

Introduction

Sudden Cardiac Arrest (SCA)

- Life-threatening condition that occurs when the heart unexpectedly stops beating
- 10,000-20,000 childhood sudden cardiac deaths/yr. in the US
- Current screening for cardiac conditions associated with SCA, using only history and physical exam, has not been effective
 - Many of these conditions are treatable when diagnosed leading to SCA prevention

Research Question

Which symptoms, combination of symptoms, or electrocardiographic abnormalities displayed by children and young adults are most likely to be associated with a previously undiagnosed abnormal heart condition?

Study Aims

- Identify if any symptoms alone or when paired with family history are more likely to be associated with an abnormal electrocardiogram (ECG) finding or a significant cardiac condition
- Identify ECG findings associated with SCA conditions

Study Design & Population

- Observational cross-sectional study
- Data derived from the existing Heart Health Screening Study (HHSS) at CHOP
- 4,535 enrolled subjects ages 0-19 years without a known cardiac condition
- Subjects completed a heart health screening questionnaire reporting symptoms, family history, and exercise patterns.**
- Subjects' vitals (height, weight, blood pressure) were taken, and an ECG was performed.
- Patients with abnormal ECGs or family history received an echocardiogram.

Preliminary Results

Table 1. Study Population Demographics

Characteristic	N	(%)
Age, years		
Infant (2-6 weeks)	6	(<1)
Infant - 4	4	(<1)
5-9	1219	(27)
10-11	810	(18)
12-13	1025	(23)
14-16	1121	(25)
17-19	350	(8)
Race		
White	3382	(75)
African American or Black	887	(20)
Asian	97	(2)
Hawaiian or Other Pacific / American Indian or Alaskan Native / Other	56	(1)
More Than One Race	113	(2)
Ethnicity		
Non-Hispanic	4410	(97)
Hispanic	125	(3)
Sex		
Male	2595	(57)
Female	1940	(43)

Table 4. Abnormal ECGs

	N=229				
	Total	ECG Normal	ECG Mildly abnormal	ECG Abnormal	p-value
ECHO Normal	204 (89.08)	34 (14.85)	53 (23.14)	117 (51.09)	0.3676
ECHO Mildly Abnormal	13 (5.68)	1 (0.44)	5 (2.18)	7 (3.06)	
ECHO Abnormal	12 (5.24)	3 (1.31)	5 (2.18)	4 (1.75)	

Table 2. Family History of Conditions Associated with SCD

Characteristic	N	(%)
Sudden Death		
No	2963	(5)
Yes	1357	(65)
Unkown	215	(5)
SCD Relationship		
Child's Mother	2	(<1)
Child's Father	22	(<1)
Child's Sister or Brother	12	(<1)
Child's Grandparent	631	(14)

N=4535

Table 3. Symptoms

Characteristic	N	(%)
Chest Pain		
No	4097	(90)
Yes	388	(9)
Chest discomfort / chest pain during exercise	169	(4)
Chest discomfort / chest pain after exercise	122	(3)
No answer provided	50	(1)
Dizziness		
No	4139	(91)
Yes	355	(8)
Dizziness / lightheadedness during exercise	112	(2)
Dizziness / lightheadedness after exercise	102	(2)
No answer provided	41	(1)
Fainting		
No	4279	(94)
Yes	220	(5)
Fainted or passed out during exercise	15	(0.3)
Fainted or passed out after exercise	11	(0.2)
No answer provided	36	(1)
Seizure		
No	4448	(98)
Yes	39	(0.9)
No answer provided	48	(1)
Shortness of Breath		
No	3802	(84)
Yes	703	(16)
Yes, but not related to asthma	125	(3)
No answer provided	30	(1)
Fatigue		
No	4122	(91)
Yes	371	(8)
No answer provided	41	(1)
Palpitations		
No	4290	(95)
Yes	194	(5)
No answer provided	44	(1)

N=4535

Discussion

- Data analysis is ongoing and only preliminary descriptive statistics are currently presented.
- Future work includes further analysis of the counts presented in Tables 1-4 (symptoms and family history) as well as their correlation with ECG and ECHO findings.

Limitations

- Due to the self-reported data collected from the Heart Health Screening Questionnaire, there are many limitations to the data that were collected
- Individuals may not be aware or disclose their family's complete medical history
- Recall bias may have occurred when subjects completed the "symptoms" portion of the questionnaire
- Statistical analysis is ongoing

Conclusions

- Symptoms attributed to cardiac causes are relatively common in the screened population from 5-16%.
- Chest pain is less frequent during or after exercise of all screened.
- Fainting is less frequent during or after exercise at 0.6% of all screened.
- Over half of dizziness reported occurs during or after exercise and could be related to hydration.
- Abnormal ECHO findings are more likely to be associated with abnormal or mildly abnormal ECGs than normal ECGs.
- This study has the potential to determine if screening questionnaires are as effective as ECGs in identifying individuals at risk for SCA, which could provide support for ECG screenings of youth.