Acute Coronary Syndromes: Unstable Angina and Myocardial Infarctions
Part 1

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Objectives

- Review the prevalence of ACS in the US and discuss differences between age, sex, and ethnic groups.

- Discuss the pathophysiology of athero-thrombosis with the addition of infarction and necrosis.

- Describe the diagnosis, evaluation, and testing of patients with ACS.

- Compare and contrast disease presentation and treatment outcomes between the sexes.

Objectives Continued

- Discuss the AHA recommended timeline from time of presentation to diagnosis to treatment of STEMI and determine appropriate treatment options for various types of ACS.

- Differentiate between the recommended acute treatments for patients with UA/NSTEMI versus STEMI based on pathophysiology of the disease.

- Apply recommended secondary prevention therapies for patients with ACS.
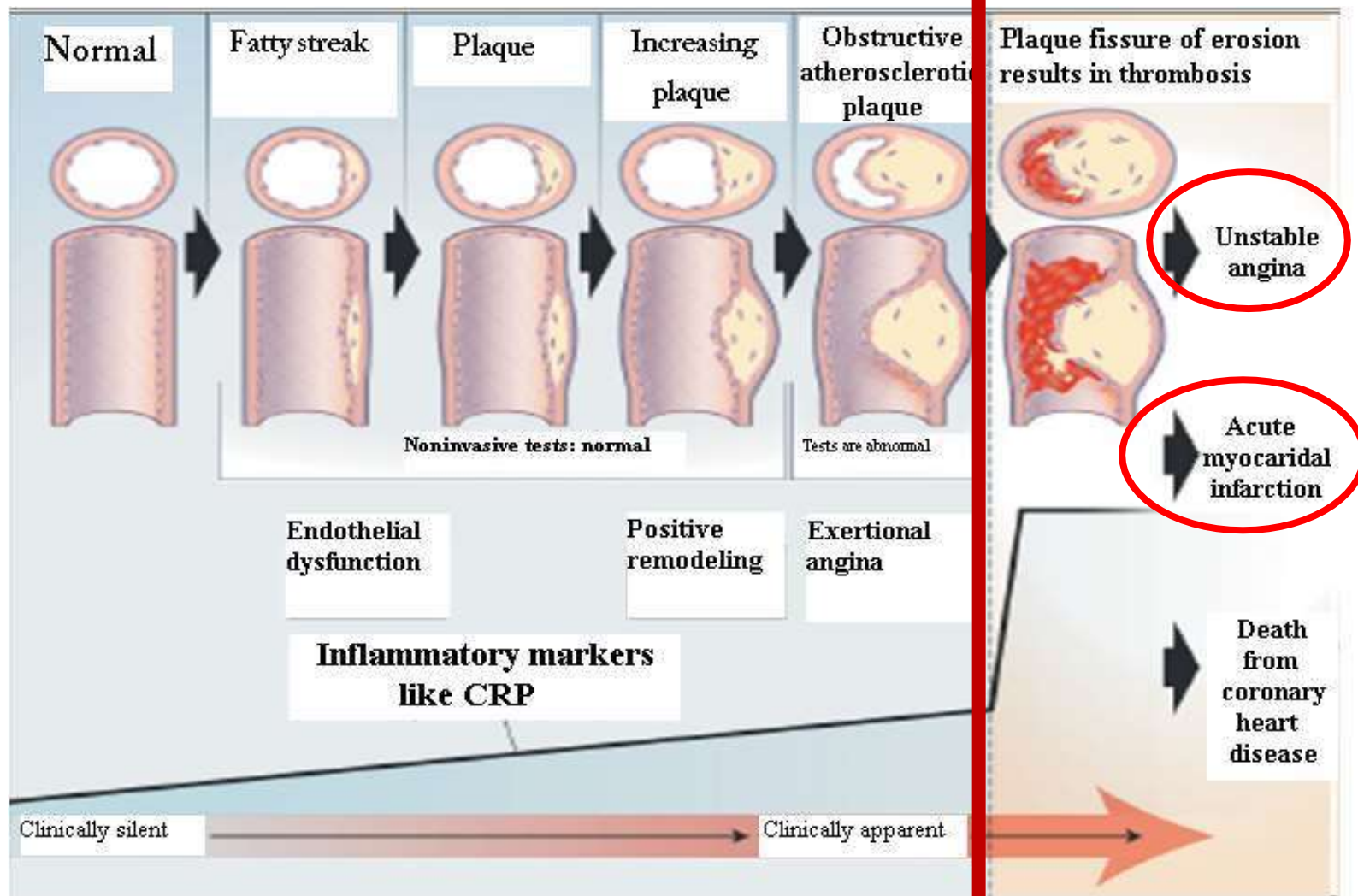
Resources

