Acute Chest Pain in Childhood

Pediatric Emergency Medicine Update

Donald T. Ellis, II, MD

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Duke Children's

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Any clinical example is purely for illustrative purposes only, and no names, ages, other demographic information, or specific diagnoses are based on actual patients.

Acute Chest Pain in Childhood

Objectives

1. Recognize chest pain as a common complaint in childhood.
2. Use a diagnostic algorithm to suggest presence or absence of a cardiac etiology for chest pain.

Acute Chest Pain in Childhood

- Background
- Approach to Evaluation and Management of Pediatric Chest Pain
- Cases
- Summary
- Questions

Background

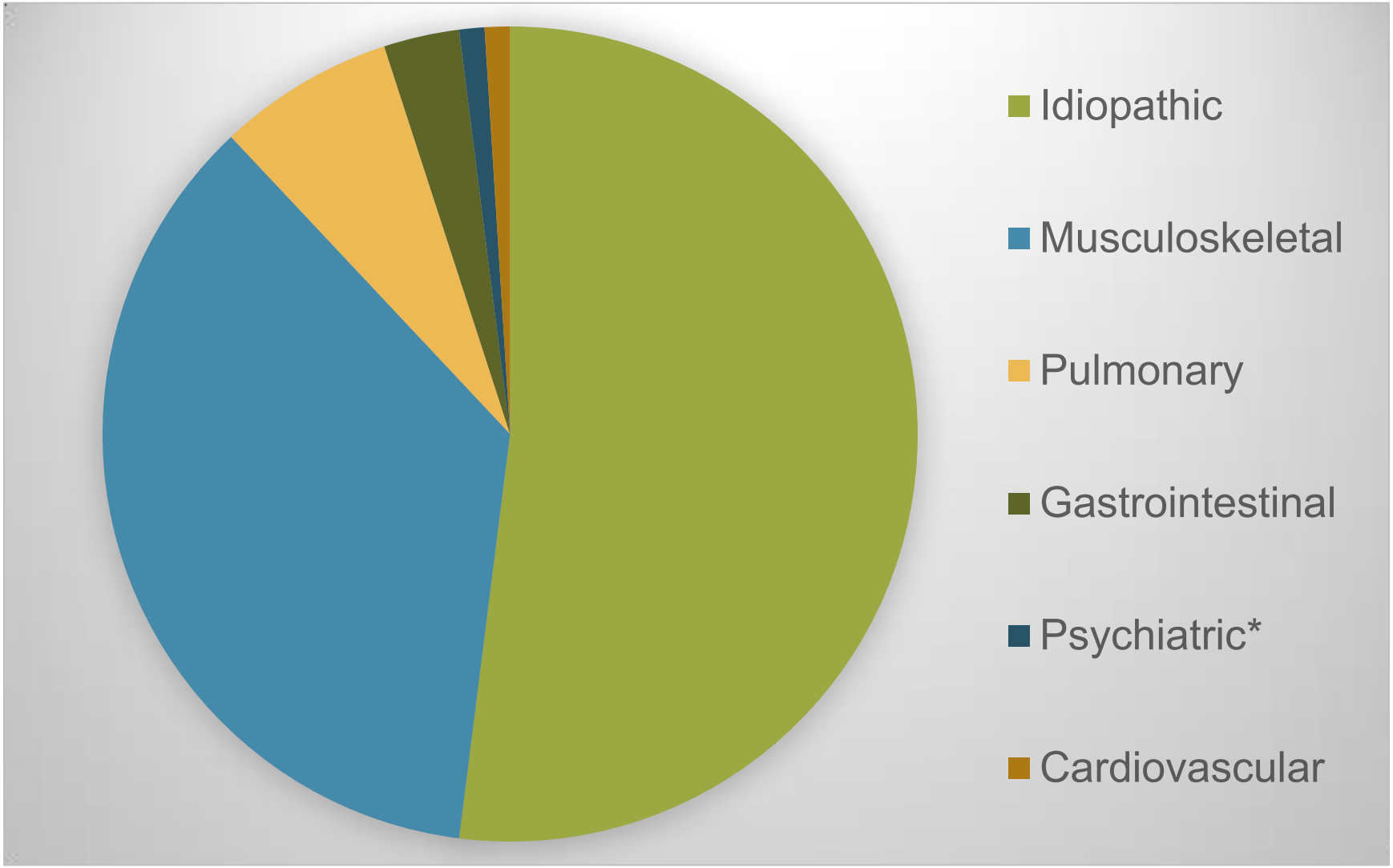
- Frequency
- Underlying Cardiac Pathology
- Resource Utilization

