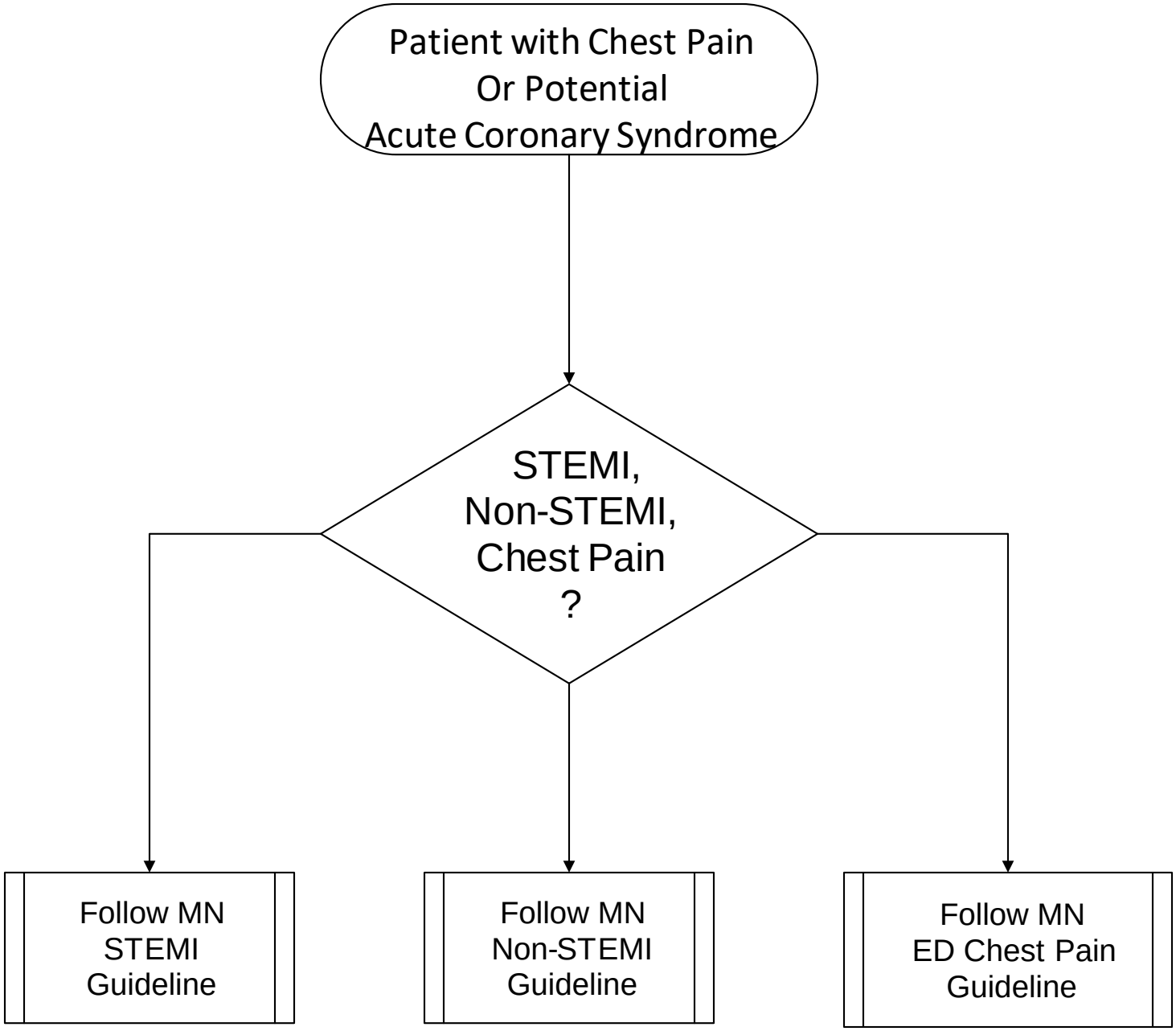
Minnesota Chest Pain / Acute Coronary Syndrome "Tool-Kit"



DEPARTMENT OF HEALTH

Final Draft: June 12th, 2018

This ACS/Chest Pain "Tool-Kit" was created with coordination from the Minnesota Department of Health, in conjunction with the American Heart Association Minnesota Mission:Lifeline™ Workgroup. This information is intended only as a guideline. Please use your best judgement or newly published literature in the treatment of patients. The Minnesota Department of Health is not responsible for inaccuracies contained herein. No responsibility is assumed for damages or liabilities arising from accuracy, content error, or omission.