- 2012 ACCF/AHA Guideline for the Management of ST-Elevation Myocardial Infarction

- 2015 ACCF/AHA Focused update: ST-Elevation Myocardial Infarction Guideline

- ACCF/AHA 2014 Guideline Update for the Management of Patients with Unstable Angina and Non-ST-segment Elevation Myocardial Infarction

- AHA/ACCF 2011 Secondary Prevention Guideline

- AHA/ACCF 2012 Stable Ischemic Heart Disease Guideline

- 2015 ACC/AHA/SCAI Primary Percutaneous Coronary Intervention for Patients with ST-Elevation Myocardial Infarction

- 2016 ACC/AHA Guideline Focused Update on Duration of Dual Antiplatelet Therapy in Patients with Coronary Artery Disease

- ESC 2019 Chronic Coronary Syndromes Guideline

Stable Ischemic Heart Disease (CCS)

Acute Coronary Syndrome

Normal

Fatty streak

Plaque

Increasing plaque

Obstructive atherosclerotic plaque

Plaque fissure of erosion results in thrombosis

Noninvasive tests: normal

Tests are abnormal

Unstable angina

Acute myocaridal infarction

Endothelial dysfunction

Positive remodeling

Exertional angina

Death from coronary heart disease

Inflammatory markers like CRP

Clinically silent

Clinically apparent

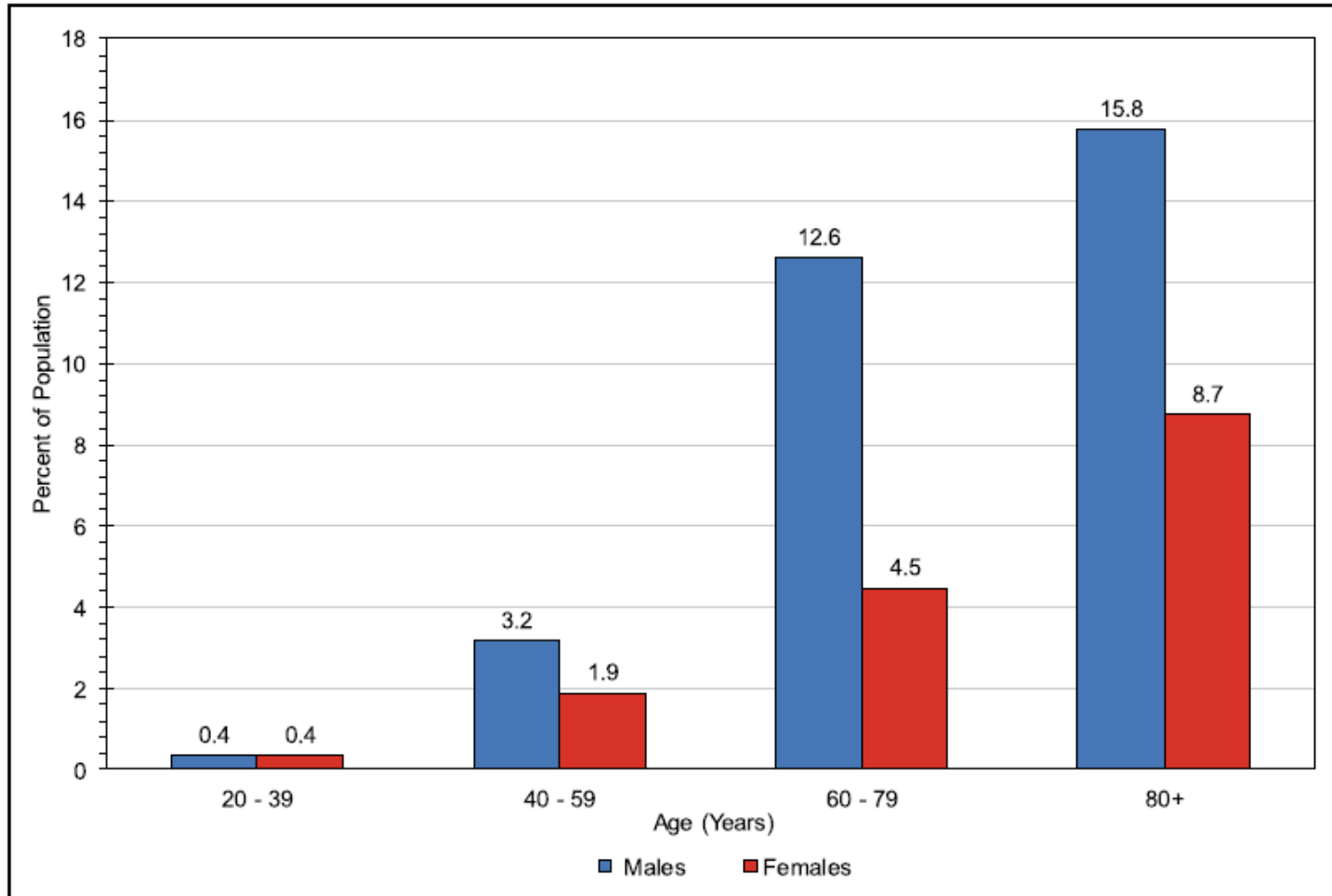Adapted from NEJM 2005;352:2524-2533

ACS Statistics–AHA 2021 Update

- An estimated 20.1M Americans $\geq$ 20 years of age have CHD, 8.8M have had an MI and 11.3M have CCS.
- ~ 605,000 Americans will have new onset MI this year, another 200,000 will have a recurrent event.
  - Average 1 MI every 40 seconds
  - Average age: 65.6 years for men, 72 years for women
- Only 18% of people who suffer an ACS have a history of longstanding angina.
- 35% of people who suffer an ACS in a given year will die from it.
- 2014:   1,016,000 angiographies, 480,000 PCIs, and 371,000 CABG procedures were performed.
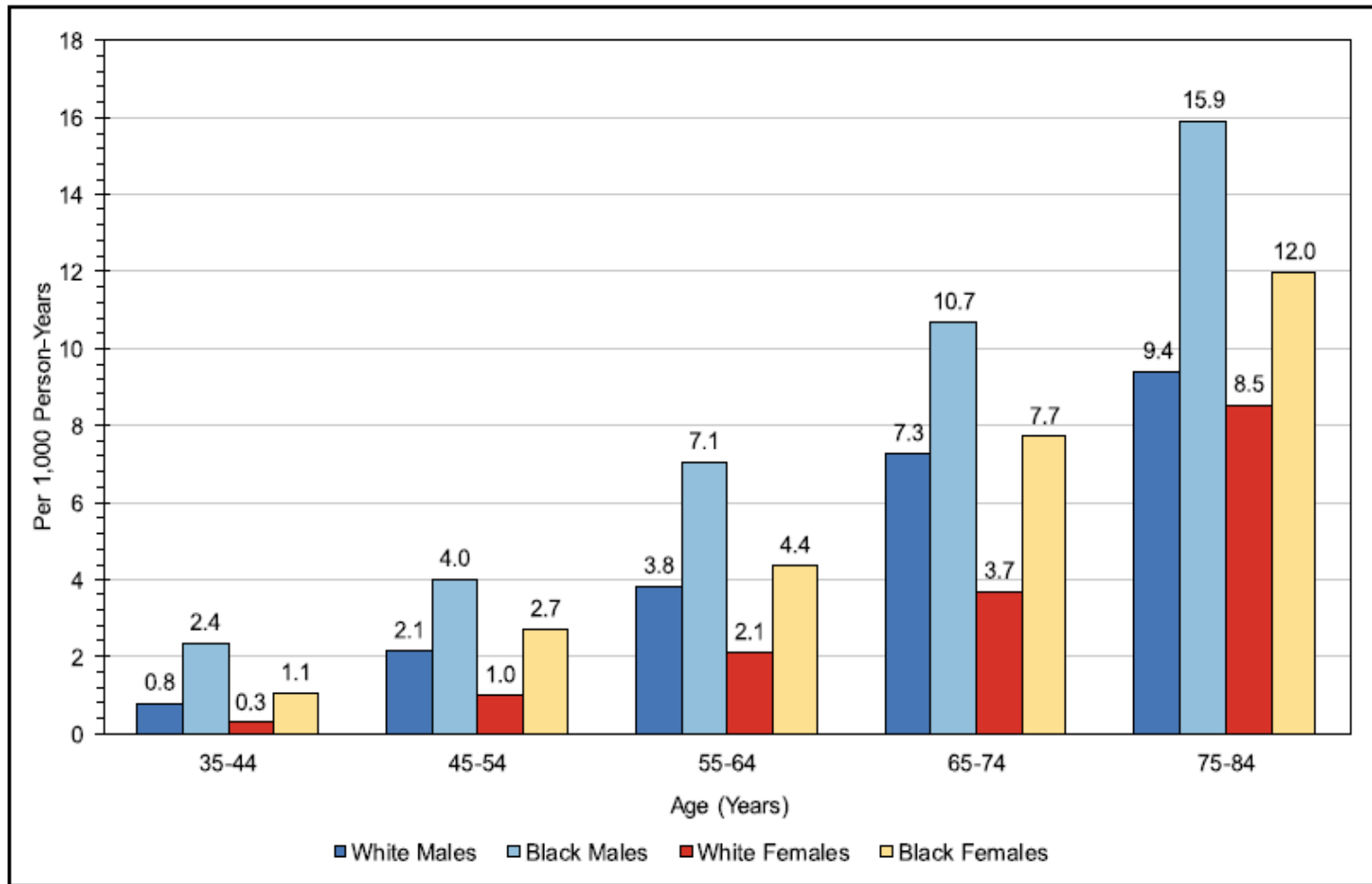- Estimated direct and indirect cost of CHD for 2017 was $298.6 billion.