Differential Diagnosis

Coronary artery disease-ischemia/infarction
Anomalous coronary arteries
Kawasaki disease (coronary arteritis)
Diabetes mellitus (long standing)
Arrhythmia
Supraventricular tachycardia
Ventricular tachycardia
Structural abnormalities of the heart
Hypertrophic cardiomyopathy
Severe pulmonic stenosis
Aortic valve stenosis
Infection
Pericarditis
Myocarditis
Chest wall strain
Direct trauma/contusion
Rib fracture
Costochondritis
Severe cough
Asthma
Pneumonia
Pneumothorax
Pneumomediastinum
Pulmonary embolism
Psychological disorders
Stress-related pain
Gastrointestinal disorders
Reflux esophagitis
Pill-induced esophagitis
Esophageal foreign body
Sickle cell crisis
Aortic dissection
Aortic aneurysm
Pleural effusion (collagen vascular disease)
Pleurodynia (coxsackievirus)
Breast tenderness (pregnancy, physiologic)
Tietze syndrome
Texidor's twinge/precordial catch syndrome
Chest mass
Idiopathic

Selbst SM. Approach to the Child with Chest Pain. *Pediatric Clinics of North America*. 2010 Dec;57(6):1221-34.

Differential Diagnosis



Saleeb SF, Li WY V, Warren SZ, et al. Effectiveness of screening for life-threatening chest pain in children. *Pediatrics*. 2011; 128:e1062-8.

Options for Diagnostic Testing

Electrocardiogram
Chest radiographs
Echocardiogram
Exercise Stress Testing
Holter monitoring
Cardiac magnetic resonance imaging
Troponin measurement
Creatinine kinase (with MB frac) measurement
Esophageal pH probe
Upper endoscopy
Computerized tomography angiogram
Ventilation-perfusion scan

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Heed the Red Flags!!!

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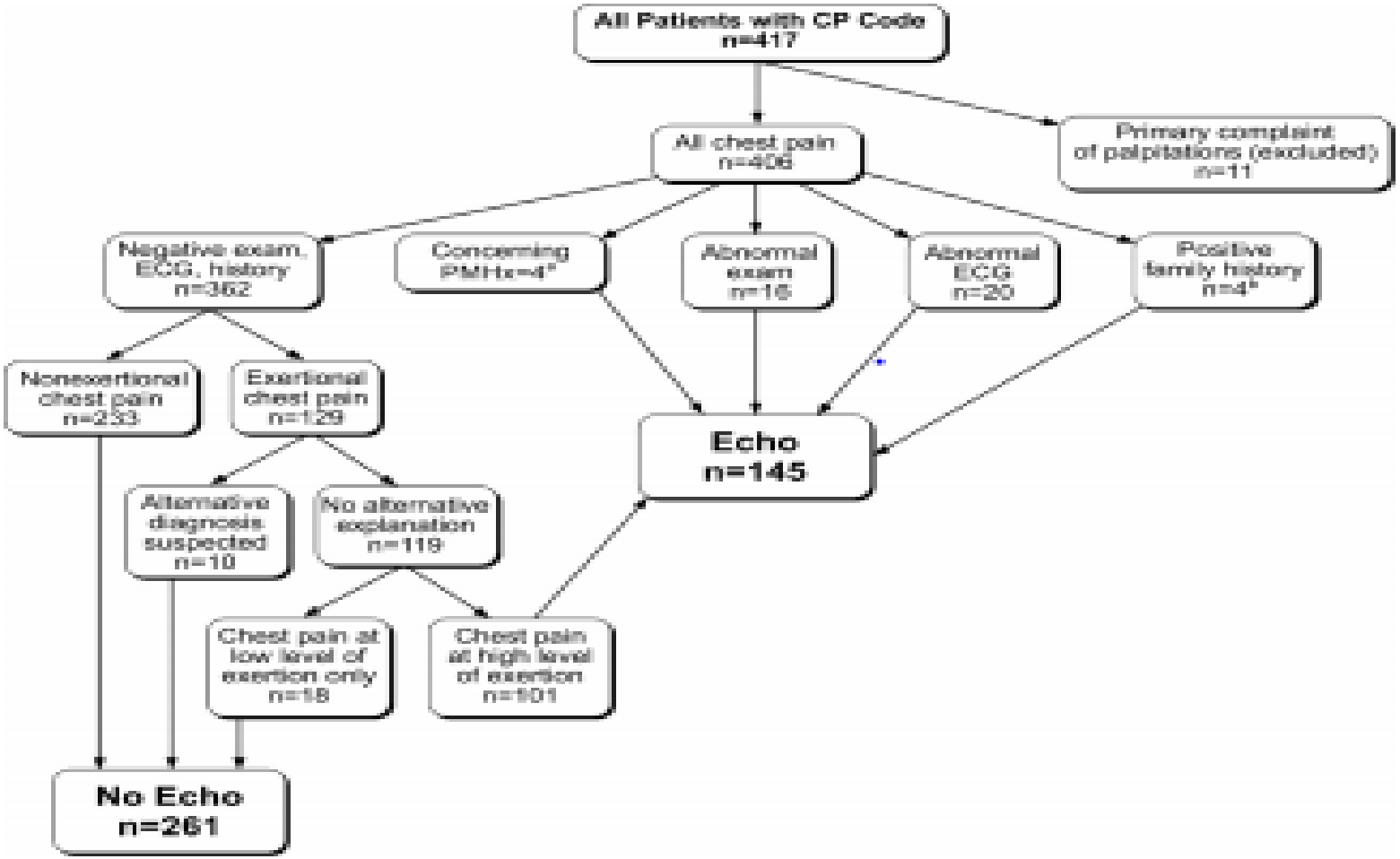
Clues from the History and Physical



