

Chest Pain but not a STEMI what else can it be?

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Disclosures

- No Financial investments
- Employed by Trinity Health
- Employed By Heart of America Medical Center
- Employed by State of North Dakota
- Member Board of Directors of Quality Health Associates of North Dakota



I have Chest Pain and

- 136.3 million ED visits per year
- 9 - 10% of ED visits in the United States present with chest pain
- 13,630,000 Chest pain evaluations annually

Reference; CDC

Chest Pain Diagnosis

- 48% of patients presenting to ED with chest pain are not given a specific diagnosis
- 8% Unstable Angina
- 4.6% CHF
- 1.9% STEMI
- 1.7% Pneumonia
- 1.3% Stable Angina

Chest Pain Diagnosis

- 1.1% NSTEMI
- 0.5% Pulmonary Embolism
- 0.3% Pericarditis
- 0.1% Dissecting Aneurysm
- 32.5% Other

Reference; Chest Pain Triage in the ED

Chest pain

- Missed MI results in 2% of discharged patients with chest pain.
- 25% of those have lethal consequences.
- Up to 25% of these had ST elevation missed on EKG
- With another 25% showing significant changes
- Low volume ED's have 2 fold higher odds of missing an MI than high volume ED's

Reference; Pub Med

Chest Pain

- Which physician specialties are most likely to be sued for missed MI?
 - Family Physicians 32%, General Internists 22%, Emergency Physicians 15%.
- Reasons for miss-diagnosis?
 - Misinterpretation of EKG findings in up to 40%, Young age of patient, atypical presentation, physician inexperience.

Reference; Mayo Clinic Proceedings 2010 Mar;85(3) 284-299

Chest Pain

- Should it bother us that most chest pain patients have no definitive diagnosis?
- What is the purpose of the ED evaluation?
- If we miss AMI 2% of the time what other critical diagnosis might we overlook?

Objectives

- List the causes of chest pain that can be an immediate threat to life.
- List common causes of chest pain.
- Discuss symptom constellations of individual causes.
- Discuss a reasonable approach to evaluation.

Conditions that pose an Immediate Threat to life

- Acute Coronary Syndrome
- Aortic Dissection
- Pulmonary Embolism
- Tension Pneumothorax
- Pericardial Tamponade
- Mediastinitis

Reference; Up to Date

Common Causes of Chest Pain

- Cardiac causes
 - STEMI, Non-STEMI, other levels of ACS, Aortic Stenosis, Mitral Prolapse, Endocarditis, Pericarditis, Myocarditis
- Pulmonary Causes
 - Pneumonia, Asthma, COPD, Pneumothorax, Pleural effusion, Cor Pulmonale
- Gastrointestinal Causes
 - GERD, Esophageal causes, Boerhaave syndrome, Pancreatitis
- Musculoskeletal Causes
 - Trauma, Fibromyalgia, Rheumatoid arthritis, Ankylosing spondylitis, Psoriatic arthritis, Costochondritis
- Psychiatric Causes
 - Reference Up To Date



Cardiac Ischemic Pain

- **Onset** - typically gradual with waxing and waning intensity.
- **Provocation and Palliation** - generally provoked by activity, it may not respond to nitroglycerin, it may respond to a GI cocktail, response may be temporary.
- **Quality** - often described more as a discomfort or abnormal feeling than pain. Often hard for the patient to describe.

Cardiac Ischemic Pain

- **Radiation** - Often radiates to other parts of the body.
- **Site** - not felt in one specific spot, usually diffuse and difficult to localize.
- **Time Course** - generally lasts more than 30 minutes

Cardiac Ischemic Pain Evaluation

- Serial EKG
- Serial Troponin
- CK and CK MB
- Non diagnostic EKG and normal cardiac enzymes does not mean non ACS.
- Stress Test
- ECHO
- Cardiac Cath

STEMI

- Follow State Protocol
- Primary PCI if within 120 minutes
- Thrombolytics and Transfer for PCI if >120 minutes

NSTEMI

Pulmonary Embolism

- Incidence 1 : 1000 patients
- Wide variety of presenting features from asymptomatic to shock and sudden death.
- Most present with mild non specific symptoms

Pulmonary Embolism Symptoms

- Dyspnea (73%)
 - Usually rapid onset within seconds (46%) within minutes (26%)
- Chest pain usually pleuritic (44%)
- Calf or thigh pain and /or swelling (44%)
- Cough (37%)
- Orthopnea (28%)
- Wheezing (21%)
- Hemoptysis (13%)

Pulmonary Embolism Signs

- Tachypnea (54%)
- Calf or thigh swelling, erythema, edema, tenderness, palpable cords (47%)
- Tachycardia (24%)
- Rales (18%)
- Decreased breath sounds (17%)
- An accentuated pulmonic component of the second heart sound (15%)
- Jugular venous distension (14%)
- Fever (3%)

