Pediatric Cardiac Emergencies And COVID impact on Youth

NEUSHA

Summer Academy August 8, 2022 Julianne Evangelista, DNP, APRN, CPNP, FAHA The Benderson Family Heart Center Boston Children's Hospital

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Age Group	Respiratory Rate	Heart Rate	Systolic Blood Pressure	
Infant	20 - 30	80 - 140	70 - 100	
Toddler (1-3 yrs.)	20 - 30	80 - 130	80 - 110	
Preschooler (3-5 yrs.)	20 - 30	80 - 120	80 - 110	
School Age (6-12 yrs.)	20 - 30	70 - 110	80 - 120	
Adolescent (13+ yrs.)	12 - 20	55 - 105	110 - 120	

Innocent vs. Pathologic Murmurs Clinical Findings

- Innocent/functional murmur:
 - Healthy well-appearing child with otherwise normal physical examination
 - Normal S1 and S2
 - Systolic murmur
 - Not associated with a thrill
 - 50 % of children have murmur at some point

• Pathological murmur:

- Abnormal physical examination (failure to thrive, cyanosis, abnormal pulses)
- Abnormal S1 or S2
- Diastolic murmur
- Associated with a thrill





Increased Pulmonary Blood Flow	Obstruction to Blood Flow	Decreased Pulmonary Blood Flow	Mixed
ASD	Coarctation of the Aorta	Tetralogy of Fallot	Transposition of the Great Arteries
PDA	Aortic Stenosis	Tricuspid Atresia	Total Anomalous Pulmonary Venous Return
VSD	Pulmonary Stenosis		Truncus Arteriosis
CAVC	НСМР		HLHS











Cardiac Neurodevelopmental Program

Goals

- Identify developmental challenges ASAP
- Develop customized treatment plans
- Intervene quickly and effectively.

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Cardiac

- 1-4% of chest pain in children has a cardiac cause
- Congenital & acquired anomalies
 - Coronary artery anomalies
 - Left ventricular outflow tract obstruction
 - Cardiomyopathy (restrictive/dilated/hypertrophic)
 - Pulmonary hypertension
 - Pulmonary embolism
 - Pericarditis/ Myocarditis
 - Aneurysm
 - Arrhythmias

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Assessment of Chest Pain OLDCART

- Onset
- Location
- Duration
- Continuous
- Aggravating Factors
- Relieving Factors
- Treatments (effective and ineffective)

History Suggestive of Possible Cardiac Etiology

- Exertional chest pain
- Chest pain that radiates to the left shoulder or is exacerbated when supine
- History of prolonged immobilization, obesity, oral contraceptive pills, etc.
- History of recent intercurrent illness (Lyme disease, recent fever >38.5)
- Tachycardia in the absence of fever
- Palpitations
- Concerning family history
- Toxin exposure (cocaine, methamphetamine)

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Cardiac vs Non Cardiac CP Characteristics Chest pain associated with: With exertion only With dizziness or fainting Occurs with palpitations or irregular rhythm Radiates to back, jaw or left arm Hemodynamic or respiratory instability Child has known heart disease or family history of heart disease or HCMP Chest pain that occurs only at rest, with a normal electrocardiogram, physical examination and without known risk factors, is likely NOT cardiac in origin





Management of Neurocardiogenic & Vasovagal Syncope

Acute management

- Supine position and allow to awaken spontaneously- elevate feet
- If hyperventilation, encourage to relax
- Observe for several minutes

Chronic management

- Hydration, hydration- increase fluids 2-3 L per day
- Salt Increase sodium to 2-4 g/ day
- Aggressive hydration resolves symptoms in 90% of children
- Anti-gravity maneuvers, avoidance of trigger situations, sodium supplementation
- Prevention: recognize symptoms, steps to prevent syncope
- Medications
 - Reserved for those with persistent symptomsMineralocorticoids (fludrocortisone)