Minnesota Chest Pain / Acute Coronary Syndrome Toolkit

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Minnesota STEMI GUIDELINE

Minnesota Mission: Lifeline Statewide STEMI Interfacility Transfer Guideline

American Heart Association. | MISSION: LIFELINE

IDENTIFY/ Confirm STEMI

- Signs & Symptoms suspect for AMI (Acute Myocardial Infarction) Duration > 15 min < 12 hrs.
- ST Elevation defined by criteria on page 2
- Pre-Hospital STEMI criteria on page 2

ACTIVATE TRANSPORT

Establish availability and ETA of Air or Ground ALS EMS for Interfacility Transfer to Primary PCI Hospital

ACTIVATE YOUR INTERNAL STEMI ALERT

Alert appropriate provider(s) and team members

ESTABLISH KEY TIMES:

Symptom Onset:
First Medical Contact (**FMC**):
ETA to arrival at PCI Hospital:

Estimate FMC (First Medical Contact) to Potential PCI:

(Allow approx. 20 minutes after arrival to PCI capable hospital)

Estimated FMC to PCI ≤ 120 minutes

Or FMC > 120 minutes, and one of the following:

- Fibrinolytic Ineligible
- Resuscitated out-of-hospital cardiac arrest patients whose initial ECG shows STEMI
- Evidence of either Cardiogenic Shock or Acute Severe CHF

***Do NOT give Lytic/TNK!*

All:

- Aspirin 325 mg PO chewed
- Heparin IV Bolus 60 Units/kg, max 4,000 Units (No IV Heparin Drip)
- Ticagrelor 180 mg PO
  (If Ticagrelor not available, then give Clopidogrel 600 mg PO)

Estimated FMC to PCI 120-180 minutes

- Establish if Fibrinolytic appropriate *(See page 2 for contraindications)*
- Goal: Door to Needle < 30 minute

1. For all ages transferring not utilizing Pharmaco-invasive strategy proceed to Full Dose Fibrinolytic Strategy
2. For patient transferring to Abbott NW/MHI utilizing Pharmaco-invasive strategy, administer HALF-Dose TNK IV and transfer for PCI (Dosing table pg. 2)

All:

- Aspirin 81 mg x 4 (324 mg) chewed
- Heparin IV Bolus 60 Units/kg, max 4,000 Units (No IV Heparin Drip)
- Clopidogrel 600 mg PO
- TNK **"HALF–Dose"** IV

Estimated FMC to PCI > 120 minutes

(& For all ages transferred with an estimated FMC to PCI > 180 minutes)

- Establish if Fibrinolytic appropriate *(See page 2 for contraindications)*
- Goal: Door to Needle < 30 minutes
- Consider consultation with PCI receiving center Cardiology prior to administration of fibrinolytic.

All:

- Aspirin 325 mg PO chewed
- Heparin IV Bolus 60 Units/kg, max 4,000 Units
- Heparin IV Drip 12 Units/kg/hr., max 1,000 Units/hr.

For AGE ≤ 75 years old:

- Clopidogrel 300 mg PO
- TNK **"FULL-Dose"** IV*

For AGE > 75 years old

- Clopidogrel 75 mg PO
- TNK **"HALF–Dose"** IV

ACTIVATE CODE STEMI / STEMI ALERT AT PCI HOSPITAL

(Follow your regional STEMI protocol)

TRANSPORT PATIENT AS SOON AS POSSIBLE!

Fax or Transmit ECG and other pertinent records
(EMS reports, allergies, past medical history, etc.)

Top Patient Care Priorities:

- Establish DNR/ Resuscitation Status
- Obtain vital signs and assess pain level on scale of 1-10
- Cardiac Monitor & attach hands-free defibrillator pads
- Establish Saline Lock - large bore needle (left arm preferred)
- Oxygen PRN at 2 L/min and titrate to SpO2 > 90%
- Assess Allergies (Note if reaction to IV Contrast?)

Notes:

Patient Care When Time Allows:

- Establish 2nd large bore IV with Normal Saline @TKO (Left arm preferred)
- Obtain Appropriate Labs: Troponin, CBC, Potassium, Creatinine, PT/ INR, aPTT
- Nitroglycerin 0.4 mg SL every 5 min or Nitropaste PRN for chest pain (hold for SBP < 90)
- Evaluate if erectile dysfunction or pulmonary hypertension medications taken in the past 48 hours including: Sildenafil (Viagra, Revatio), Vardenafil (Levitra, Staxyn), Avanafil (Stendra), or Tadalafil (Cialis, Adcirca), and if so, hold nitrates for 48 hours

Minnesota STEMI GUIDELINE
Mission: Lifeline Statewide STEMI Interfacility Transfer Guideline

American Heart Association. | MISSION: LIFELINE

STEMI (ST Elevation Myocardial Infarction) Diagnostic Criteria:

- ST elevation at the J point in at least 2 contiguous leads of ≥ 2 mm (0.2 mV) in men or ≥ 1.5 mm (0.15 mV) in women in leads V2–V3 and/or of ≥ 1 mm (0.1 mV) in other contiguous chest leads or the limb leads
- Signs & symptoms of discomfort suspect for AMI (Acute Myocardial Infarction) or STEMI with a duration > 15 minutes < 12 hours
- Although new, or presumably new, LBBB at presentation occurs infrequently and may interfere with ST-elevation analysis, care should be exercised in not considering this an acute myocardial infarction (MI) in isolation...If in doubt, immediate consultation with PCI receiving center is recommended
- ECG demonstrates evidence of ST depression suspect of a Posterior MI…consult with PCI receiving center
- If initial ECG is not diagnostic but suspicion is high for STEMI, obtain serial 12 Lead ECG's at 5-10 minute intervals

Pre-Hospital STEMI confirmed by 12 Lead ECG trained ALS EMS, recognize ST segment elevation of ≥ 1 mm in 2 contiguous leads, confirmed interpretation of STEMI transmitted, or ECG monitor interpretive statement infers: "Acute Myocardial Infarction" with pt. signs & symptoms suspect of AMI