Pulmonary Embolism Evaluation

- Pulmonary Angiogram
- CT Pulmonary Arteriography
- D-Dimer
 - Sensitive but non specific
 - Not a screening test
 - Should be used in patients who PE is a consideration but thought to be low probability

Wells criteria and modified Wells criteria: clinical assessment for pulmonary embolism

Clinical Symptoms of DVT (leg swelling, pain)	3.0
Other diagnosis less likely than Pulmonary Embolus	3.0
Heart Rate >100	1.5
Immobilization (3 or more days) or surgery prior month	1.5
Previous DVT/PE	1.5
Hemoptysis	1.0
Malignancy	1.0

Probability

High	>6
Moderate	2.0 - 6.0
Low	<2

Modified Wells Score

PE Likely	>4
PE Unlikely	4 or less

PERC rule

- Age <50 years
- Heart rate <100 beats/minute
- Oxyhemoglobin saturation ≥ 95 percent
- No hemoptysis
- No estrogen use
- No prior DVT or PE
- No unilateral leg swelling
- No surgery/trauma requiring hospitalization within the prior four weeks

In patients with a low probability of PE who fulfill all eight criteria, the likelihood of PE is low and no further testing is required. All other patients should be considered for further testing with sensitive D-dimer or imaging.

Aortic Dissection

- Relatively Rare 3 : 100,000
- Age tends to be 60-80 although can occur much younger
- History of hypertension (72%) in patients
 - In patients under age 40 (34%)
- Atherosclerosis in (31%)
 - In patients under age 40 (1%)

Aortic Dissection other risk factors

- Prior aortic aneurism
- Inflammatory disease that causes vasculitis
- Collagen disorders
- Bicuspid aortic valve
- Aortic Coarctation
- Turner Syndrome
- CABG
- Valve Replacement
- Recent Cardiac Catheterization
- Trauma
- High intensity weight lifting

Aortic Dissection

- Chest or Back Pain (86%)
- Abrupt onset of pain (89%)
- Migrating pain (25%)
- Hypertension (69%)
- Pulse deficit (21%)
- Hypotension/Shock (3%)
- Spinal cord ischemia (3%)
- Ischemic peripheral neuropathy (2%)

Diagnostics

- Routine blood test generally nondiagnostic except possibly D-Dimer
- Chest radiograph shows widening in 56%-63%
- EKG normal up to 16% with minor changes in the remaining
- TEE for unstable patients
- MRI highly accurate
- CT most commonly used because of availability although sensitivity can be as low as 83%
- Aortography can accompany coronary angiography and has a sensitivity of 88%

Aortic Dissection

- Should be ruled out when classic presentation
- More subtle presentation can easily overlooked.
- Should be considered when no other obvious diagnosis to account for symptoms

Pneumothorax

- Can be traumatic or spontaneous
- Incidence of spontaneous 7.4 - 15.4 : 100,000
 - More common in men than women in the US
- Smoking a significant risk factor and 102 times more likely in heavy smokers.
- Typical patient is in the early 20's and rare after age 40.
- Present with pleuritic chest pain and dyspnea
- 2% of spontaneous pneumothorax become a tension pneumothorax

Pneumothorax Diagnosis

- Tension pneumothorax clinical diagnosis based on suspicion and physical findings
- Diagnostic imaging includes Bedside ultrasound, CXR, and CT

Pneumothorax Treatment

- Tension should be immediately decompressed with needle insertion followed by chest tube placement.
- Simple pneumothorax that is small may be observed without treatment.
- Larger pneumothorax require aspiration or chest tube placement.

Pericardial Tamponade Causes

- Idiopathic
- Infectious
- Radiation
- Neoplasm
- Cardiac
- Traumatic
- Autoimmune
- Drugs
- Metabolic

Acute Cardiac Tamponade

- Sudden in onset
- Chest Pain
- Dyspnea
- Tachypnea
- Jugular venous pressure is elevated

Sub Acute Cardiac Tamponade

- Progresses over days to weeks
- Can be asymptomatic early
- Once intrapericardial pressure reaches critical level will be symptomatic and can progress quickly