Friedman KG, Alexander ME. Chest pain and syncope in children: a practical approach to the diagnosis of cardiac disease. *Journal of Pediatrics*. 2013;163:896-901.e1-3.

Clues from the History and Physical

Past Medical History:

- Cardiac disease
- Systemic inflammatory disease
- Malignancy
- Clotting disorder/blood clot
- Connective tissue disorder
- Chronic medical problems
- Psychiatric/behavioral health
- Young age*

Clues from the History and Physical

Past Medical History:

Family History*:

- Sudden/unexplained death < 50 years
- MI < 50 years
- Congenital heart disease
- Arrhythmia
- Cardiomyopathy
- Severe familial hyperlipidemia
- Pulmonary hypertension
- Connective tissue disorder
- Clotting disorder
- Congenital deafness

Clues from the History and Physical

Past Medical History

Family History

Social History:

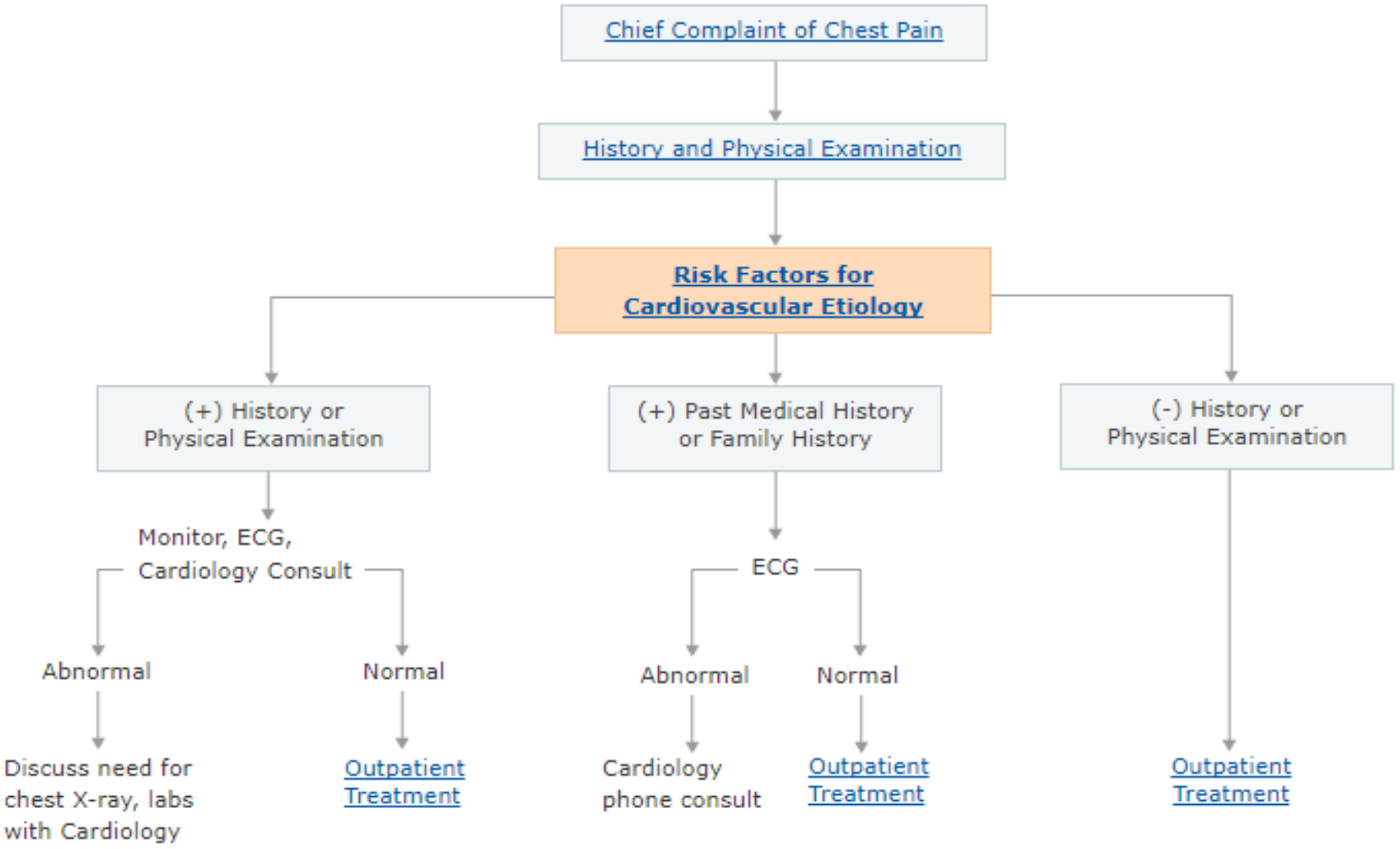
- Drug use

Approach to the Child with Chest Pain

"Tell me about your pain…"