ABSOLUTE CONTRAINDICATIONS FOR FIBRINOLYSIS

- Chest Pain / Symptom Onset > 12 hours
- Suspected aortic dissection
- Any prior intracranial hemorrhage
- Structural cerebral vascular lesion or malignant intracranial neoplasm
- Any active bleeding (excluding menses)
- Ischemic stroke within 3 months
- Significant closed-head or facial trauma within 3 months
- Pregnancy

RELATIVE CONTRAINDICATIONS FOR FIBRINOLYSIS

- Chest Pain / Symptom Onset > 6 hours
- Current use of oral anticoagulants (Warfarin, Dabigatran, Rivaroxaban, Apixaban, etc.)
- Uncontrolled hypertension on presentation (SBP > 180 or DBP > 90 mmHg)
- History of ischemic stroke more than 3 months, dementia, or known intracranial pathology not covered in contraindications
- Traumatic or prolonged CPR (over 10 minutes)
- Major surgery within last 3 weeks
- Recent internal bleeding (within last 2-4 weeks)

Tenecteplase (TNKase) Dosing Chart

Patient Weight	** FULL-DOSE **	** HALF-DOSE **
59 kg or less	30 mg = 6 mL	15 mg = 3 mL
60 - 69 kg	35 mg = 7 mL	18 mg = 3.5 mL
70 - 79 kg	40 mg = 8 mL	20 mg = 4 mL
80 - 89 kg	45 mg = 9 mL	23 mg = 4.5 mL
90 kg or more	50 mg = 10 mL	25 mg = 5 mL

AHA Mission: Lifeline STEMI Recommendations:

- **FMC (First Medical Contact)-to-First ECG** time ≤ 10 minutes unless pre-hospital ECG obtained
- All eligible STEMI patients receiving a **Reperfusion Therapy** (Primary PCI or fibrinolysis)
- Fibrinolytic eligible STEMI patients with **Door-to-Needle** time ≤ 30 minutes
- Primary PCI eligible patients transferred to a PCI receiving center with referring center **Door in- Door out** *(Length of Stay)* ≤ 45 min
- Referring Center ED or Pre-Hospital **First Medical Contact-to-PCI time** ≤ 120 minutes *(including transport time)*
- All STEMI patients without a contraindication receiving **Aspirin** prior to referring center ED discharge

Notes:

Minnesota Mission: Lifeline EMS STEMI Transport Guideline

Obtain 12 L ECG with Initial Assessment & Vital Signs

Goal: First Medical contact to ECG ≤ 10 min, Scene time: ≤ 15 minutes
-to provide early identification and pre-hospital arrival notification for suspected myocardial infarction or STEMI.

- Chest pain, pressure, tightness or persistent discomfort above the waist in pts. ≥ 35 yrs. of age
- "Heartburn" or epigastric pain
- Complaints of "heart racing" (HR >150 or irregular and >120) or "heart too slow" (HR < 50 and symptomatic)
- A syncopal episode, severe weakness, or unexplained fatigue
- New onset stroke symptoms (< 24 hours old)
- Difficulty breathing or shortness of breath (with no obvious non-cardiac cause)
- ROSC (return of spontaneous circulation) post cardiac arrest
- Recent Cocaine, stimulant and/or other Illicit drug use (patients of any age)

If initial ECG is not diagnostic but suspicion remains high for ACS (acute coronary syndrome) and symptoms persist, obtain serial ECG's at 5-10 minute intervals

Pre- Hospital STEMI ALERT Activation Criteria:

Goal: Identify potential ACS patents, Recognize STEMI, Alert Receiving Facility

Activate STEMI Alert when any **one** or more of the following criteria are met and patient demonstrates signs & symptoms suspect of (AMI) acute myocardial infarction as described above with a duration of ≥15 minutes ≤24 hours

1. EMS personnel trained in 12 L ECG interpretation recognize ST segment elevation of ≥ 1 mm in 2 contiguous leads
2. Interpretation of ECG transmitted and reviewed by a provider (Physician, NP, PA) confirmed to be diagnostic of STEMI
3. 12 Lead ECG Monitor Algorithm Interpretative statement reads: "Acute Myocardial Infarction"

Determine Transport Destination

- **Transport time estimated to be ≤ 60 minutes**
  Goal FMC to PCI ≤ 120 minutes
- Notify medical control of STEMI and consider transport via the most expedient method available to the nearest PCI Capable Receiving Hospital for Primary PCI.
- Activate STEMI Alert at receiving facility and transmit 12 L ECG as able
- Consider Air Transport

- **Transport time estimated to be ≥ 60 minutes**
  Goal Door to Thrombolysis administration ≤ 30 min
- Notify medical control and consider transport to the closest appropriate non-PCI capable referring hospital for possible thrombolytic therapy and subsequent urgent transfer to a PCI Capable Receiving Facility for reperfusion.
- Initiate thrombolytic contraindication checklist per protocol
- Activate STEMI Alert at receiving facility and transmit 12 L ECG as able for provider confirmation
- Consider Air Transport

Diversion Criteria

If patient demonstrates instability and/or has any one of the following criteria that may require ED evaluation and treatment by a practitioner proceed to **nearest appropriate hospital:**

