

**GOALS - By the end of the session, the student will be able to:**

1. List the key history and physical examination features of cardiac murmurs and arrhythmias.
2. Make a problem list for each patient.
3. List the age appropriate differential diagnosis for pediatric patients presenting with *heart failure, cardiac murmurs, or palpitations*.
4. Find reliable resources to help in distinguishing the various etiologies of cardiac problems in children including murmurs, CHF, anemia, myocarditis, patent ductus arteriosus and valvular defects.
5. Describe the epidemiology, clinical, laboratory, and radiographic findings, of *sepsis, severe dehydration, anaphylaxis, CHF and ingestion*.
6. Explain how the physical manifestations of disease and the evaluation and management may vary with the age of the patient. Be able to give specific examples.
7. Recognize age related differences in the appearance of the EKG.
8. Discuss the characteristics of the patient and the illness that must be considered when making the decision to manage the patient in the hospital or in the outpatient setting.

**Case 1**

*Your preceptor asks you to stop and see one of his patients for a sick visit. He provides you with the chart from the office where you learn that:*

CC: 10 day old with poor feeding

7#7oz product of a full term gestation born to a G2P1-2 mother by NSVD. APGARS were 8/9 at 1/5 mins. Babe had no problems in the nursery. Discharge exam on day 2 was normal and weight was 7#.

He was seen in your pediatrician's office for a weight check at 8 days. Weight then was 7#4oz.

Mom called this morning with the concern that her baby fed well (nursing) initially but is now noted to have rapid breathing during and after feeds the last couple of days. He seems to tire easily. He sometimes sweats with feeds and appears blue around the lips.

On exam the babe was alert, acyanotic with mild tachypnea at rest. Weight 3.37 kg (7#7oz), height 49.2 cm. HR : 150-160 and RR : 70-80/min with mild sub-costal retractions. Chest was clear. On cardiac exam there was a slightly hyperactive apical impulse. No thrills were palpable. There was a normal S1 and split S2. No clicks or gallops were audible. There was a 3/6 high-pitched holosystolic murmur heard best at the LLSB with radiation to the RLSB. Abdomen was soft with a liver edge palpable 2 cms below the RCM and the spleen tip was palpable. There were good peripheral pulses and perfusion.

**What are your concerns at this point?**

**Do you need more information?**

History?

Physical exam?

Lab data?

**Does this child need referral? - who, where, how , why?**

**Topics to think about -**

**How are neonatal ECG's different than adults?**

**What is the expected rate of growth for normal newborns?**

**Why are some murmurs not present at birth and then appear later?**

EKG

## Case 2

*Your preceptor asks you to stop and see one of his patients for a well child check. He provides you with the chart from the office where you learn that:*

3 year old with heart murmur

This little girl was in for a routine 3 year check up. She has been healthy and active with normal growth and development. Parents have no concerns.

On exam the child was WDN girl in NAD. Weight was 33 #. Height 36". HR:100, RR:20, BP: 90/60. Chest was clear. On cardiac exam has a normal S1 and physiologically split S2 of normal intensity. Normal apical impulse. No thrills are palpable. There is a 2/6 low pitched, vibratory early systolic ejection murmur heard best at the apex in the supine position. The murmur radiates towards the mid-LSB. It is not heard well in the base or the back. The abdomen is soft with no HSM. Femoral pulses are normal.

**Would you like more information?**

History?

Physical?

Laboratory?

**What are your concerns?****Does this child need referral?****Topics-**

**How common are heart murmurs in childhood?**

**What causes heart murmurs in children besides congenital heart disease?**

**How can you distinguish between innocent murmurs of childhood and murmurs that require evaluation?**

EKG

### Case 3

13 year old with palpitations

Previously well girl presents to the emergency room with complaints of palpitations and chest pain. This started when she was sitting in school and doing a test. She noticed her heart pounding and pain in her upper chest. When she stood up to go to the nurse's office she felt a little dizzy.

The school nurse noted that her HR was "too fast to count". She appeared pale. The mother was called. Her pediatrician suggested that she immediately take her daughter to the ER.

On exam in the ER the girl appeared pale and distressed. HR was almost 200 bpm on the monitor. RR was 16. BP was 110/80. There were visible JVD pulsations. Chest was clear. Cardiac exam - rapid rate. No click, gallops, rubs or murmurs were audible. Abdomen soft without HSM. Pulses were 1-2+ throughout with good perfusion.

ECG was done.

#### **Do you need more information?**

- History?
- Physical exam?
- Lab data?

#### **What would you consider doing next?**

- Acutely?
- On discharge form the ER?
- On follow up?

#### **Topics to consider-**

- Heart rate variability in children**
- Are arrhythmias in children different than in adults?**
- Is the approach different?**

**TEACHING NOTES****FOR EACH CASE:**

- 1. Make a problem list or Make a one sentence summary that includes a statement of:**

- the child's prior health
- the chief complaint or most important problem
- some of the pertinent positives and negatives

*Case 1: 10 day old who is back to birth weight fatigues with eating.*

*Case 2: Healthy 3 year old with normal growth and exercise tolerance.*

*Case 3: Previously healthy teen with palpitations and orthostatic symptoms.*

- 2. Ask specifically how each of the following may be important in the case:**

- Patient's age
- Growth
- EKG

- 3. Generate a differential diagnosis and how you would distinguish between each.**

- 4. For each patient, get the students to commit to a**

- Diagnostic plan
- Therapeutic plan
- Monitoring plan

- 5. Discuss how you would tell the difference between an innocent and a significant murmur.**

- 6. Discuss how ECGs differ in children compared to adults.**