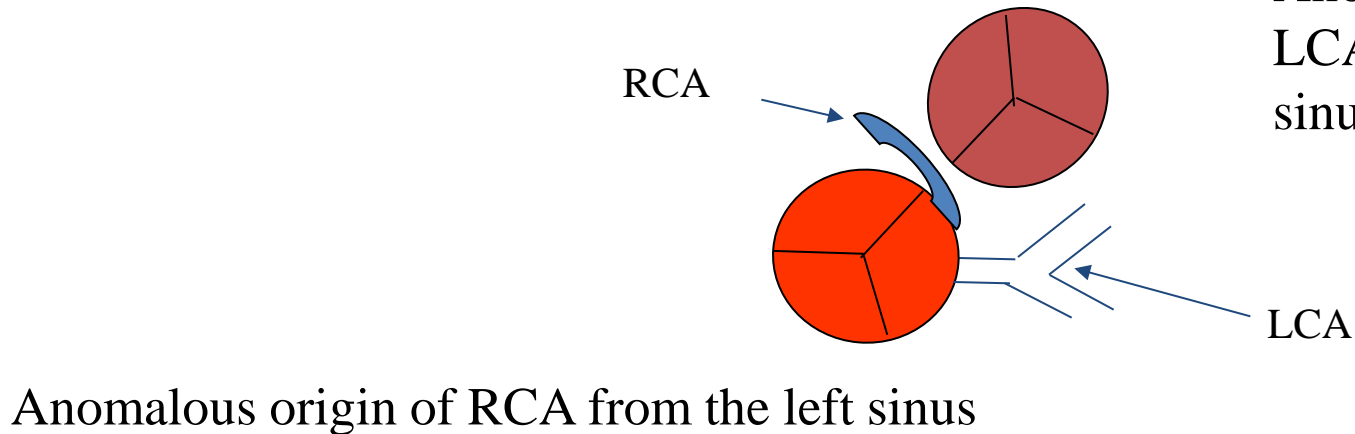
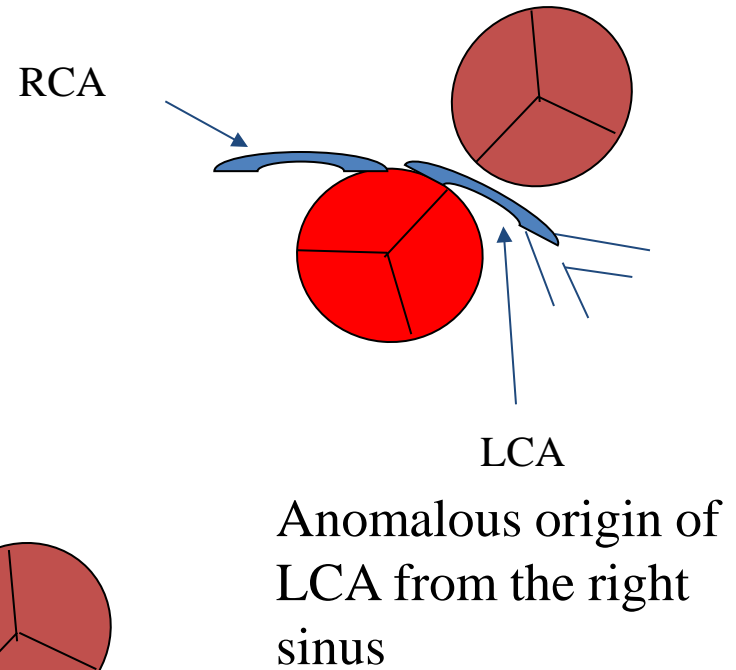
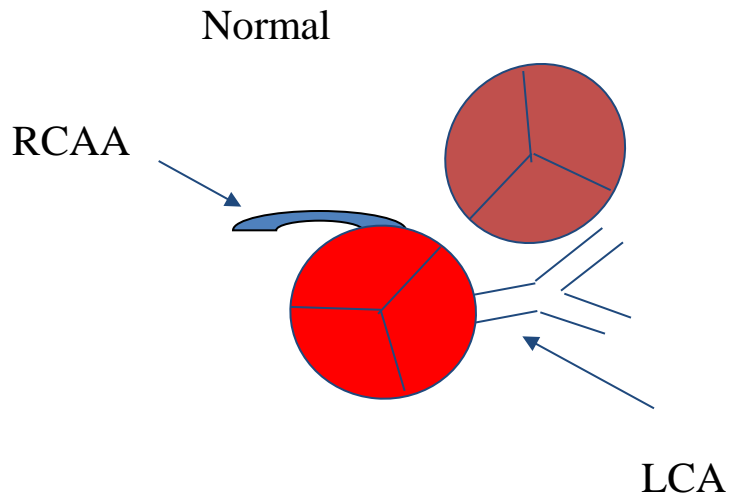


RCA

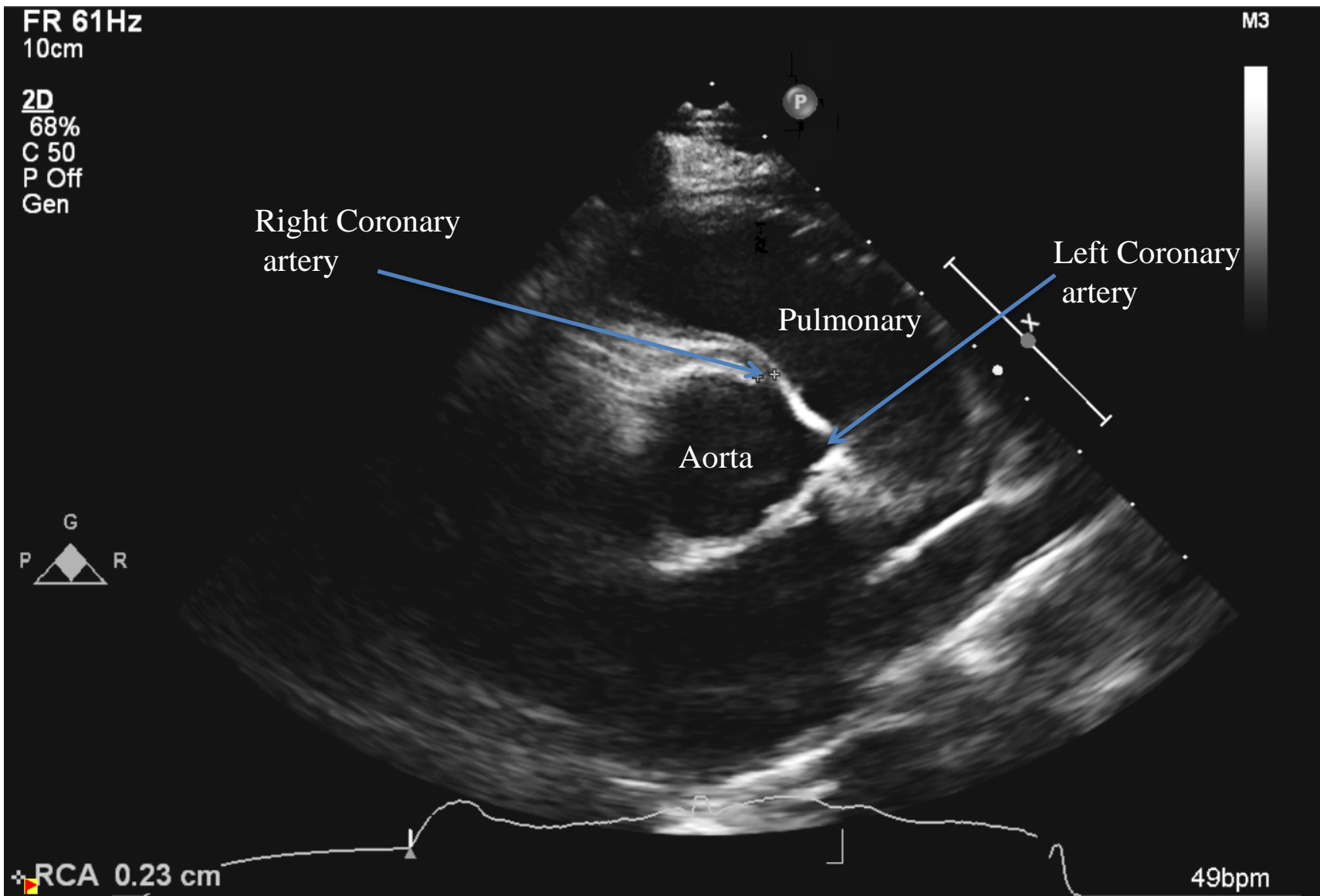


Anomalous origin of  
LCA from the right  
sinus

# Coronary artery anomalies







# Chest Pain/Syncope

## Cardiac

- Hypertrophic cardiomyopathy
- Coronary artery anomalies
- Aortic stenosis
- Pulmonary hypertension
- Pericarditis/Myocarditis
- Rhythm abnormalities

