APPROACH TO A CASE OF CHEST PAIN

Initial management at outpatient level

SUMMARY
- ‘Severe acute chest pains’ mostly land up in Emergency departments
- At the outpatient level non cardiac causes are common.
- But serious causes of chest pain are not to be overlooked
- Conditions to be r/o:
  - acute coronary syndrome,
  - pulmonary embolism,
  - Aortic dissection or
  - Tension pneumothorax
  - Ruptured esophagus
  - pneumonia

Common Causes of chest pain classified

Cardiovascular
- Ischemic heart disease
- Pericarditis
- Aortic aneurysm dissection

Respiratory
- Pleurisy
- Tracheitis

Gastro intestinal
- Peptic ulcer
- Hiatus hernia
- Biliary tract disease

Miscellaneous
- Pancreatitis
- anxiety states
- root pain
- chest trauma
- Chest wall diseases
- Costochondritis

Epidemiology
Cardiac causes are commoner in emergency departments
Non cardiac causes are common in outpatient department
Still evaluation must be thorough to R/o serious conditions ACS,PE,Pneumonia and others

OUT PATIENT MANAGEMENT
NEW CASE:
History:
Exertional pain: relieved by rest/nitroglycerine – Cardiac ischemia
Aggrivated on inspiration: pleural ,less commonly pericardial
Alters with posture; pericarditis; eases when sitting up and leaning forward
Worsening on swallowing: Oesophageal
GERD, peptic ulcer: Epigastric pain, retro sternum burning
Changes with movement; musculo skeletal pain
aggravated by pressing site of pain or
putting the muscle into contraction
Chest pain, dyspnea + fever: pneumonia/bronchitis

**Routine Procedure:**
History taking as above

*Physical examination*
Examination should *include the abdomen.*
Routine *ECG and X-ray chest* is required in most cases

**Inference and follow up:**
- Chest pain + ECG changes + cardiac risk factors when present:
  Troponin measurement and Stress test (if not contraindicated)
- **Pulmonary embolism:**
  Go by simple prediction rule + D-dimer assay
  then Helical CT and venous ultra sound as indicated
- **Pneumonia:**
- **h/o fever, dullness / egophony-confirm by X-ray**
- **Heart failure:**
  Chest pain with dyspnea; suggests Heart failure
  Clarify by Brain natriuretic peptide level
- **Musculoskeletal pain:**
  Pain reproducible by palpation and by putting the muscle into action
- **Chest pain with panic disorder**
  History taking with 2 item questionnaire

Also apply clinical prediction rules

**Clinical Decision rules**
Considerable overlap occurs in the signs and symptoms amongst these various clinical conditions
Several validated clinical Decision rules – available conditions based on key symptoms and clinical findings
- Rouan decision Rule for Myocardial infarction
- Wells Model for clinical diagnosis of pulmonary embolism
- Diehr rule of or diagnosing pneumonia in adults with acute cough
- Dukes treadmill score for predicting prognosis
- Reader is requested to refer Cardiac text books / journal for details of these’
Table 1. Diagnosis using history, physical examination and probability of accuracy

<table>
<thead>
<tr>
<th>Diagnosis with</th>
<th>Clinical finding</th>
<th>Probability of diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall out patient probability</td>
<td></td>
<td></td>
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<tr>
<td>Myocardial Infarction</td>
<td>Chest pain radiating to both arms, dyspnea, hypotension, sweating S3, Age above 65, prior MI, HF + presence of Other Risk factors like DM, hyperlipidemia, ECG-ST elevation Qwave, conduction defect compare with previous ECG</td>
<td>Highly probable</td>
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<tr>
<td></td>
<td></td>
<td>Refer ROUAN decision rule of MI</td>
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<td></td>
<td>Test-troponin level stress ECG as indicated</td>
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<tr>
<td></td>
<td>Chest pain - if Ecg is normal or non-specific with negative cardiac evaluation</td>
<td>Less probable case</td>
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<tr>
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<td></td>
<td>Even then - “Close follow up is must. 3% go for MI/death in 30 days</td>
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<td></td>
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<td>Further test with stress ECG, Perfusion scan, angiography – depending upon level of risk</td>
</tr>
<tr>
<td></td>
<td>To predict long term prognosis for patients under going stress test</td>
<td>Duke treadmill score</td>
</tr>
<tr>
<td>Anginal pain</td>
<td>All 3 criteria plus i.e. Substernal pain Evoked by exertion Relieved by rest/Nitor glycerine</td>
<td>High risk for CAD in all age groups</td>
</tr>
<tr>
<td>Atypical Anginal pain</td>
<td>2 of the above 3 criteria</td>
<td>Intermediate risk for CAD in women &gt; 50 yrs &amp; in all men</td>
</tr>
<tr>
<td>Non angina pain</td>
<td>Only one of the above 3 criteria</td>
<td>Intermediate risk for women &gt; 60 yrs &amp; men &gt; 40 yrs.</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>Egophony Dullness on percussion Fever</td>
<td>Highly Probable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Absence does not rule out the diagnosis)</td>
</tr>
<tr>
<td>Cardiac failure</td>
<td>Exertional dyspnea Displaced apex</td>
<td>Positive likely hood</td>
</tr>
<tr>
<td>Chest wall pain</td>
<td>Palpation of tender area reproduces chest pain</td>
<td>Positive likely hood</td>
</tr>
<tr>
<td></td>
<td></td>
<td>h/o rheumatic arthritis/osteo arthritis increases likely hood.</td>
</tr>
<tr>
<td>Panic disorder</td>
<td>“Yes’ on at least one item of autonomic nervous system questionnaire</td>
<td></td>
</tr>
</tbody>
</table>