AHA Heart Disease and Stroke Statistics- 2021 Update

Prevalence of MI by Age and Sex
(NHANES: 2015–2018)

AHA Heart Disease and Stroke Statistics- 2021 Update

Prevalence of MI by Age, Sex, and Race
(ARIC Surveillance: 2005-2014)

AHA Heart Disease and Stroke Statistics- 2021 Update

The Faces of Heart Disease

CCS

ACS

PCI $42,211; CABG $98,000

Heart transplant >$600,000

Ethnicity and ACS

Compared to Caucasians, Blacks are at higher risk for:

- Developing CHD
- Having a MI
- Dying from a MI
- Having a recurrent MI
- Having a CVA after MI
- Developing HF after MI
- Experiencing SCA after MI

AHA Heart Disease and Stroke Statistics- 2021 Update

ACS Statistics- AHA 2021 Update

Sudden Cardiac Arrest victims: Tim Russert James Gandolfini

- 18% of men and 23% of women will die within 1 year of having a first MI

- Median survival time after first MI:
  - Men 8.2 years   - Women 5.5 years

- Increase risk of sudden cardiac death is 4-6 times higher than general population
  - 50% of all cardiac deaths occur within 1 hour of symptom onset

AHA Heart Disease and Stroke Statistics- 2021 Update

Potential Complications of MI

Pump failure

- Bradycardia, heart blocks
- Cardiogenic shock
- Papillary muscle dysfunction or rupture
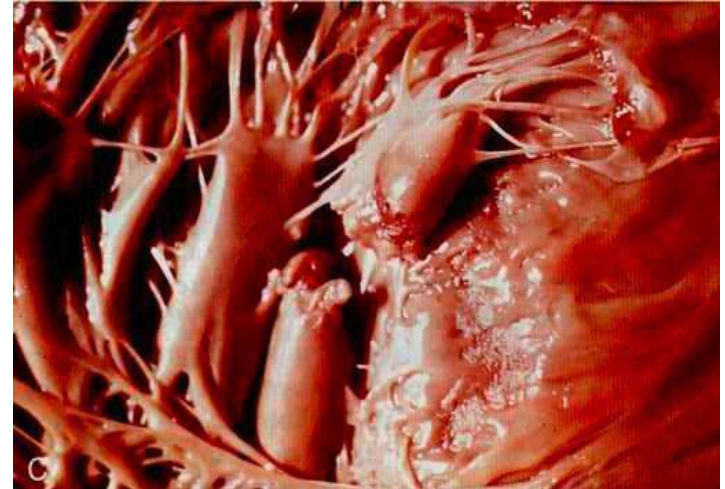- LV wall rupture
- HF (acute and chronic)