# Chest Pain/Syncope: When to Refer

# Items representing red-flag for referrals

- 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 ( $>38.4^{\circ}\text{C}$ )
  - Syncope with no warning, sudden onset
- Past Medical History\*
  - Hypercoagulable state
  - Arthritis/Vasculitis
  - Immobilization
- Family History
  - Sudden unexplained death
  - Cardiomyopathy
  - Hypercoagulable state

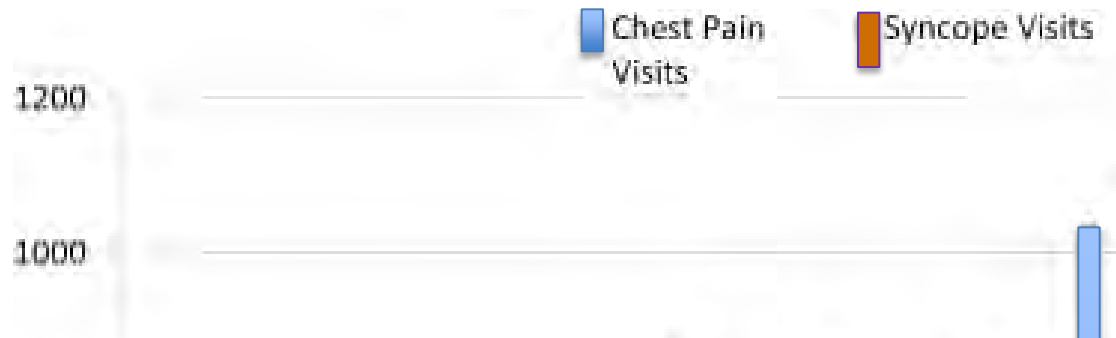
Harahsheh et al. Clinical Pediatrics (Phila). 2017 Jan 1

# Items representing red-flag for referrals

- **Physical Examination**

- RR > 40
- Temperature > 38.4° C
- Ill-appearing
- Painful/swollen extremities
- Non-innocent murmur
- Distant heart sounds
- Gallop
- Pulmonic component of S<sub>2</sub>
- Pericardial friction rub
- Peripheral edema

Harahsheh et al. Clinical Pediatrics (Phila). 2017 Jan 1



60% of patients with benign (vasovagal) syncope referred to cardiology did not meet any red flag criteria for referral



Tretter et al. J Pediatr 2013;163:1618-23 e1

## Study 1

Original

People

Referred

From

and

People

Database,

Medical

Care

Survey

Cardiac disease  
Explaining chest pain  
8/3167 (0.25%)

missions.nav  
684605  
e/cpj

Ashraf S. Harahsheh, MD, FACC, FAAP<sup>1,2</sup>, Michael L. O'Byrne, MD, MSCE<sup>1,2</sup>,  
Bill Pastor, MA, MPH<sup>1</sup>, Dionne A. Graham, PhD<sup>3</sup>, and David R. Fulton, MD<sup>3</sup>



Children's National™

# Study 1

- ...to determine if clinical indicators (red-flags) identified a sub-population of children with chest pain, in whom cardiac disease explained their chest pain
- ...to measure the incidence of low-probability referrals, and the magnitude of technical charges from resultant cardiac testing of these referrals

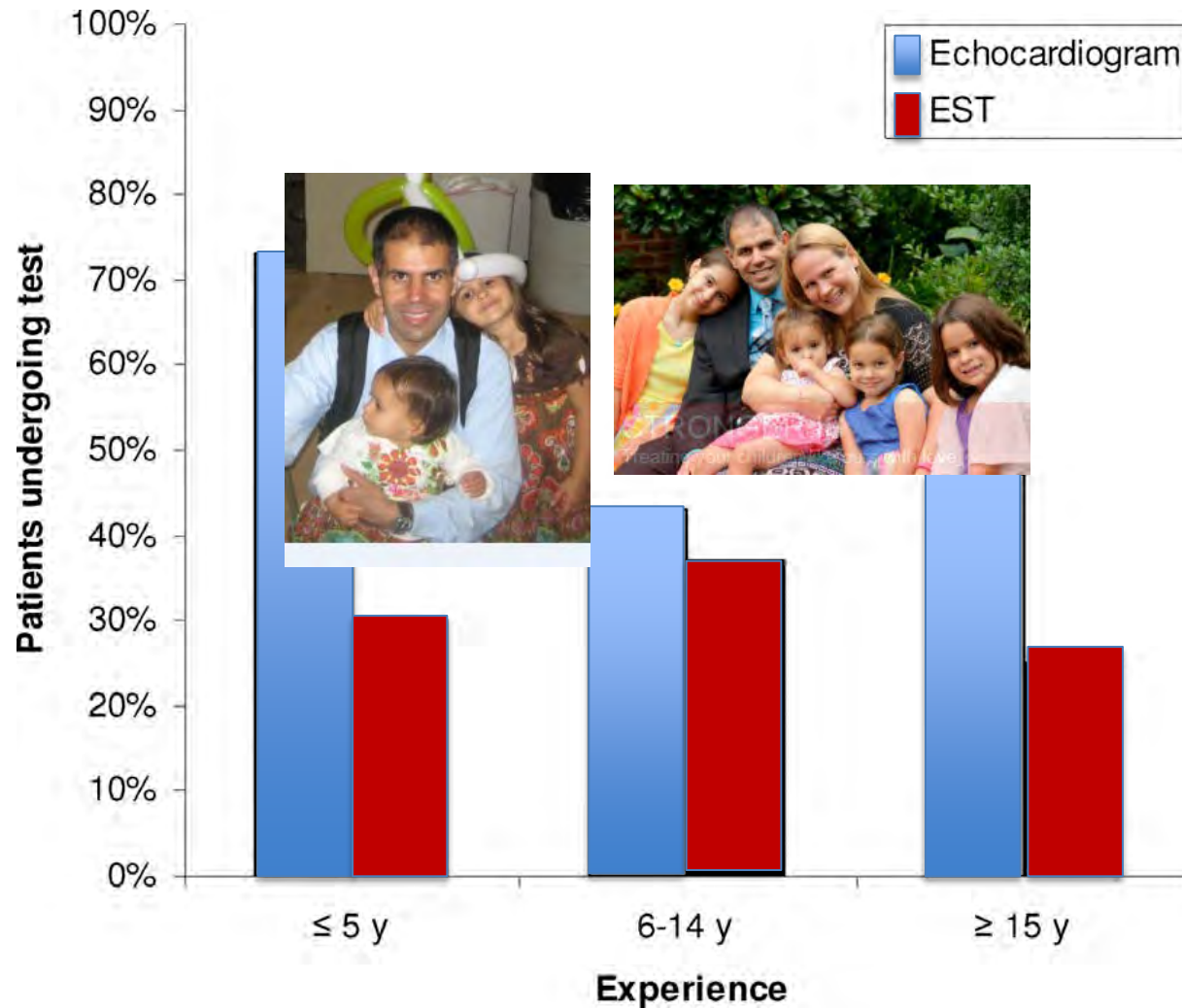
Harahsheh et al. Clinical Pediatrics (Phila). 2017 Jan 1