- Symptoms suggestive of acute stroke or neurological evaluation
- Respiratory or Circulatory Instability
- Chest trauma or MVC victims
- DNR Status
- Consider Left Bundle Branch Block

(version revised 4/2015)

BLS & ALS

- Administer Oxygen to maintain SpO2 90% - 94% titrate as needed starting at 2 LPM per nasal cannula
- Obtain Systolic/Diastolic blood pressure (BP) in both arms
- Administer Chewable Aspirin 81 mg x 4 by mouth
- Evaluate if Erectile Dysfunction or Pulmonary hypertension medications taken in the past 24 hours including: Sildenafil (Viagra, Revatio), Vardenafil (Levitra, Staxyn), or Avanafil (Stendra), Tadalafil (Cialis, Adcirca). Hold nitrates for 48 hours following the last dose
- Administer Nitroglycerin Sublingual 0.4 mg every 5 minutes up to 3 doses if chest discomfort present and SBP > 100. Check BP prior to each administering dose. Hold if SBP ≤ 90.
- BLS only: Request ALS Intercept per local protocol (if transport time exceeds 15 min)
- Establish large bore IV Access (L) *upper extremity preferred*. Establish a 2nd IV line as time allows.

ALS

- If available consider:
  - Ticagrelor (Brilinta) 180 mg by mouth if transferring for PPCI with confirmation by PCI Receiving Facility and local medical control per protocol *** Do Not Administer Both Clopidogrel and Ticagrelor
    OR
  - *If Ticagrelor not available, then give Clopidogrel 600 mg* by mouth if transferring for PPCI with confirmation by PCI Receiving Facility and local medical control per protocol
- Heparin IV Bolus 60 Units/kg, max 4,000 Units (No IV Heparin Drip) if transferring for PPCI after confirmation by PCI Receiving Facility and local medical control per protocol
- Establish a Nitroglycerine IV Drip if chest discomfort is unrelieved. Initiate @ 5 mcg/min & titrate in increments of 5mcg/min every 5 minutes for chest discomfort per protocol. Maintain a systolic BP of ≥90 mm/Hg or greater. Hold nitrates as indicated for crtieria above.
- Administer Analgesia as needed per protocol

Documentation Reminders:

- ✓ Provide a printed copy of EMS Run Sheet, and 12 L ECG with Report to the receiving hospital ED staff
- ✓ Document Date and Time of:
  - EMS dispatch, First Medical Patient Contact, Scene departure, STEMI alert requested
- ✓ Document EMS agency number, and EMS run number

AHA Mission: Lifeline EMS Best Practice Goals

1. All patients with non-traumatic chest discomfort, ≥ 35 yrs. of age, treated and transported by EMS receive a pre-hospital 12-lead electrocardiogram
2. All STEMI patients transported directly to a STEMI receiving center, receive a first (pre-hospital) medical contact to PCI time ≤ 90 minutes directly or ≤120 minutes for Interfacility hospital transfers
3. All thrombolytic eligible STEMI patients treated and transported to a referring hospital for fibrinolytic therapy receive a door to needle time ≤ 30 minutes

AHA Mission: Lifeline EMS Recognition Achievement Measures:

1. Percentage of patients with non-traumatic chest pain ≥ 35 years, treated and transported by EMS who receive a pre-hospital 12-lead electrocardiogram
2. Percentage of STEMI patients treated and transported directly to a STEMI receiving center, with pre-hospital first medical contact to device time ≤ 90 minutes
3. Percentage of lytic eligible STEMI patients treated and transported to a STEMI referring hospital for thrombolytic therapy with a door to administration time ≤ 30 minutes

(version reviewed 4-2015)

EMS STEMI

Mission:Lifeline Minnesota
Transport Flowchart
(Final Draft: July-2015)

American Heart Association. | MISSION: LIFELINE

Suspected Cardiac Event

Obtain 12 Lead ECG
with Initial Assessment & Vital Signs
(Goal: First Medical Contact to ECG ≤ 10 min)

Provide All Additional Treatments per Chest Pain or Appropriate Protocols

Pre-Hospital STEMI ALERT Activation Criteria:
Signs & symptoms suspect of AMI with duration ≥ 15 min but ≤ 24 hrs, and one or more are met):
1. ECG transmitted & reviewed by a provider (Physician, NP, PA) confirmed to be diagnostic of STEMI
2. EMS personell trained in 12 L ECG interpretation recognize ST elevation of ≥ 1 mm in 2 contiguous Leads
3. 12-Lead ECG Monitor Algorithm Interpretative statement: (ie. *** Acute Myocardial Infarction ***)

Is STEMI Alert Activation Criteria Met?

Yes

Determine Transport Destination
-Consider Air Transport
-Consider ALS Intercept if BLS transport > 15 min

Transport Time to PCI Capable Hospital ≤ 60 min?

Yes

-Notify medical control at nearest appropriate PCI Hospital of **STEMI ALERT**
-Request **Cath Lab Activation**
-Consider transport via the most expedient ALS method available for **Primary PCI**

Instability or Diversion Criteria?