Cardiac Tamponade Symptoms

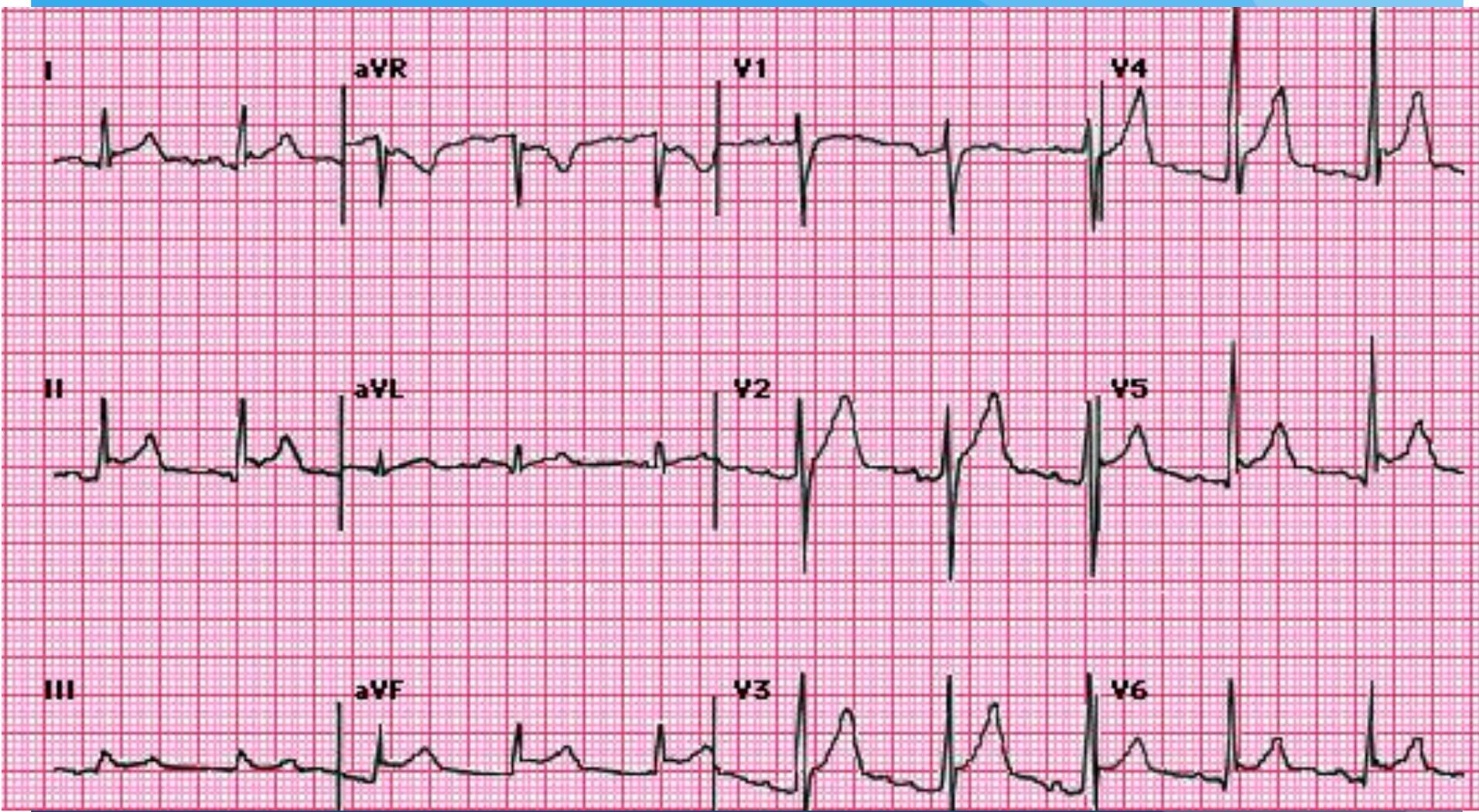
- Chest pain or fullness
- Dyspnea
- Peripheral edema
- Fatigability

Cardiac Tamponade Signs

- Tachycardia
- Narrow pulse pressure
- Elevated jugular venous pressure
- Pulsus paradoxus
- Pericardial rub
- ECG may show low voltage
- CXR may show enlarged cardiac silhouette

Evaluation

- Confirmatory diagnosis made with ECHO



Mediastinitis

- Odontogenic Infections
- Esophageal Perforation
- Iatrogenic Complications

- Mortality is high 42%

Mediastinitis Symptoms

- Chest Pain
- Back Pain
- Neck Pain
- Radiation to shoulder
- Odynophagia
- Dyspnea
- Fever
- Tachycardia
- Tachypnea
- Hypotension
- Cyanosis