# Methods

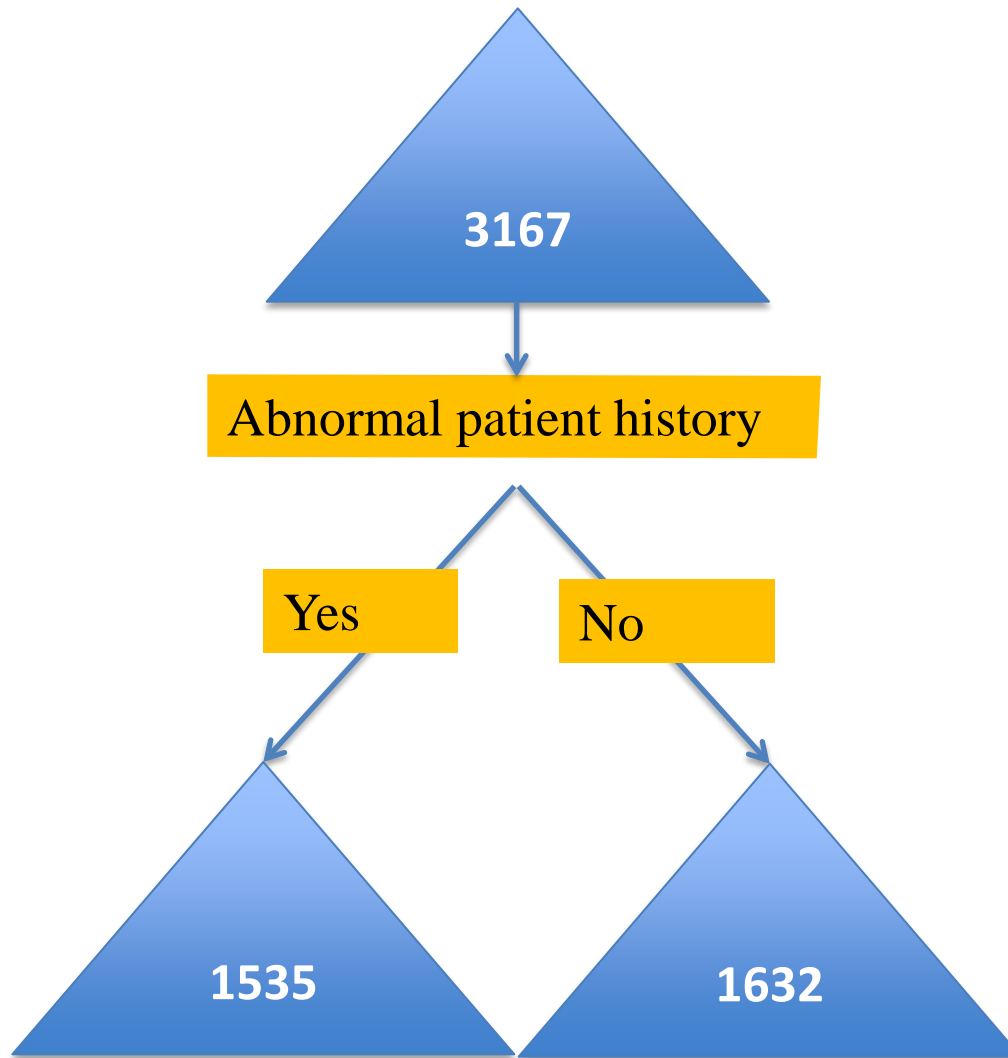
- Standardized Clinical Assessment and Management Plans (SCAMPs<sup>®</sup>)