Yes

Diversion Criteria:
Patient demonstrates instability and/or has any one of the following criteria that may require ED evaluation and treatment by a practitioner:
- Symptoms suggestive of acute stroke or neurological evaluation
- Respiratory or Circulatory Instability
- Chest trauma or MVC victims
- DNR Status
- Consider Left Bundle Branch Block

No

Call PCI Hospital with Patient Identifiers

Proceed to PCI Hospital

No

If suspicion high for ACS & symptoms persist, continue protocol treatments and obtain serial ECG's at 5-10 minute intervals

No

Notify medical control of **STEMI ALERT** and consider transport to the closest appropriate non-PCI capable referring hospital…
...For possible Fibrinolytic therapy and/or subsequent urgent transfer to a PCI Capable Receiving Facility for reperfusion

Proceed to Nearest Appropriate Hospital!

Documentation Reminders Upon Arrival at Hospital:
Provide a printed copy of EMS Run Sheet, & 12 L ECG with Report to the receiving hospital staff.

Document Date and Time of:
-EMS dispatch
-First Medical Patient Contact
-12-Lead ECG
-Scene departure
-STEMI alert requested
-Destination Arrival.
-EMS agency number, and run number.

Minnesota Non-STEMI Guideline

Final Draft 6.12.18

Patient meets any of the following criteria

- HEART Score of 7-10
- ST depression or dynamic T-wave inversion strongly suspicious for ischemia
- Otherwise identified Non-ST elevation acute coronary syndrome (Non-STEMI)

Next step

- Admit to CCU or appropriate unit with cardiac telemetry (may require transfer)
  - Consider Cardiology consult

Medications

- Start adjunctive treatments (as indicated/if no contraindications):
  - Aspirin 324 mg PO (give suppository if unable to take PO)
  - Ticagrelor 180 mg PO or Clopidogrel 600 mg PO (loading doses)
    - (Prasugrel 60 mg PO could also be considered, but note warnings*)
  - Heparin 60 Units/kg (max 4,000 Units) IV bolus
  - Heparin 12 Units/kg/hr (max 1,000 Units/hr) IV infusion
- Other medications as indicated per institutional AMI order set

Assess Criteria for Early Invasive Strategy (Cath Lab)

- High-risk features & patient a candidate for invasive angiography (PCI)?
- Persistent or recurrent symptoms?
- New ST-segment depression and positive serum Troponin(s)?
- Depressed LV functional study that suggests multi-vessel CAD?
- Hemodynamic instability or VT?

Choose Treatment Strategy

Early Invasive Strategy (Cath Lab)

- Prepare for Cath Lab
  - Transfer if necessary by ground ambulance
    (Air transfers should be reserved for STEMI)
- Insert 2 large bore peripheral saline lock IV's in left arm
- Continue adjunctive treatments as above
- Consult Cardiology for additional treatments
  - (i.e. Beta-Blocker, Nitro, Morphine, O2, etc.)

If CABG surgery is required

- Continue Aspirin
- Consult CT surgeon about stopping other therapies and timing (i.e. when to hold antiplatelet)

Ischemia-Guided Strategy (Medical Therapy)

- Continue adjunctive treatments as indicated
- Continue serum Troponins q 3 hours x 3
- Continue serial ECG's
  - Repeat PRN for recurring/worsening symptoms
- Obtain cardiac imaging study
  - Consult Cardiology for appropriate test
  - (i.e. Echocardiography, CTA, Radionuclide, etc.)

If therapy not effective, or pending results of imaging study, reconsider if Invasive Strategy (Cath Lab) would be appropriate.

P2Y12 Inhibitor Maintenance Dosing & Considerations

- Ticagrelor 90 mg PO twice daily or
- Clopidogrel 75 mg once daily or
- Prasugrel* 10 mg PO once daily (5 mg if ≤ 60 kg)

- Continue up to 12 months if medically treated
- Continue at least 12 months if treated with drug eluting stent, or per Cardiologist discretion
- If switching to a different P2Y12 inhibitor, consider a full loading dose at the time the next dose would be due