Learning points from the above Table:
Typical features of MI are:
Chest pain radiating to both sides, with giddiness sweating, hypotension and S₃ gallop in male above 65 with prior history of MI
Rouan Decision rule reasonably predicts possibility of IHD
But 3% of cases diagnosed as non cardiac may suffer MI or death within 30 days
If there are cardiac risk factors present they must be closely followed up

**Acute coronary syndrome and CAD**

Important diagnostic tests to be done:
- 12 lead ECG, serum markers of myocardial damage, stress ECG, nuclear imaging,
- Strongly suggestive ECG findings:
- Newly developed ST elevation, Q waves, conduction defects new T wave inversion
- But absence of these ECG changes does not r/o MI.
- Markers of myocardial damage: CK-MB, troponin T, troponin I

Supportive Diagnostic Values
- CK-MB >6mcg/L within 9 hrs of presentation (Likelihood of MI)
- Troponin T > 2mcg/L at least 8 hrs from presentation
- Troponin >1 mcg/L at least 6 hrs from presentation

These levels indicate likelihood of MI, death or recurrent MI within 30 days
Cases with chest pain with no high risk history, normal or near normal ECG, and with no elevated troponin can be safely evaluated as **outpatient**.

A normal ECG alone does not exclude Probability of MI

**Action to be taken after history, examination and basic investigations:**

**Low risk for CAD:**
No further testing unless medical history/family history of risk is present

**Intermediate risk:**
*In patient capable of exercising* and with no LBBB, No preexcitation, no significant resting ST depression further evaluate by Exercise stress ECG
- If baseline ECG is abnormal perfusion imaging done along with stress ECG
- If patient cannot exercise-evaluate with pharmacological stress or vasodilator test

**High risk patients:**
Proceed directly to Angiography especially if other tests are non diagnostic
And cases who would benefit from revascularization
Duke treadmill Score and Prognosis
In cases undergoing Stress test, prognosis can be assessed by Duke Treadmill score

Pulmonary Embolism:

Low clinical suspicion
- D-dimer testing especially Quantitative Elisa D-Dimer assay is very valuable
- Normal Elisa D-Dimer and low clinical suspicion – safely rules out P.E 99.5%
Follow up if symptoms progress or change

In Moderate clinical suspicion:
- Elisa D-Dimer assay plus
- Helical CT and
- Lower limb venous ultra sound

In moderate/high clinical suspicion
- If CT scan and Venous ultra sound abnormal,
  Treat for PE /DVT irrespective D-Dimer value

In moderate/high clinical suspicion
- Abnormal D-Dimer plus normal CT and normal ultra sound of lower limb Veins
- Consider Serial ultrasound in moderately suspect cases
- If clinical suspicion high consider pulmonary angiography
Pneumonia and heart failure

For **Pneumonia** –
Chest X-ray is reference standard

**Heart failure**
Acute dypnea + chest pain + Cardiomegaly in CXR, + Abnormal ECG - likely H.F
B-type Natriuretic peptide level reliable clinching test (if > 500ngm/L); if
Less than 100ng/L can reliably rule out

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**Chest wall pain**
Diagnosis by history and clinical exam after r/o other conditions
Sometimes radiology is helpful
ESR does not help.

Diagnostic algorithm given in next page;
An Algorithm for outpatient diagnosis of causes of chest pain

Reference: *Am fam physician* 2005 15;72, PubMed database