# Cardiac Testing According to Provider Experience.

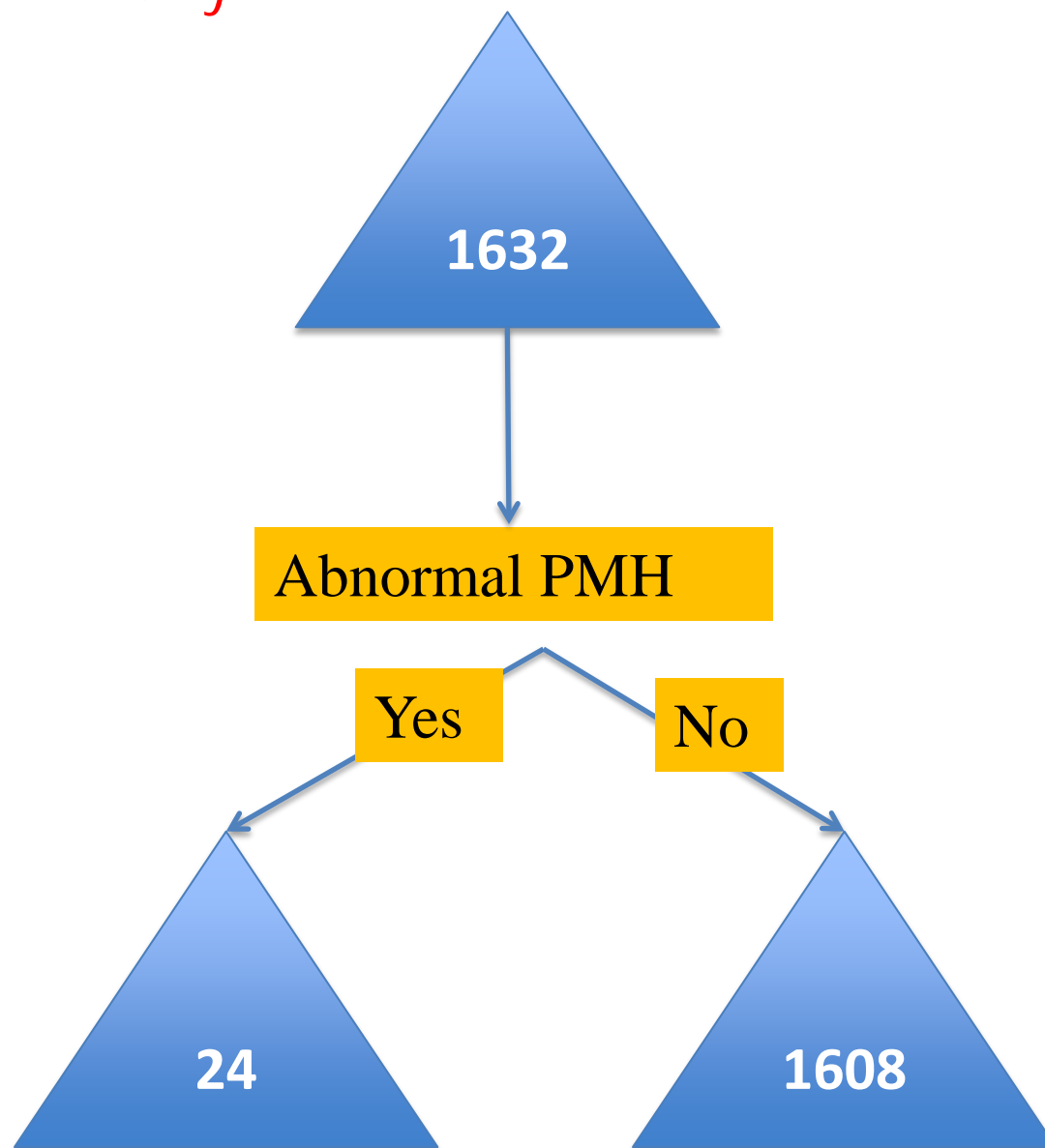


Friedman K G et al. Pediatrics 2011;128:239-245

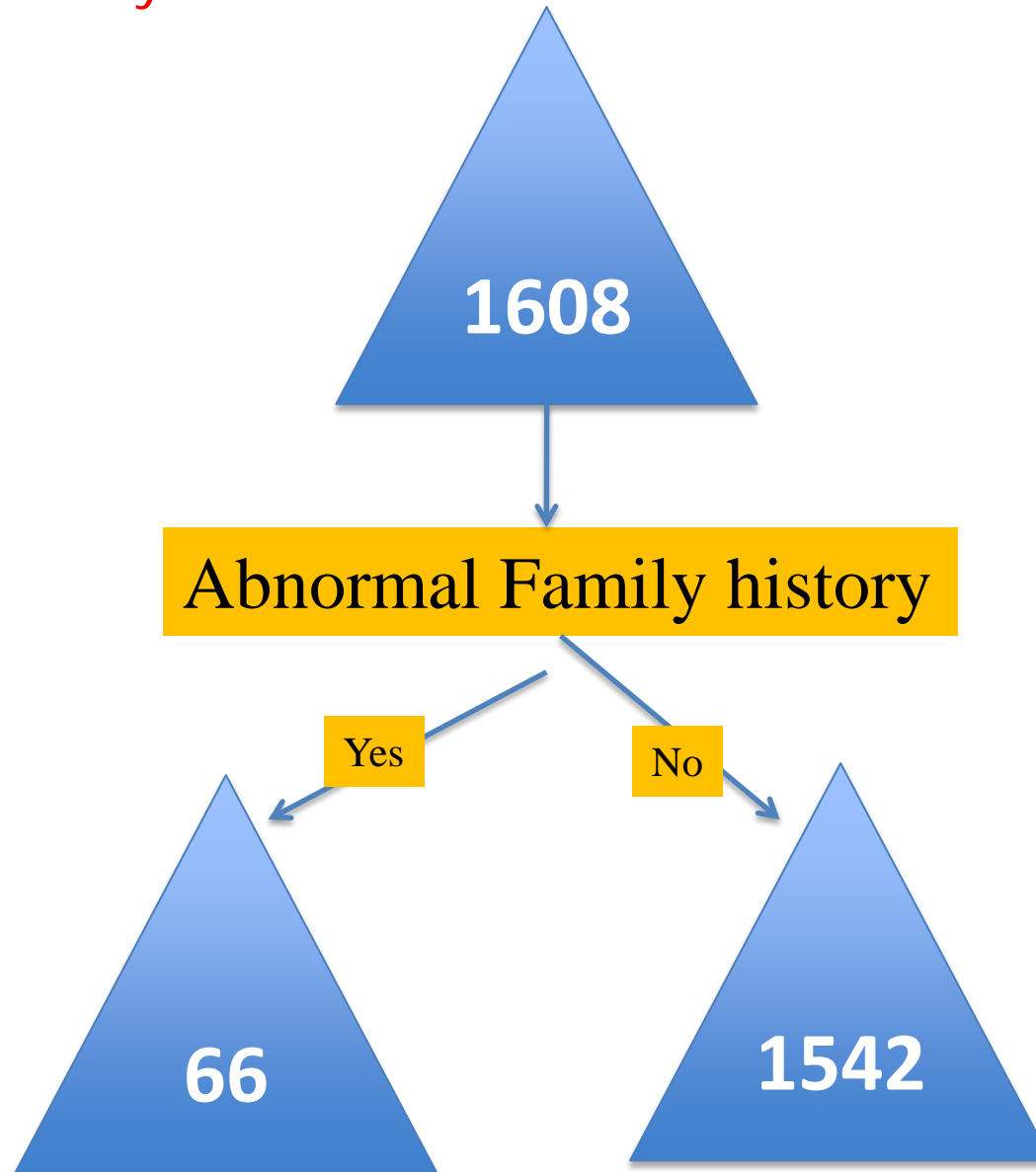
# History of Present Illness



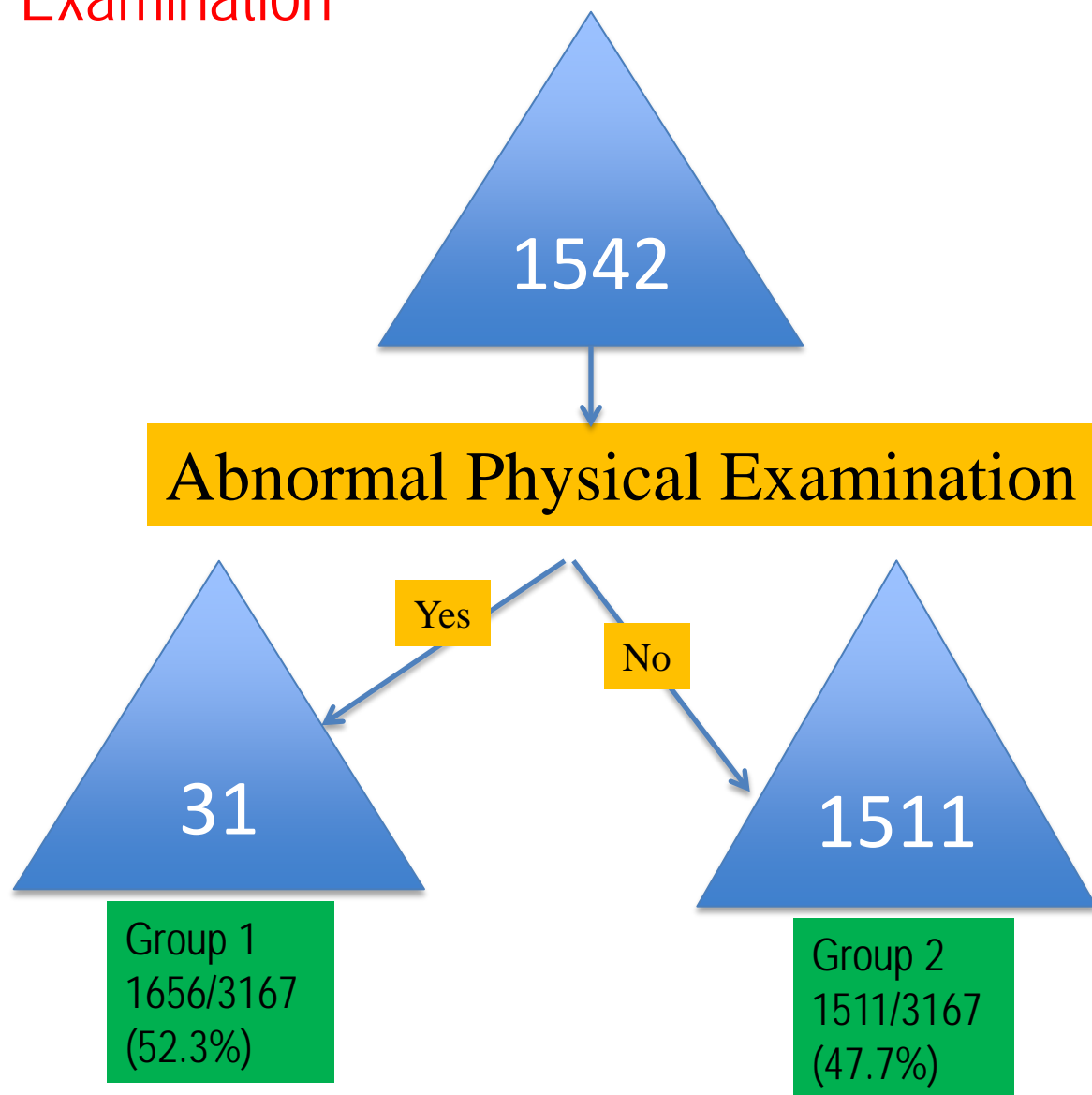
# Past Medical History



# Family history



# Physical Examination



Cardiac cause for chest pain		
Group 1 + red-flag for referral	Group 2 Benign (no need for referral)	p value
8/1,656 (0.48%)	0/1511 (0%)	0.03

Harahsheh et al. Clinical Pediatrics (Phila). 2017 Jan 1

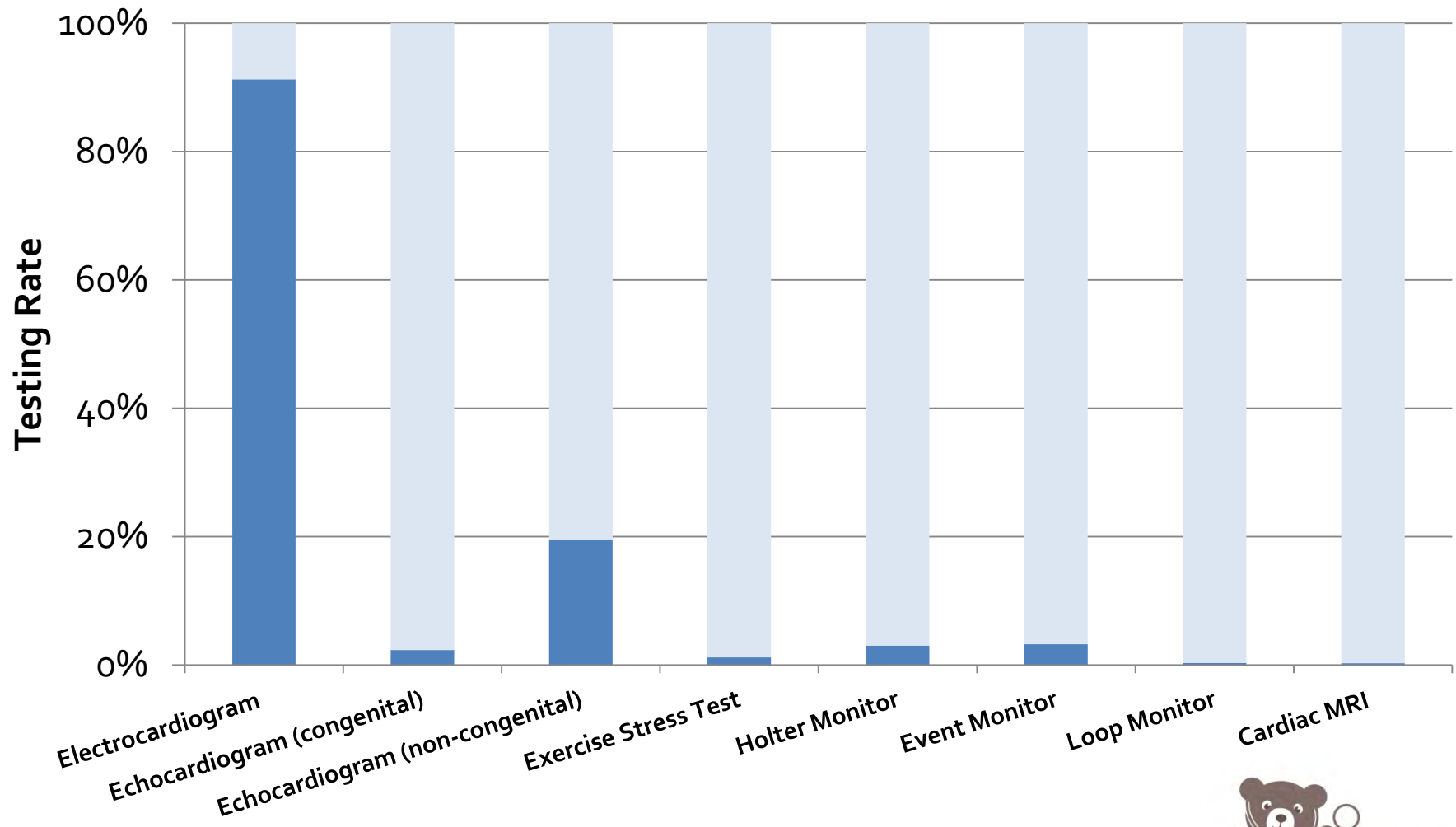
The presence of any red-flag identified subjects with a cardiac cause of chest pain with