Exertional
Syncope (or presyncope)
Palpitations
Skipped beats
Dyspnea
Acute, awakens from sleep
"Substernal crushing"
Radiation
Orthopnea
Pulmonary embolism risk factors

Outpatients without Known Cardiac Disease



http://www.chop.edu/clinical-pathway/chest-pain-clinical-pathway

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Case #1

Deonte*: 15 y.o. male

Chief Complaint: Chest pain

Past Medical/Surgical History: None relevant

Social History: No stressors. +Athletics.

Family history: Sudden death in uncle.

History (Present Illness):

- Mild (currently pain-free)
- Substernal/leftward
- +Exertional
- +Presyncope (no syncope)

Case #1

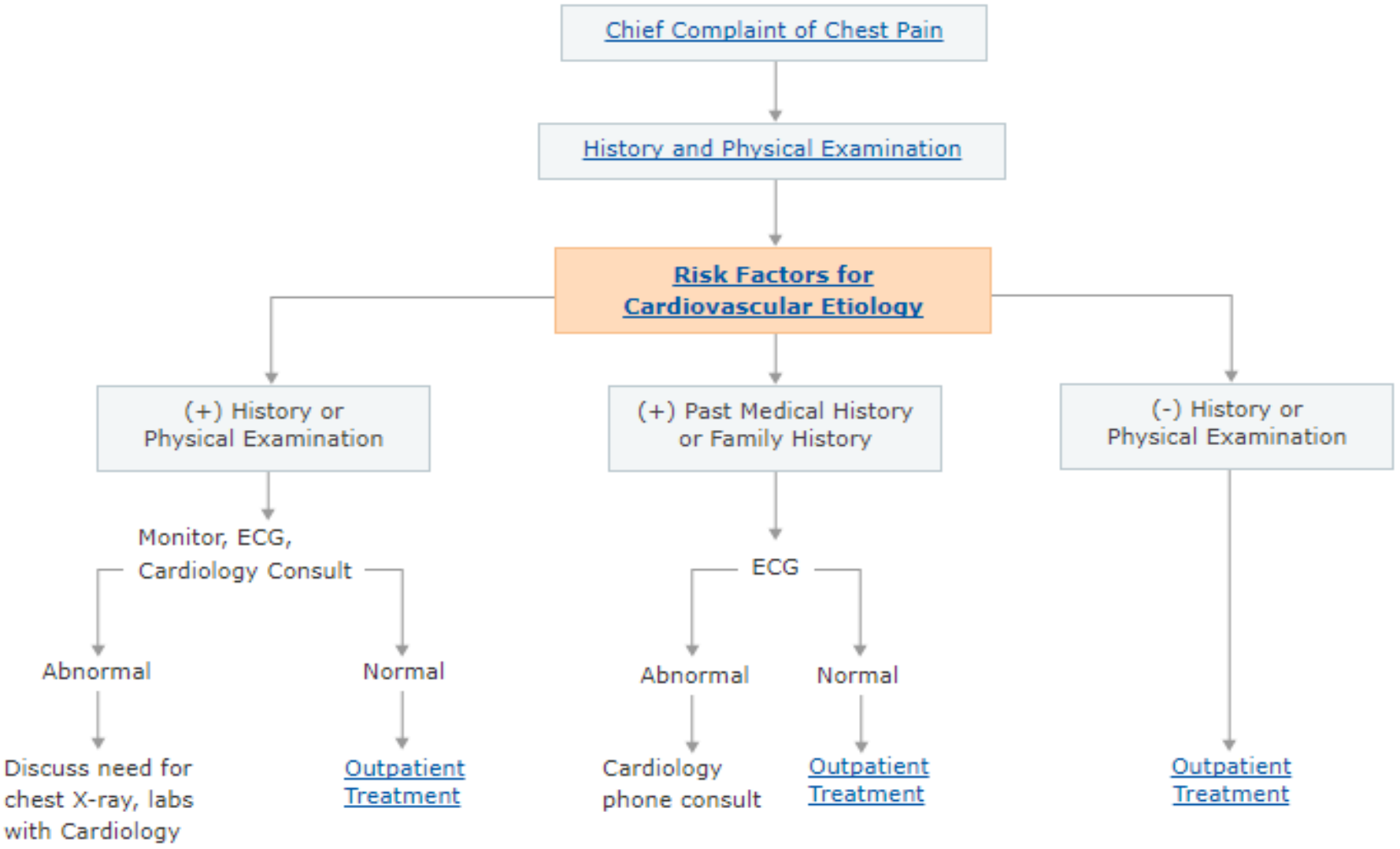
Deonte: 15 y.o. male

Chief Complaint: Chest pain

Examination:

- Vital signs are normal for age
- Systolic murmur
- Parasternal lift
- Normal pulses and capillary refill
- No hepatomegaly
- No edema

Outpatients without Known Cardiac Disease



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Case #1: HOCM

Hypertrophic Obstructive Cardiomyopathy

- Increased risk of sudden death
- Increased risk of arrhythmia
- Most common cause of sudden death in “competitive athletes”
- Approximately up to 1:100,000
- Medical treatment does not alter disease progression
- Automated internal defibrillators

Case #2

Eleanor*: 8 y.o. female

Chief Complaint: N/A (chest pain elicited during a routine well visit)

Past Medical/Surgical History: None relevant

Social History: Starting new school.

Family history: Father died of colon cancer the previous year.

History (Present Illness):

- Nonspecific anterior chest pain
- Not exertional
- No associated syncope

Case #2

Eleanor: 8 y.o. female

Chief Complaint: N/A (chest pain elicited during routine well visit).

Examination:

No fever*

Heart rate is 145

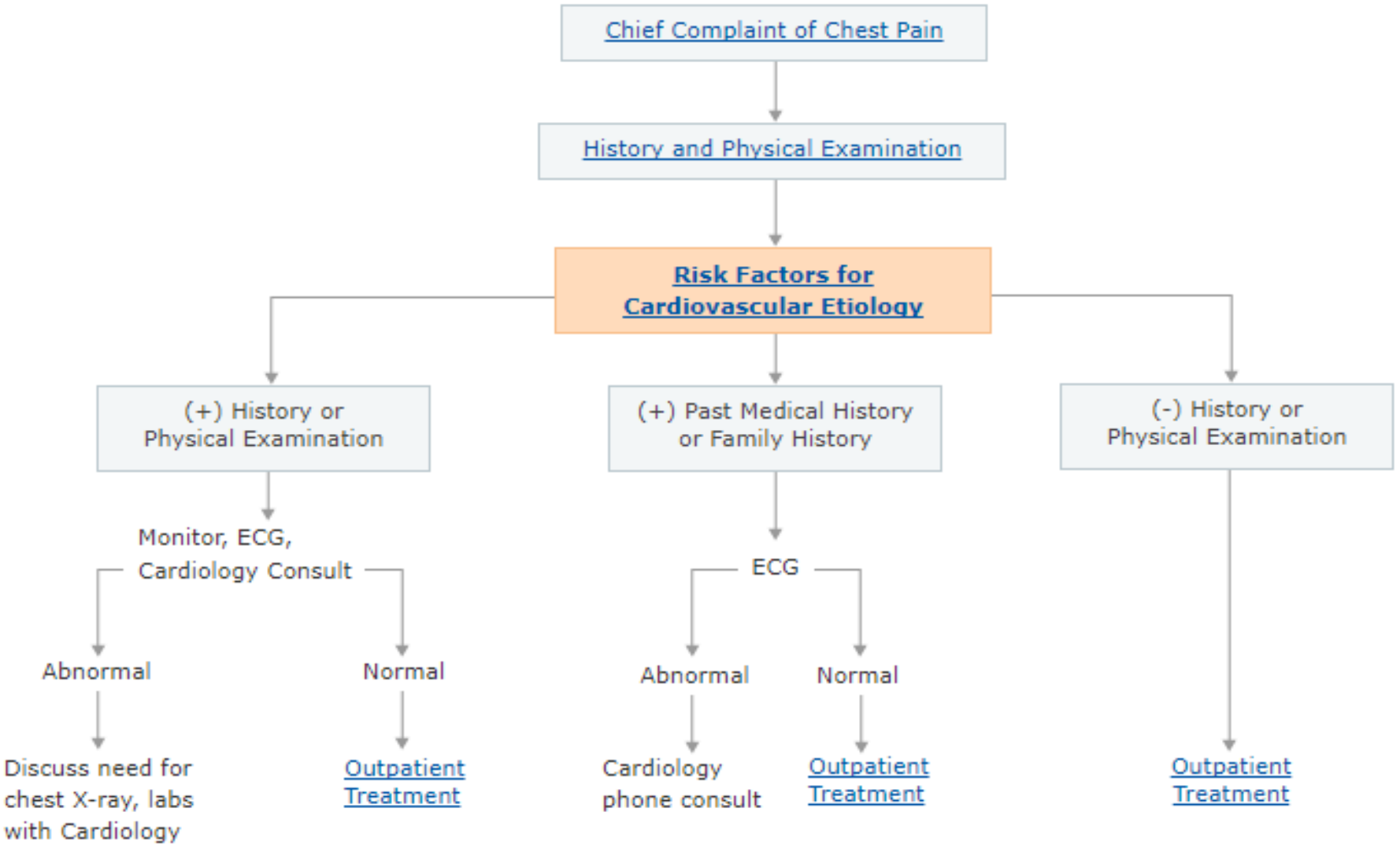
Respiratory rate is 31

Tired-appearing but non-toxic

CV and lung exams OTW normal

No organomegaly or edema

Outpatients without Known Cardiac Disease



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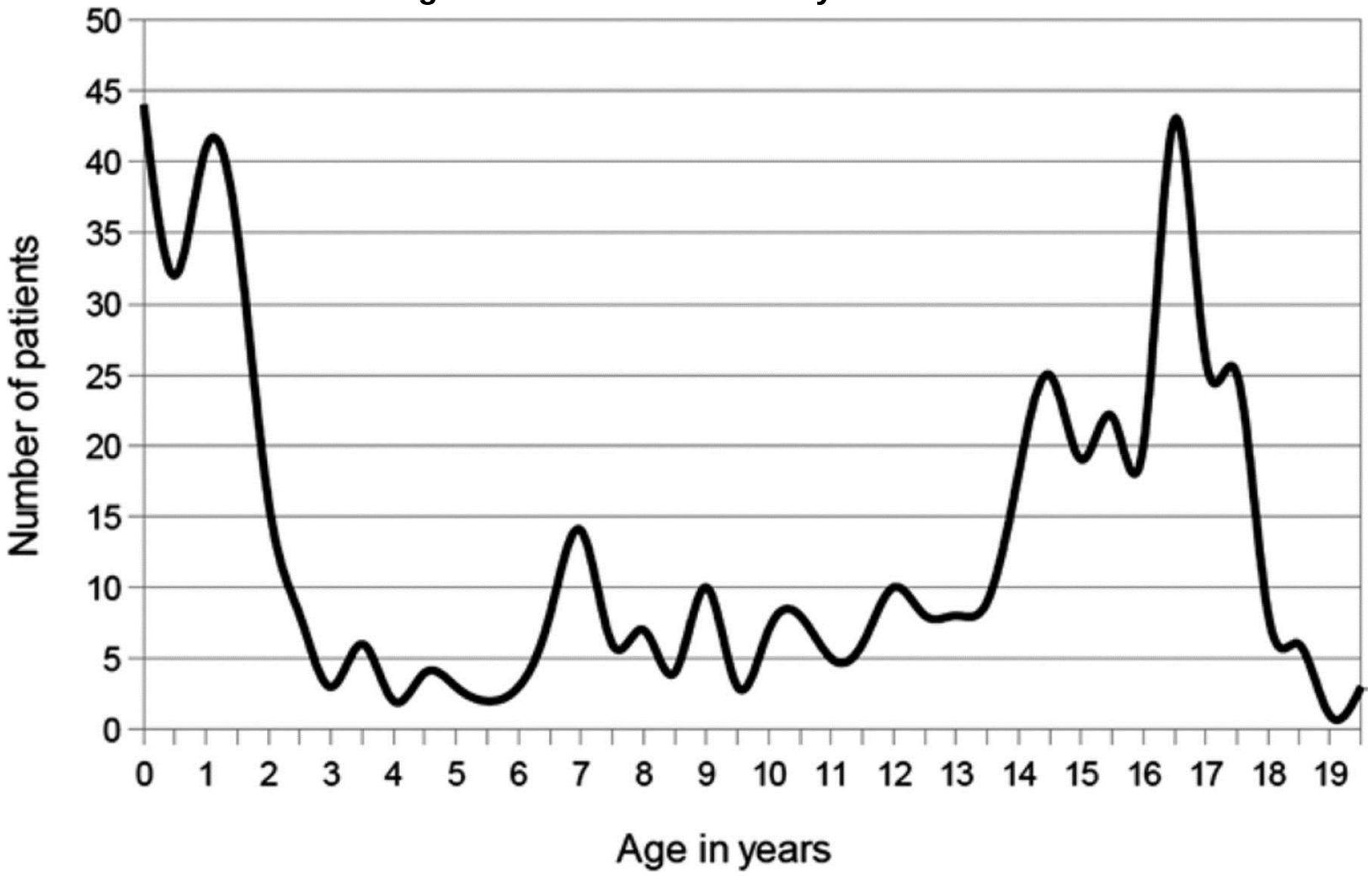
Case #2: Myocarditis

- Primarily viral*
  - Enterovirus and adenovirus
  - Parvovirus and human herpesvirus-6
- 1-5:100,000 healthcare visits
- Bimodal distribution

Age distribution in acute myocarditis.