 - Alpha-agonists (Midodrine)
 - Beta-blockers



Different Types of Syncope							
Category	Abrupt Onset?	Associated With Exercise	Prodromal Symptoms	Orthostatic Changes	Other Characteristics		
Typical	No	No	Yes	Variable	1) Duration < 1 minute 2) Loss of consciousness and loss of tone		
Exertional	No	Yes	Variable	Variable	Transient collapse		
Convulsive	Yes	No	Yes	Variable	Very self-limited opsthitoric posturing or myodonic jerks that resolve win seconds		
POTS Atypical / Refractory	Variable	No	No	Yes	Plausible pre-syncopal symptoms		

POTS – Postural Orthostatic Tachycardia Syndrome

- Form of orthostatic intolerance
- An increase in the heart rate of at least 30 40 bpm from sitting to standing within the first 10 minutes of standing
- Most commonly presents during late adolescence and in females who are tall, thin and active. (you can generally pick them out of the waiting room)..

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Arrhythmias

- Too Fast: Tachycardias
 - Sinus Tachycardia
 - Supraventricular Tachycardia (SVT)
 - Ventricular Tachycardia (VT)
- Too Slow: Bradycardias
 - Sinus Bradycardia
 - Atrioventricular Block (AV Block)
 - Sick Sinus Syndrome

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Tachycardia

<u>SVT</u>

•Too fast to count

•Abrupt onset and termination

•Often felt in the neck

•May terminate with rest/squatting

<u>Sinus</u>

Hard and fast
Frequent symptoms
May be situational
May terminate with rest/squatting
Rates tend to be lower
Gradual increase and decrease in HR

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Cardiac Ablation

- Uses radiofrequency energy to destroy a small area of electrical conduction tissue that is causing rapid and irregular heartbeats..
- Low-risk procedure generally successful.
- Takes place in an (EP) lab or a cardiac catheterization lab. It takes 2 to 4 hours. Discharged day of procedure or spend one night in hospital
- Back to normal activities in 3 days

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WPW Definition A form of SVT: intermittent tachycardia a short PR interval widened QRS complex on their ECG WPW results from an accessory pathway that that directly connects the atria and ventricles and bypasses the AV node. Occurs in 1- 1.5 / 1000 people













Bradycardias

• Sinus node dysfunction

- Common in children with congenital heart disease who have had complex atrial surgery (ex. Fontan operation)
- RARE in children with normal hearts
- Symptoms include exercise intolerance and fatigue

• Sinus bradycardia

- Largely benign
- Can be seen in highly trained athletes, eating disorders, side effect of medication (ex. beta-blockers)
- Unusual to be symptomatic

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Presentation and Diagnostic Criteria

- Referral for family history, abnormal EKG, syncope, presence of a murmur
- Echocardiogram

- Septal thickness (typically > 15mm), evidence of diastolic dysfunction, presence of left ventricular outflow tract obstruction

• EKG

-T-wave inversion or ST-segment depression, left atrial enlargement, left axis deviation, long QT interval, ventricular arrhythmias

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- Annual resting echocardiogram with EKG
- Cardiac MRI ~ Q3 years to detect for the presence of myocardial scarring
- Holter monitor
 - Every year for children < 8 years of age, then alternates with stress test every other year for children > 8 years of age
- Stress test with immediate post exercise echocardiogram









COVID and Cardiology

-So much has been learned in the last 2 years about COVID and related cardiac illness including MISC and myocarditis.

-MISC is rare (as of 6/2022 there have been 8639 cases, 70 deaths in the US).

-Blacks, Hispanics, Asian and Pacific Islanders more affected

-Children with CHD in general do well with COVID, unless PHTN or Trisomy 21.

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Post Covid Viral Syndrome

COVID post-viral fatigue type process.

• Persistent fatigue, SOB, dizziness, tachycardia seen for up to 8 weeks post infection. These kids are very deconditioned with poor intravascular volume

Treatment: Aggression hydration, good NACL intake, eating regularly, at least 8 hours of sleep per night and slow return to activity.

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