- 100% sensitivity
- 48% specificity
- 0.5% positive predictive value
- 100% negative predictive value





## Testing Rate in the benign group (n=1511)



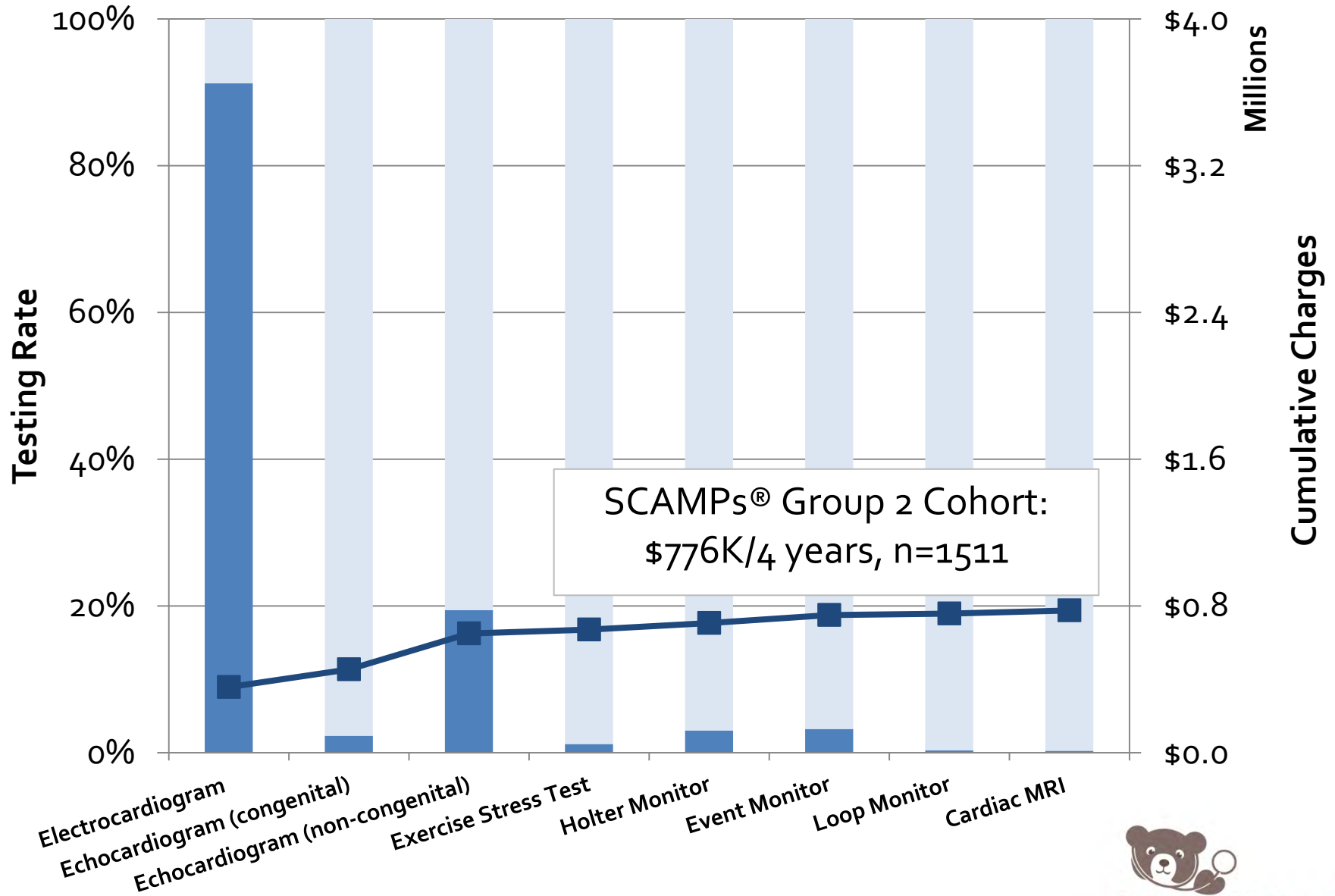
# Methods

- Standardized Clinical Assessment and Management Plans (SCAMPs<sup>®</sup>)
- Pediatric Health Information System (PHIS) database
- National Ambulatory Medical Care Survey (NAMCS)

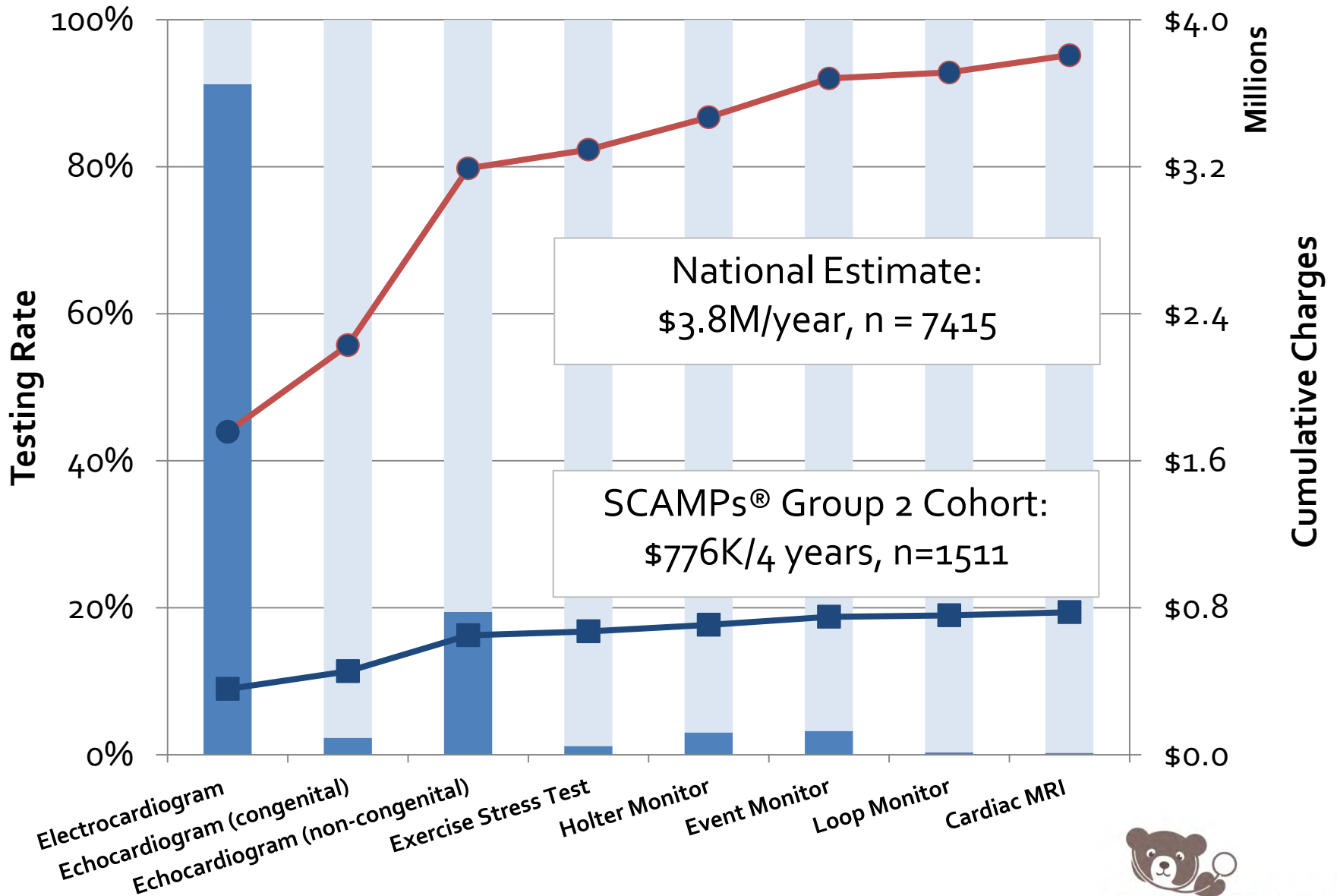
## Technical charges for diagnostic tests for hospitals in PHIS database (2014)