Arrhythmias

- Atrial and ventricular
- Sudden cardiac death

Pericarditis

Recurrent ischemia and re-infarction

- Heart
- Brain

Treatment of ACS:
4 Main Topics

1. Management of ACS S/Sx

2. Initial Management in ED

3. Acute therapies during hospitalization

4. Chronic therapies after discharge

Treatment of ACS

1. **Management of ACS S/Sx**
    A. PREVENTION!
        a) Identification and management of RF
        b) Education on CHD risk (CV risk assessment)
    B. **Activate EMS early!**
        a) **Identify symptoms of MI**
        b) **Understand gender differences**
2. Initial Management in ED
3. Acute therapy during hospitalization
4. Chronic therapy after discharge

ACS Awareness- Wake up and Smell the Coffee!

- In a survey conducted in 2005,
  - 27% of people were aware of the 5 warning signs of ACS <u>and</u> would call 911 if they thought someone was having a heart attack
  - 44% of patients with CHD had low knowledge levels of the possible symptoms of a heart attack
  - 43% of patients with CHD assessed their risk of having a MI or dying compared to general population as LOW
  - 49.5% of patients delayed $\geq$ 4 hours from onset of symptoms to hospital arrival

Symptoms of ACS

1. Chest discomfort (with or without radiation)

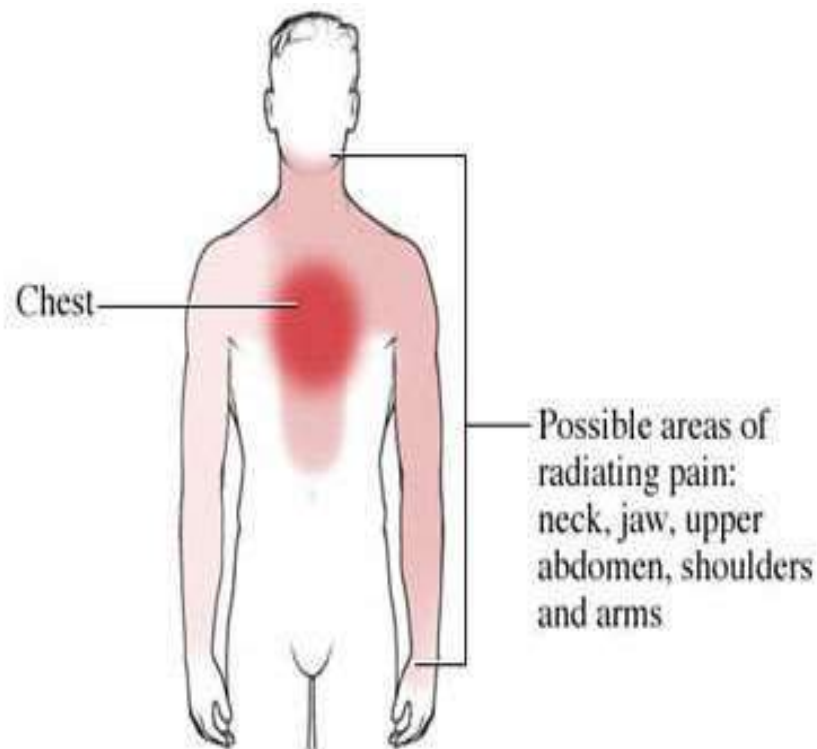2. Discomfort in one or both arms, back, neck, jaw, or stomach
3. SOB
4. Diaphoresis, nausea, vomiting, or light-headedness
5. Weakness

"Atypical" or angina-equivalent symptoms

"Typical" or "classic" symptoms

Chest

Possible areas of radiating pain: neck, jaw, upper abdomen, shoulders and arms

2013 STEMI and 2014 NSTE ACS Guidelines

Gender Differences in Presentation

- "Typical" cardiac symptoms based on experience of white, middle-aged men
- "Atypical" cardiac symptoms more
- commonly experienced in women
  - SOB, cough
  - weakness or unusual fatigue
  - cold sweat
  - dizziness
  - N/V, indigestion, loss of appetite