Sunil J. Ghelani et al. Circ Cardiovasc Qual Outcomes. 2012;5:622-627

Case #2: Myocarditis

- Primarily viral*
  - Enterovirus and adenovirus
  - Parvovirus and human herpesvirus-6
- 1-5:100,000 healthcare visits
- Bimodal distribution
- Treatment remains controversial

Case #3

Gabriel: 18 y.o. male

Chief Complaint: Chest pain

Past Medical/Surgical History: None relevant

Social History: None

Family history: None relevant

History (Present Illness):

- Tender
- Unilateral
- Non-exertional, non-radiating
- No syncope, palpitations, or dyspnea

Case #3

Gabriel*: 18 y.o. male
Chief Complaint: Chest pain

Examination:

Vitals are normal

Normal heart sounds, pulses

No precordial heave or JVD

Lungs are clear to auscultation

+Tender area over the costo-chondral junction of the 3rd rib on the left.

Case #3: Tietze Syndrome

- Teens/young adults
- Unilateral
- Single site
- Exacerbating factors
- Chronic

Case #4

Mathias*: 17 y.o. male

Chief Complaint: Chest pain

Past Medical/Surgical History: Asthma/None

Social History: None relevant

Family history: None relevant

History (Present Illness):

+Exertional

+Dyspnea

+Palpitations

+Syncope

Case #4

Mathias*: 17 y.o. male

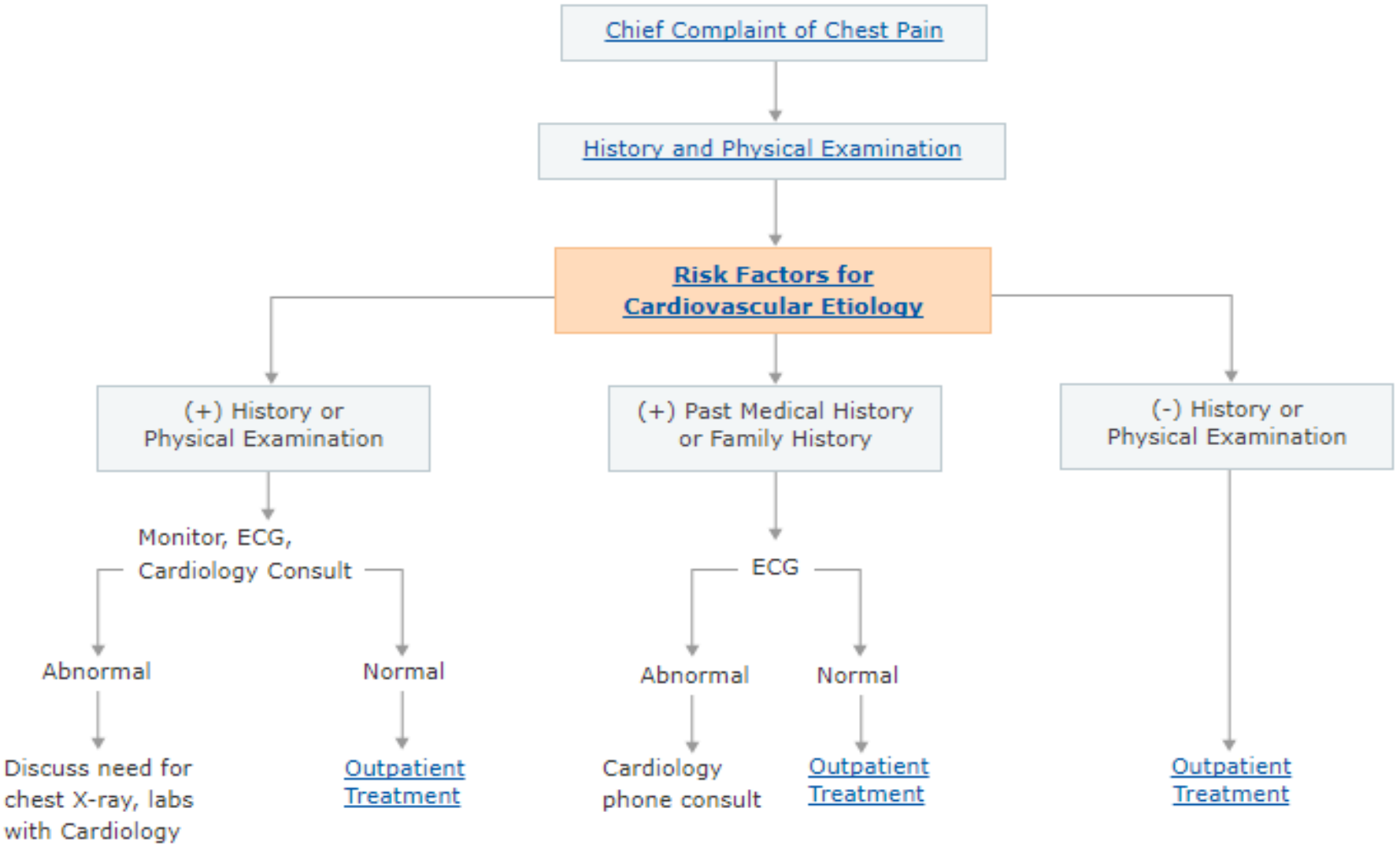
Chief Complaint: Chest pain

Examination:

Vitals are normal.