	Charge per Test (US2014\$)				
	Minimal	1st Quartile	Median	3rd Quartile	Maximum
Electrocardiogram	59	213	260	332	722
Echocardiogram (congenital)	927	1,731	2,765	3,525	5,318
Echocardiogram (non-congenital)	148	411	665	873	2,507
Exercise stress test	309	521	1,147	1,480	2,298
Holter monitor	214	612	795	1,129	2,001
Event monitor	241	615	890	1,238	2,102
Loop monitor	218	934	1,484	2,962	23,332
Cardiac MRI with contrast	1,391	3,230	4,281	5,366	9,281

# Testing Rate and Total Charges (US2014\$)



# Testing Rate and Total Charges (US2014\$)



# Why so much referrals

# Why so much referrals/ unnecessary testing

- Parental anxiety/preference was the reason for ordering unnecessary testing in 14% of cases<sup>1</sup>
- Forrest et al. reported that approximately 1 in 6 (16.7%) pediatric referrals involved parental request for specialty care<sup>2</sup>

1- Harahsheh et al. Clinical Pediatrics (Phila). 2017 Jan 1

2- Forrest et al. Archives of pediatrics & adolescent medicine. Jul 1999;153(7):705-714

# You are not alone!

- 96% of senior pediatric residents desire more education about the referral process
- Only 50% the residents feel well-prepared to: incorporate parental perception of the need for referral in their conversations with families
- Only 45% feel well-prepared to address anxiety causing families to press for an unnecessary urgent referral.

Hamburger et al. Academic pediatrics 2015;15:5-8.



# Barriers to achieving fruitful encounters

- Primary pediatricians and gaps in their education
  - ability to identify red flag criteria for referral
  - to counsel and reassure families not requiring such referrals.
  - feel pressured by concerned parents

Hamburger et al. Academic pediatrics. Jan-Feb 2015;15(1):5-8

Forrest et al. Archives of pediatrics & adolescent medicine. Jul 1999;153(7):705-714

Referral and consultation is a professional activity that residents should be entrusted to do proficiently by graduation

Englander et al. A developmental approach to the competencies. J Pediatr. 2010;157:521-522, 522 e521

New curriculum

# An Innovative Pilot Curriculum Training Pediatric Residents in Referral and Communication Skills on a Cardiology Rotation



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From the Department of Pediatrics (Dr Greenberg, Dr Harahsheh, and Dr Ottolini), Division of Cardiology (Dr Harahsheh), Graduate Medical Education (Dr Ottolini), Children's Research Institute (Dr Mitchell), Children's National Health System, Clinical Learning and Simulation Skills Center (Drs Lewis, and Blatt), and George Washington University School of Medicine and Health Sciences, Washington, DC

The authors have no conflicts of interest to disclose.

An abstract of this project was presented at the 2014 Northeast Group on Educational Affairs Annual Retreat, New Haven, Connecticut, and another abstract of this project was presented at the Pediatric Academy Society meeting in San Diego, California, in April 2015.

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**ACADEMIC PEDIATRICS** 2016;16:700–702



## Project 2

- To evaluate the effect of a learner-centered syncope curriculum on improving resident confidence in making a referral decision for syncope patients
- To explore if the residents overall self-efficacy and standardized patient (SP) ratings improved post-intervention

Harahsheh et al. Academic Pediatrics 2016 Sep-Oct;16(7):700-2

# Methods

## Pre-Test (90 minutes)

- Syncope Medical Knowledge cognitive exam
- Demographics data
- 2 OSCE cases
- SP checklist

## Mid rotation syncope workshop (90 minutes)

- Interactive, case-based presentation by a cardiologist on syncope
- Short interactive didactic on the principles of communication based on the Kalamazoo consensus and the communication model described by Korsch
- Practice with the SPs.

## Post-Test (90 minutes)

- Syncope Medical Knowledge cognitive exam
- Retrospective pre and post self-efficacy questionnaire
- 2 OSCE cases.
- SP checklist

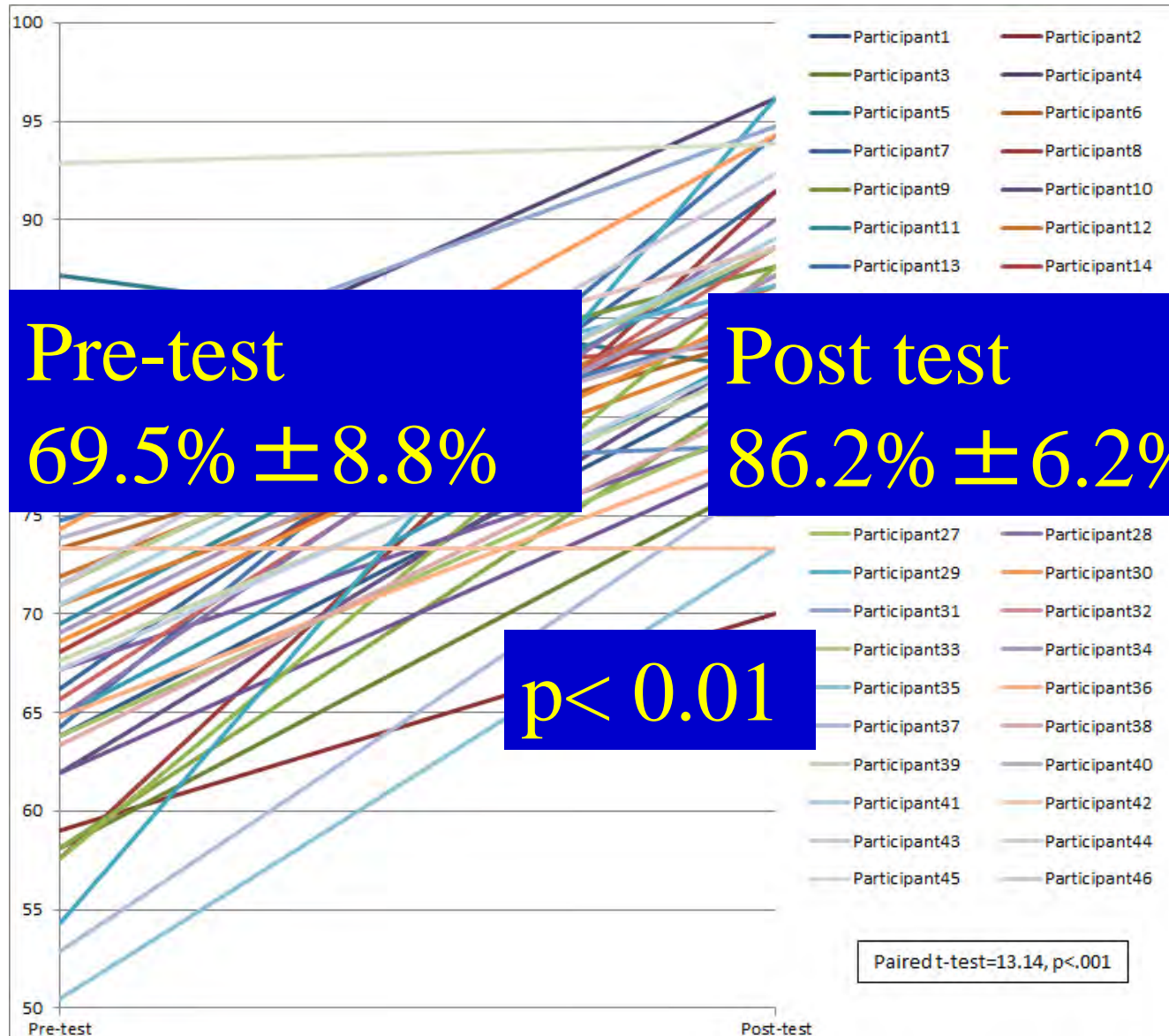


# Results

- Forty eight residents
- Percentage of residents who were confident about their decision to refer or not refer syncope patients to cardiology increased from 28% to 98%,  $p < 0.001$