Mehta LS et al. Circ 2016;133:916-947

Acute MI in Women

- When chest pain/discomfort present, most common descriptors of angina included:
    - pressure (22%)
    - ache (15%)
    - tightness (15%)

- Location and intensity of angina:
    - middle or upper back
    - high chest
    - neck
    - jaw
    - Rate pain as severe (only 59%)

- Many women did not report any acute chest discomfort or pain (37-43%)

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Acute MI in Women Continued

- Most women report experiencing pro-dromal symptoms prior to MI
  - Average 5 symptoms per event
  - Majority experience symptoms for more than 1 month prior to event, at least daily or several times per week
  - Most frequent symptoms:
    - unusual fatigue (71%)
    - sleep disturbances (48%)
    - SOB (42%)
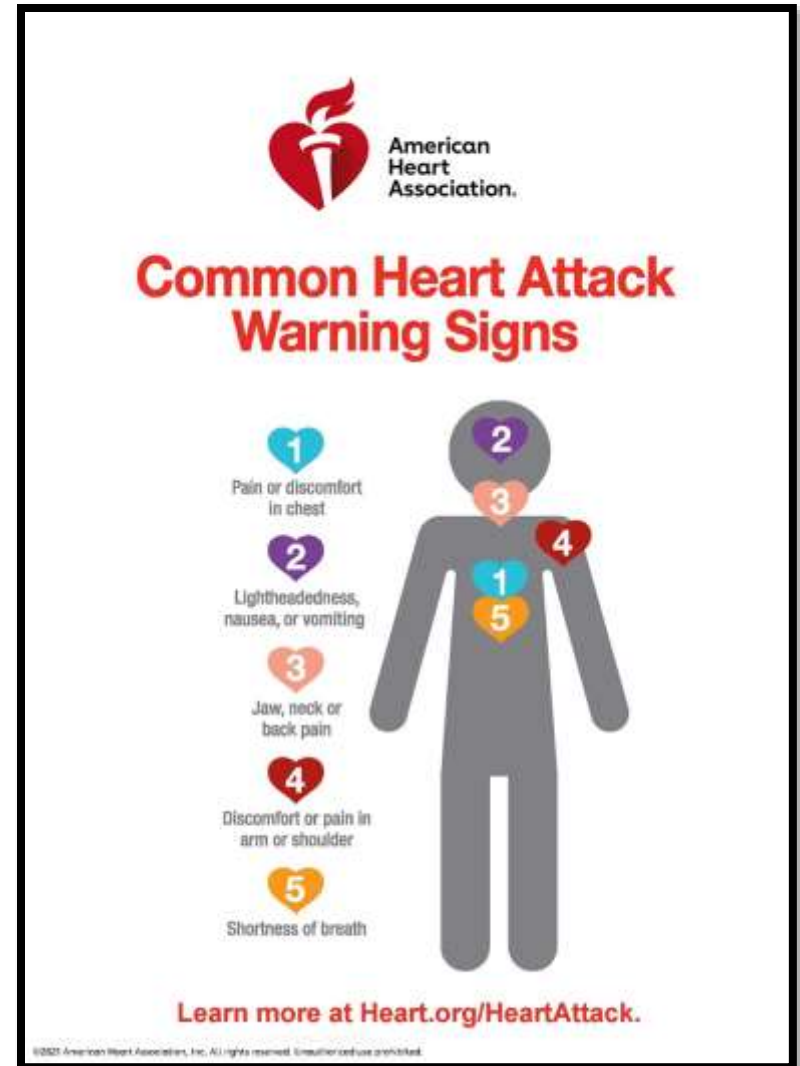   - indigestion (39%)
    - anxiety/scared feeling (36%)

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What can we do? Educate!

The public should be educated to:

Recognize the S/Sx of ACS

Activate EMS within 5 minutes of onset (EKG)

Avoid transportation via friends or relatives (no AED)

ACC/AHA 2013 STEMI Guidelines; 2014 NSTE ACS Guidelines

What can we do? Educate!

- For patients with a **history of ACS**, avoid time delay with NTG self-treatment if experiencing ACS symptoms again:
    - If symptoms do not improve or get worse after 5 min of taking first NTG tab, **call 911 with the second tablet** and continue taking NTG tabs q5min for a total of 3 tabs.

ACC/AHA 2013 STEMI Guidelines; 2014 NSTE ACS Guidelines

Thank-you!