No abnormalities on exam (including neurologic)

Outpatients without Known Cardiac Disease



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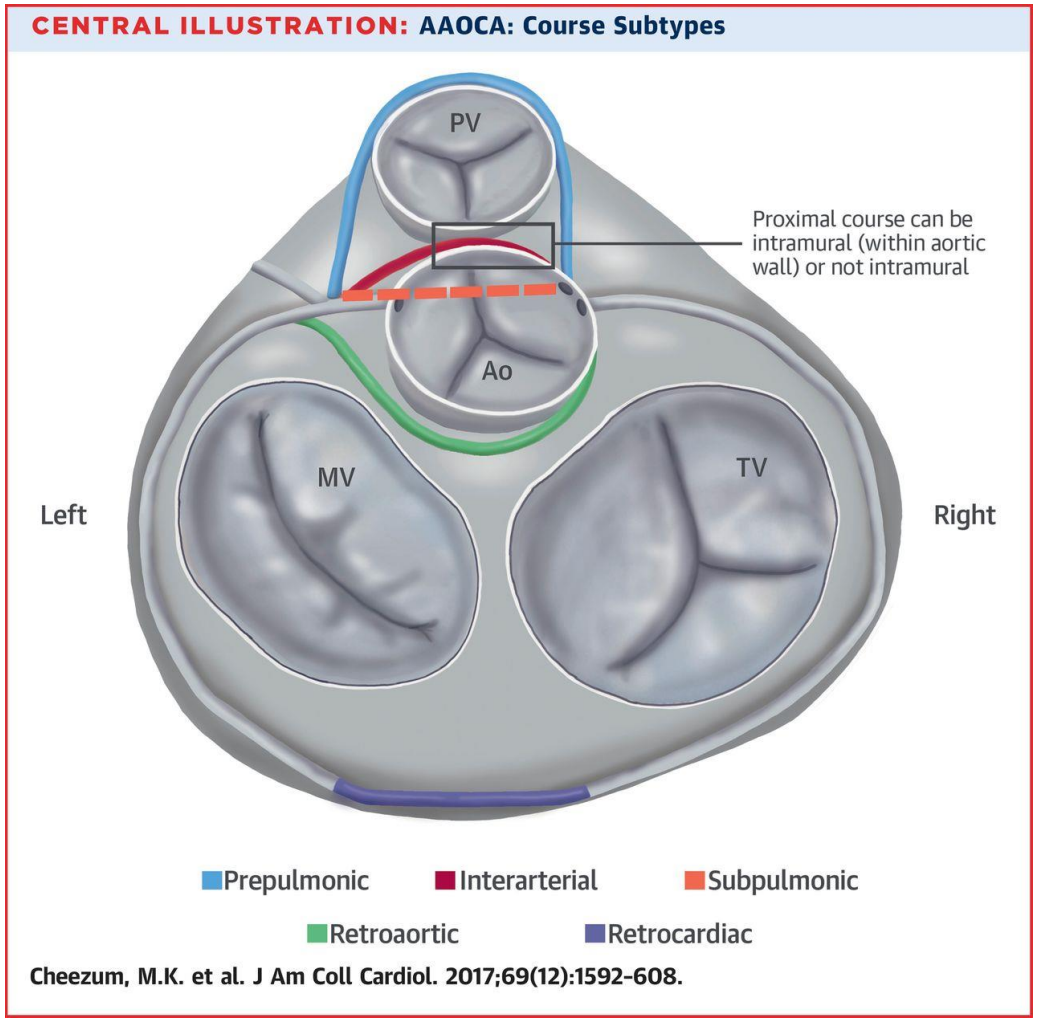
Case #4: Anomalous Aortic origin of a Coronary Artery (AAOCA)



Case #4: Anomalous Aortic origin of a Coronary Artery (AAOCA)

- May affect right or left coronary arteries
- Second most common cause of sudden cardiac death in athletes
- Incidence of 0.7%
- Sudden death may be the initial manifestation
- Diagnostic testing

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Summary

- Chest pain is common
- Heed the red flags!
- History (HPI/Fam/Social) and exam are key.
- ECGs can be important but are not always essential.
- Cardiac pathology is rare, but it still occurs.

Questions?

Thank you!!!

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