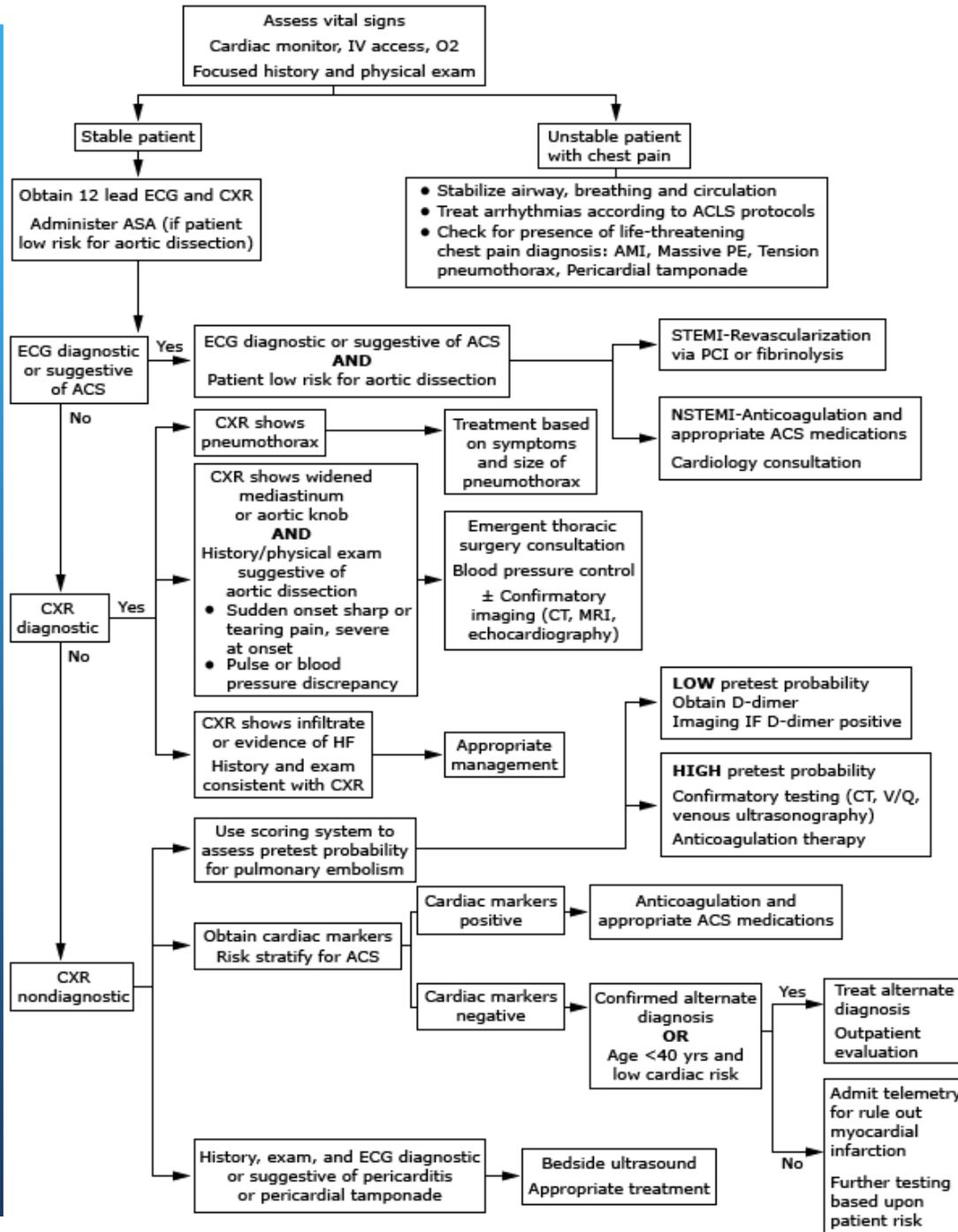
Mediastinitis evaluation

- CT Neck and Chest



Evaluation

- Stabilize as appropriate
- Develop a differential based on history and physical
- Always consider Immediate life threats
- If a definitive diagnosis is not confirmed always circle back and consider immediate life threats
- Consider observation
- Assure appropriate consultation and follow up



Summary

- Always consider the Life threatening causes of chest pain.
- Document you findings to support a definitive diagnosis.
- If you do not have a definitive diagnosis you must document the evaluation and findings that ruled out the life threatening causes of chest pain.
- Never assume non cardiac because responsive to GI cocktail or likewise cardiac because responsive to NTG, treatment for pain is not diagnostic.



• A section of the paramedic trainers and the medical team together with Prof. Zakariah (seated in the middle) in a group photograph.

NAS paramedics train in emergency care

By Charles Andoh, ACCRA

MORE than 45 paramedics of the National Ambulance Service (NAS) are undergoing a two-week emergency medical care training in Accra.

Technicians (EMT) of the service to be able to train other technicians across the country.

The workshop is being organised by the NAS in collaboration with the North Dakota Department of Health (NDDH) in the United States of America (USA), which is providing the medical officers running the programme.

Briefing the media after the opening ceremony, the Chief Executive Officer of the NAS, Prof. Ahmed N. Zakariah, said the programme would go a long way to assist the officers of the service to deliver on their mandate to save lives.

The NAS currently boasts 1,7000 EMTs across the country. Prof. Zakariah noted that while in the past

He said the trainers would also be given certificates of recognition which met international standards.

Prof. Zakariah hinted that the service was collaborating with the NDDH to sponsor two paramedics of the service to the USA.

Major McEvers, expressed satisfaction with the relationship between the NAS and NDDH, saying it