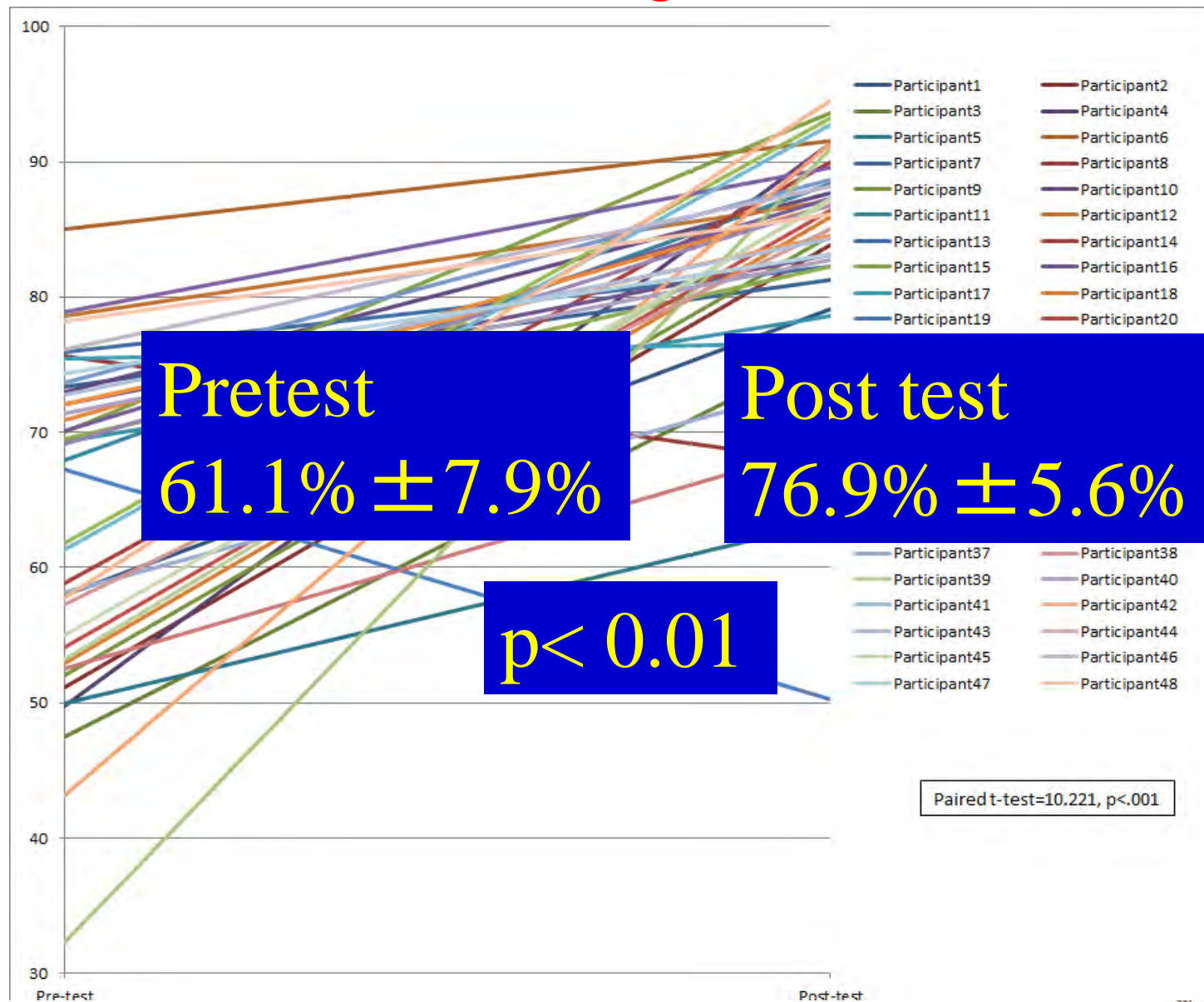


# Overall self-efficacy of residents





# Standardized Patient Ratings



# Results

- 19/46 (41%) residents encountered actual syncope patients during the rotation and outside this curriculum.
- Using one-way ANOVA, there was no significant difference in the degree of improvement in any of the tools used for those who saw and those who did not see a syncope patient.

Harahsheh et al. Academic Pediatrics 2016 Sep-Oct;16(7):700-2

# Project 3



- Expand to all subspecialty rotations
- 4.5 hour workshop (pre, intervention and post)  
Concentrate on communication skills
- Blended model (pre-workshop preparation-online material)

Harahsheh et al.

An Educational Intervention Utilizing Standardized Patients  
to Teach Pediatric Residents the Skills of Subspecialty Referral - Ongoing

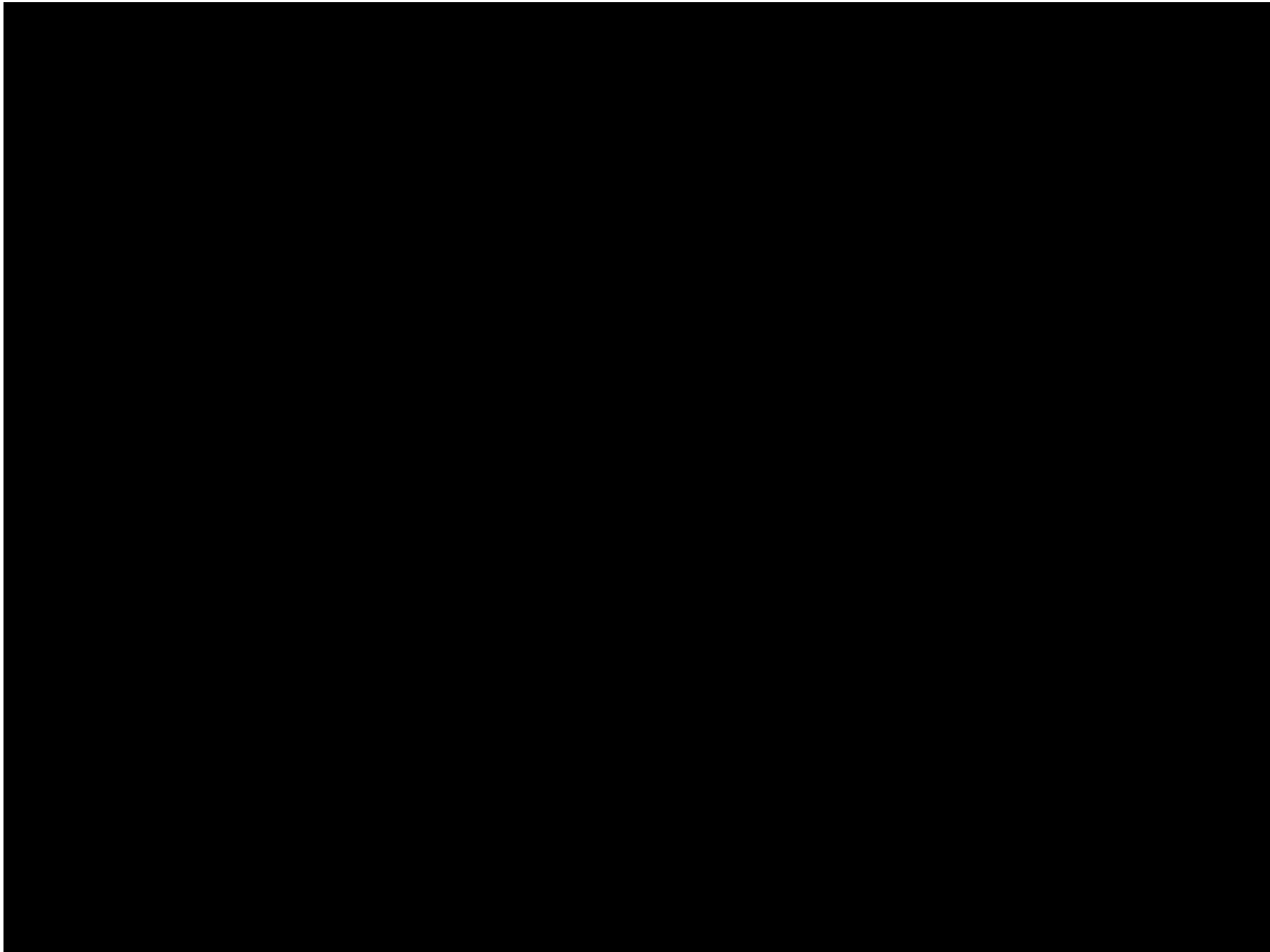
Pediatric Academic Societies 2017 Meeting, May 6 - 9 San Francisco, CA.