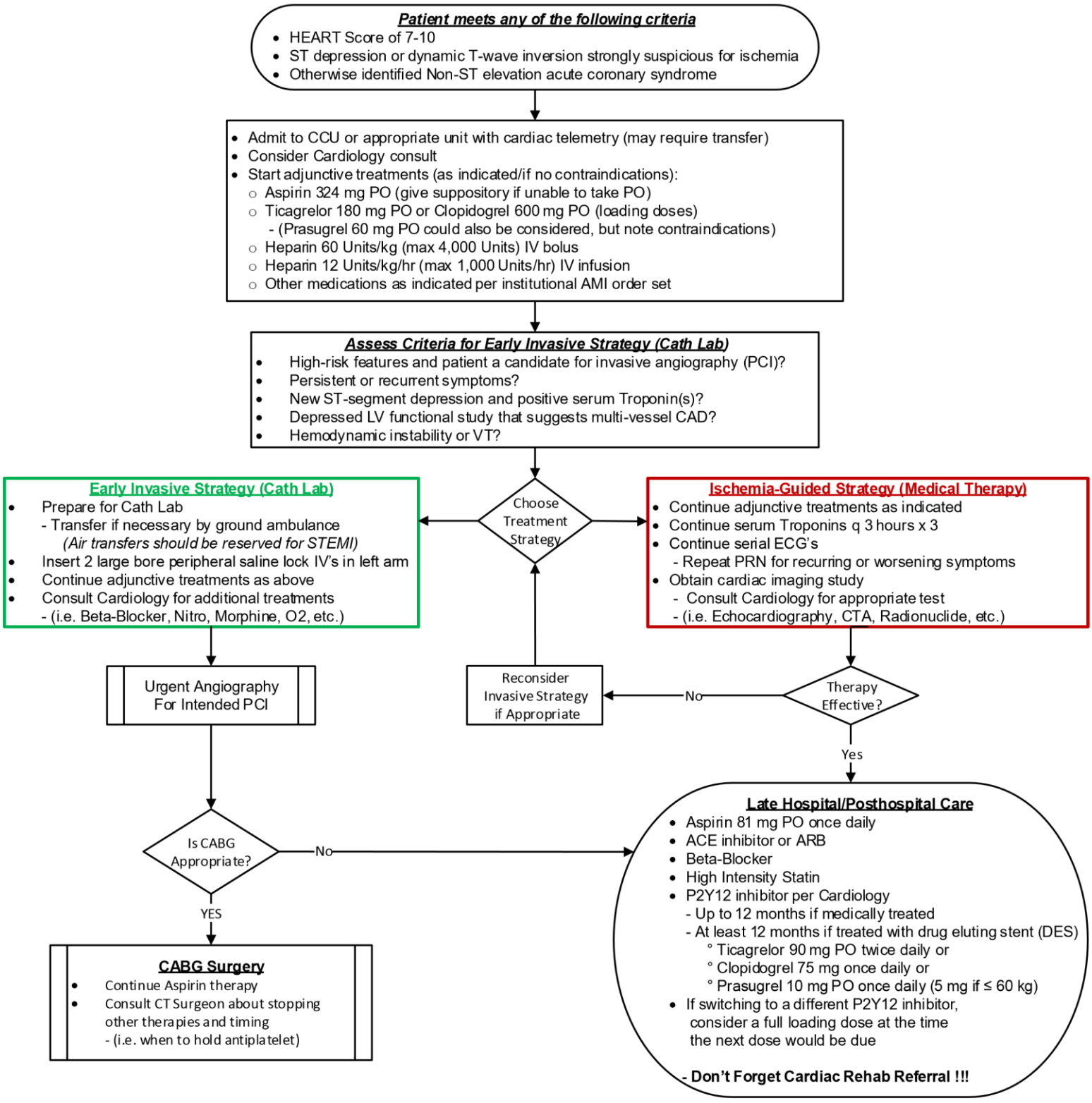
Prasugrel Warnings:
Do NOT use if history of stroke or TIA
Avoid in patients ≥ 75 yo or < 60 kg
Do NOT start if patient likely to undergo urgent CABG

Late Hospital/Posthospital Care

- Aspirin 81 mg PO once daily
- ACE inhibitor or ARB
- Beta-Blocker
- High Intensity Statin
- P2Y12 inhibitor per Cardiology
- Cardiac Rehab Referral

This Guideline is a part of the ACS/Chest Pain "Tool-Kit" created with coordination from the Minnesota Department of Health, in conjunction with the American Heart Association Minnesota Mission:Lifeline™ Workgroup. This information is intended only as a guideline. Please use your best judgement or newly published literature in the treatment of patients. The Minnesota Department of Health is not responsible for inaccuracies contained herein. No responsibility is assumed for damages or liabilities arising from accuracy, content error, or omission.

Minnesota Non-STEMI Guideline - Flowchart



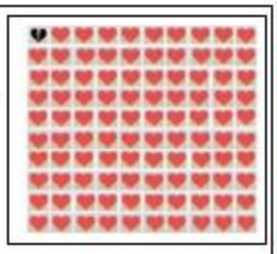
Minnesota ED Chest Pain Protocol

… for Patients Presenting to an Emergency Department
with Chest Pain or Equivalent Symptoms of a Potential Acute Coronary Syndrome (ACS)

Obtain STAT 12-Lead ECG and IV blood draw for Serum Troponin level
- If ECG or Troponin is positive for ACS, patient is no longer low risk, follow appropriate ACS protocols
- Repeat 12-Lead ECG immediately if symptoms change

Once the first Troponin is resulted, calculate the HEART Score*

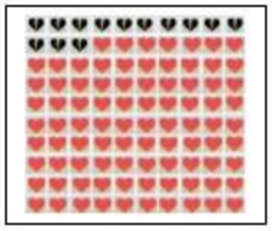
If the Heart Score is 0-3, patient is considered Low Risk:



- Use the Low Risk Shared Decision-Making Tool**
- Inform patient at this point, there is a 1.7% risk of an adverse cardiac event in the next 4-6 weeks
- Advise patient to stay for another Troponin and ECG at hour 2 of ED admission

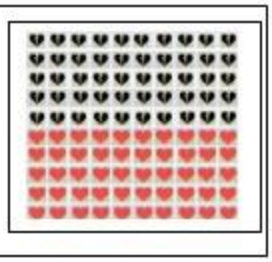
If second Troponin and ECG are negative:
- Inform the patient that now there is a 0.6% risk of an adverse cardiac event in the next 4 weeks
- Advise that patient can be ruled out for ACS without a stress test
- Advise patient to follow up with a provider within 1 week, or per local standard of care

If the Heart Score is 4-6, patient is considered Moderate Risk:



- Use the Moderate Risk Shared Decision-Making Tool**
- Inform patient at this point there is a 13% risk of an adverse cardiac event in the next 4-6 weeks
- Advise patient to be admitted for observation
- Obtain serial ECG's and Troponins at hours 3 and 6
- Evaluate need for admission or a provocative cardiac Stress Test within the next 72 hours
- Follow appropriate ACS protocols, depending on findings

If the Heart Score is 7-10, patient is considered High Risk:



- Use the High Risk Shared Decision-Making Tool**
- Inform patient at this point there is at least a 50% risk of an adverse cardiac event in the next 4-6 weeks
- Advise patient to be admitted to PCI capable hospital and follow appropriate ACS protocols
- Obtain serial ECG's and Troponins at hours 3 and 6
- Post Cardiology for consult

History:

2 Points	**Highly Suspicious (mostly high-risk features)** High-risk features: Middle or left-sided Heavy chest pain Diaphoresis Radiation Nausea/vomiting Exertional Relief of symptoms by sublingual nitrates
1 Point	**Moderately Suspicious (mixture of high-risk and low-risk features)**
0 Points	**Slightly Suspicious (mostly low-risk features)** Low-risk features: Well localized Sharp pain Non-exertional No diaphoresis No nausea/vomiting

ECG:

2 Points	**New ischemic changes** Ischemic ST segment depression (≥ 1 mm)
1 Point	**Non-specific changes** Repolarization abnormalities Non-specific T-wave changes Non-specific ST-segment depression or elevation Bundle branch blocks Pacemaker rhythms LVH Early repolarization Digoxin effect
0 Points	**Completely normal**

Age:

2 Points	≥ 65 yrs
1 Point	45-64 yrs
0 Points	< 45 yrs

Risk Factors:

-Obesity (BMI ≥ 30)
-Current or recent smoker (< 90 days)
-Currently treated diabetes mellitus
-Family history of CAD (siblings and/or parents < 55 yo)
-Hypertension
-Hypercholesterolemia

2 Points	3 or more risk factors above OR any one of the following: Known CAD Prior stroke Peripheral arterial disease
1 Point	1 or 2 risk factors
0 Points	No risk factors

Troponin:

2 Points	≥ 3x Normal Limit
1 Point	>1 to <3x Normal Limit
0 Points	≤ Normal Limit

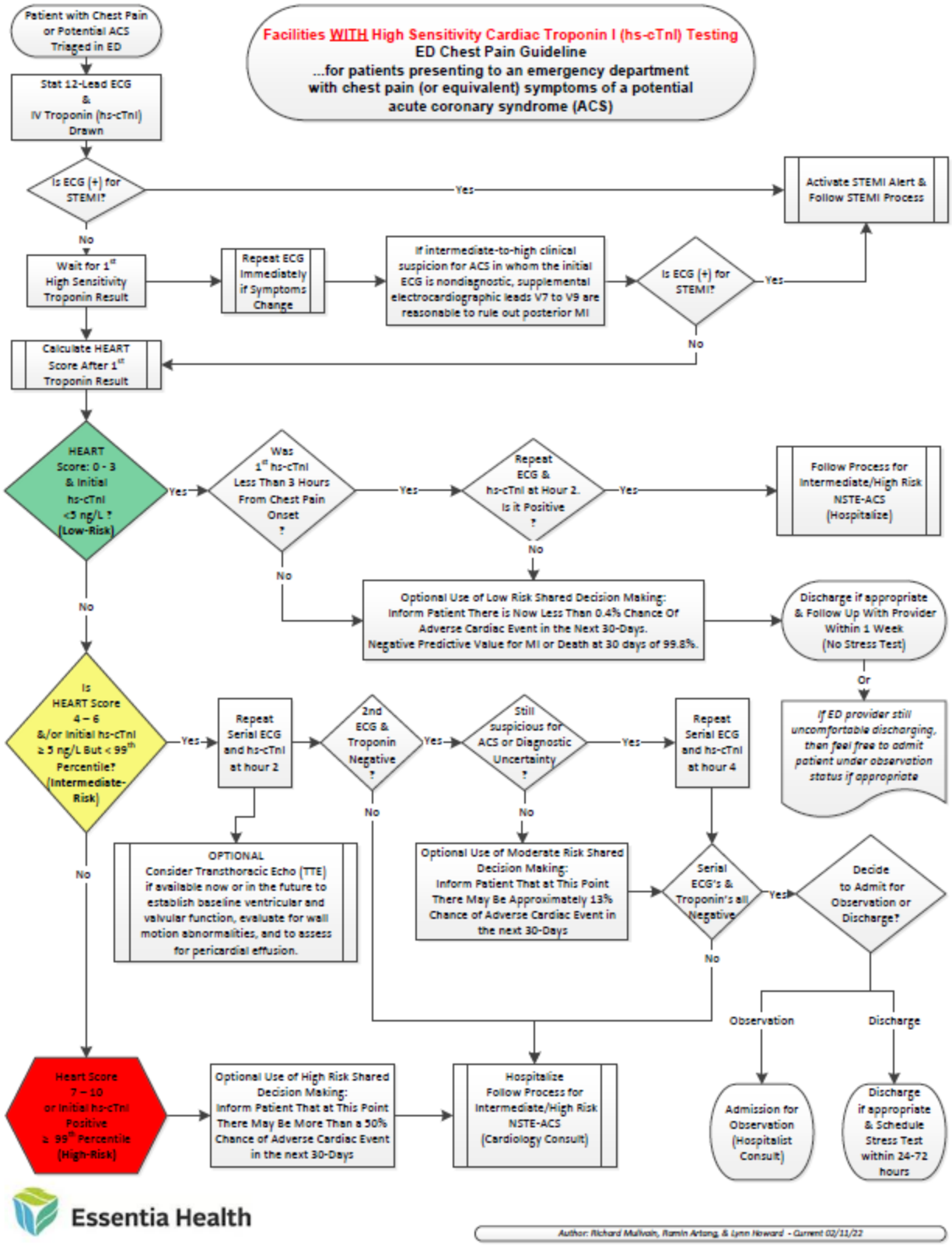
HEART Category	Patient Score
History	
ECG	
Age	
Risk Factors	
Troponin	
Total score:	