# Presenting situation/door chart information

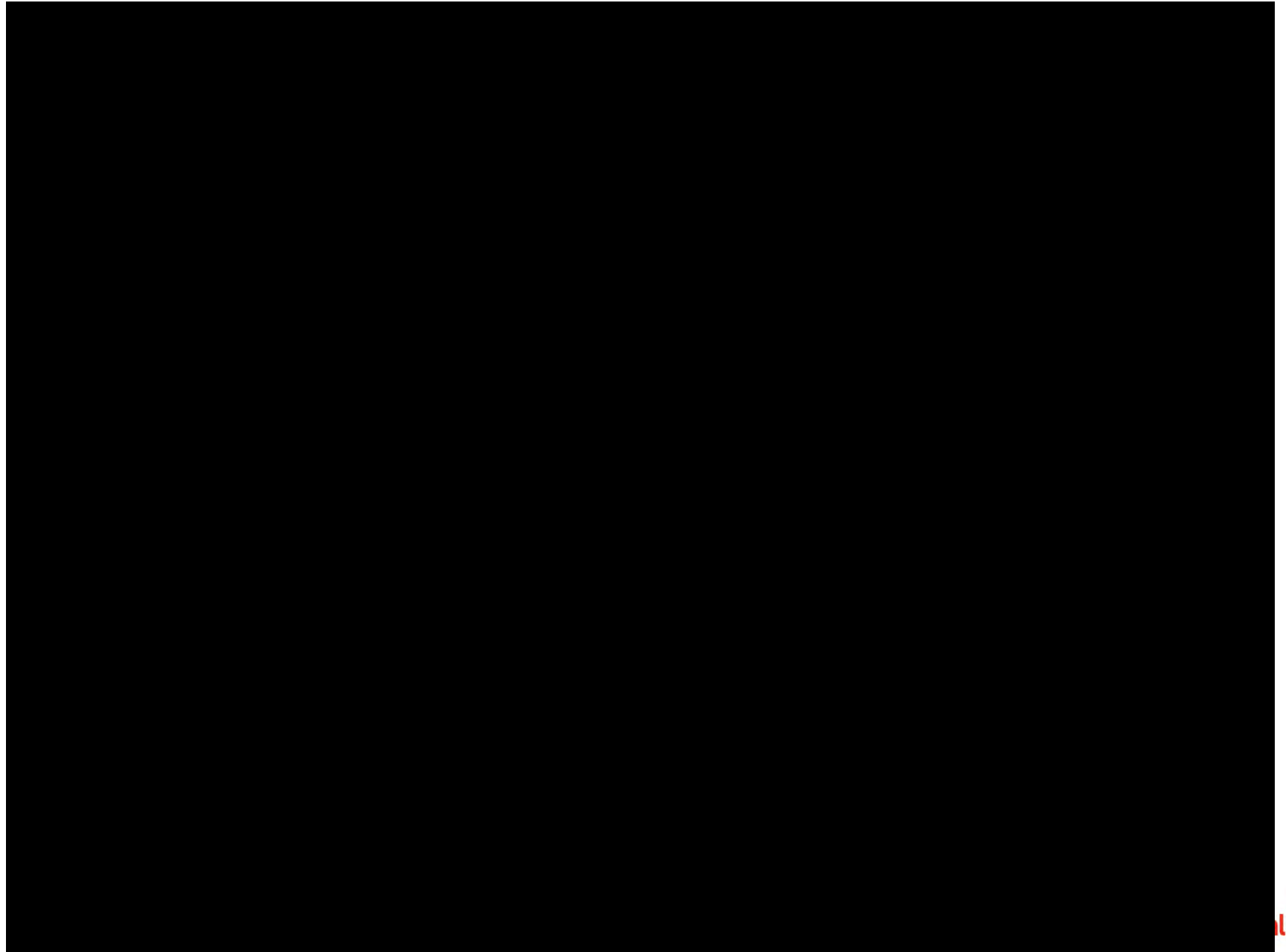
- Patient Name: Shelly Turner and 16-year-old daughter, Jen. This is an established patient of yours. She was diagnosed with a heart murmur as a baby but grew out of it by the time she started elementary school.
- 
- Location: Pediatrician's office
- Time/Date: 4:00 pm
- Hx: Jen fainted today 40 minutes after a lacrosse game (no SOB, chest pain or palpitation) with reassuring PMH (no history of cardiac or seizures), family history (no SIDS, unexplained death, drowning or car accidents, pacemakers) and normal examination. She has benign vasovagal syncope. Mother is anxious.

## Presenting situation/door chart information

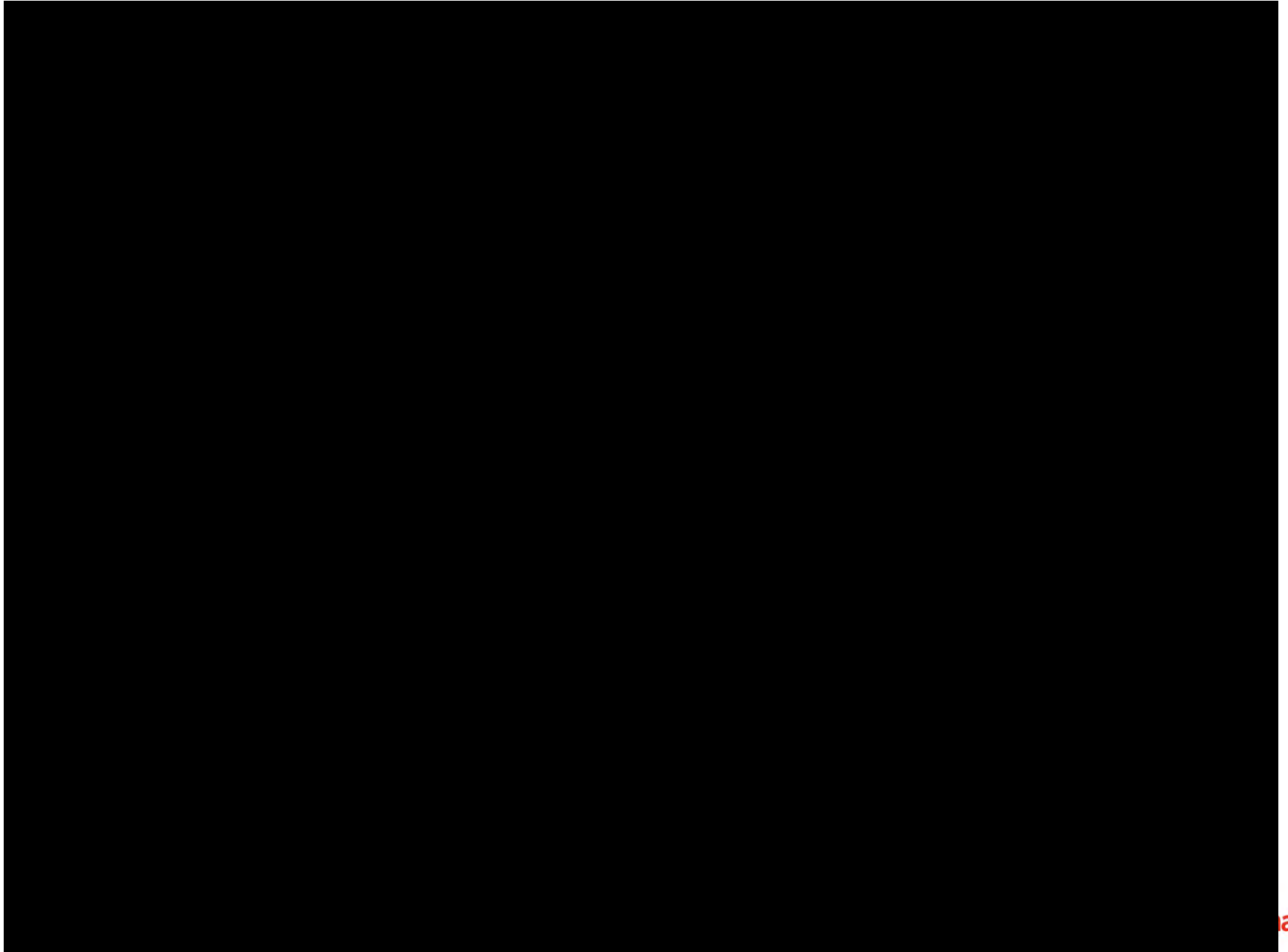
- Medical Information: Jen's physical examination is normal
- Task: You have already met with the family, obtained the history portion and performed the physical examination. During that time the mother's emotions displayed were fear and surprise. You had to step outside to answer a page and now you will counsel the family.
- Please counsel Jen's mother, Shelly, as appropriate.
- Time: 10 minutes



# Why not send to Cardiology



# Red Flags for referral





## Presenting situation/door chart information

- Patient Name: Jillian Roper and son Adam. This is an established patient of yours who was seen for a reassuring school physical 3 months ago. He was noted to have sinus arrhythmia, normal variation, in the past.
- Location: Pediatrician's office
- Time/Date: 3:00 pm, today
- Complaint: Adam "fainted" when the loud buzzer went off at the end of the first half of his basketball game, his older brother drowned at age 21 while at a ROTC boot camp, unclear circumstances. These are very concerning and require a cardiology referral.



## Presenting situation/door chart information

- Medical Information: Adam's physical examination is normal.
- Task: You have already met with the family, obtained the history portion and performed the physical examination. During that time the mother's emotions displayed were fear and sadness. You had to step outside to answer a page and now you will counsel the family.
- Please counsel Adam's mother, Jillian, as appropriate.
- Time: 10 minutes

# Communication Skills Discussed

- How can you guarantee that my son will not be the next one dropping on the field
- Why not just see the cardiologist
- How can you be 100% sure that he/she does not have heart disease?

# Future Direction

- Entire curriculum online
- Quality Improvement at PMD

# Thank You

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