Total 0 - 3	Low risk
Total 4 - 6	Moderate risk
Total 7-10	High risk

Notes:

*If EPIC available, can use Dot-Phrase: ".heartscore"
**If EPIC available, can link to Chest Pain Shared Decision-Making Tools

Final Draft - June 12th, 2018


Facilities WITH High Sensitivity Cardiac Troponin I (hs-cTnI) Testing
ED Chest Pain Guideline
...for patients presenting to an emergency department with chest pain (or equivalent) symptoms of a potential acute coronary syndrome (ACS)
Patient with Chest Pain or Potential ACS Triaged in ED
Stat 12-Lead ECG & IV Troponin (hs-cTnI) Drawn
Is ECG (+) for STEMI?
Yes
Activate STEMI Alert & Follow STEMI Process
No
Wait for 1st High Sensitivity Troponin Result
Repeat ECG Immediately if Symptoms Change
If intermediate-to-high clinical suspicion for ACS in whom the initial ECG is nondiagnostic, supplemental electrocardiographic leads V7 to V9 are reasonable to rule out posterior MI
Is ECG (+) for STEMI?
Yes
No
Calculate HEART Score After 1st Troponin Result
HEART Score: 0 - 3 & Initial hs-cTnI <5 ng/L ? (Low-Risk)
Yes
Was 1st hs-cTnI Less Than 3 Hours From Chest Pain Onset ?
Yes
Repeat ECG & hs-cTnI at Hour 2. Is it Positive ?
Yes
Follow Process for Intermediate/High Risk NSTE-ACS (Hospitalize)
No
No
Optional Use of Low Risk Shared Decision Making: Inform Patient There is Now Less Than 0.4% Chance Of Adverse Cardiac Event in the Next 30-Days. Negative Predictive Value for MI or Death at 30 days of 99.8%.
Discharge if appropriate & Follow Up With Provider Within 1 Week (No Stress Test)
Or
If ED provider still uncomfortable discharging, then feel free to admit patient under observation status if appropriate
No
Is HEART Score 4 – 6 &/or Initial hs-cTnI ≥ 5 ng/L But < 99th Percentile? (Intermediate-Risk)
Yes
Repeat Serial ECG and hs-cTnI at hour 2
2nd ECG & Troponin Negative ?
Yes
Still suspicious for ACS or Diagnostic Uncertainty ?
Yes
Repeat Serial ECG and hs-cTnI at hour 4
No
No
OPTIONAL Consider Transthoracic Echo (TTE) if available now or in the future to establish baseline ventricular and valvular function, evaluate for wall motion abnormalities, and to assess for pericardial effusion.
Optional Use of Moderate Risk Shared Decision Making: Inform Patient That at This Point There May Be Approximately 13% Chance of Adverse Cardiac Event in the next 30-Days
Serial ECG's & Troponin's all Negative
Yes
Decide to Admit for Observation or Discharge?
No
Observation
Discharge
Admission for Observation (Hospitalist Consult)
Discharge if appropriate & Schedule Stress Test within 24-72 hours
No
Heart Score 7 – 10 or Initial hs-cTnI Positive ≥ 99th Percentile (High-Risk)
Optional Use of High Risk Shared Decision Making: Inform Patient That at This Point There May Be More Than a 50% Chance of Adverse Cardiac Event in the next 30-Days
Hospitalize Follow Process for Intermediate/High Risk NSTE-ACS (Cardiology Consult)
Essentia Health
Author: Richard Mallvais, Ramin Artang, & Lynn Howard - Current 02/11/22

Low Risk Chest Pain Shared Decision Tool

...For those evaluated with High-Sensitivity Cardiac Troponin I

Essentia Health

Your Chest Pain Diagnosis:

Testing has NOT shown any evidence of a current heart attack.

This is based on electrocardiogram(s), also known as an ECG, as well as High-Sensitivity Troponin I lab testing of your blood, which can detect early heart damage.

A HEART Score* was also calculated to consider at you at Low-Risk for a heart attack.

*Based on History, ECG, Age, Risk factors for heart disease, and Troponin

Your Personal Risk Evaluation:

Of every 100 people with risk factors like yours who came to the Emergency Department with chest pain, and had negative ECG testing, negative High-Sensitivity Troponin blood testing, and a low HEART Score, there is less than a 1% risk of an adverse cardiac event or heart attack in the next 30 days. (According to some publications, the risk may actually be less that a 0.4%.)

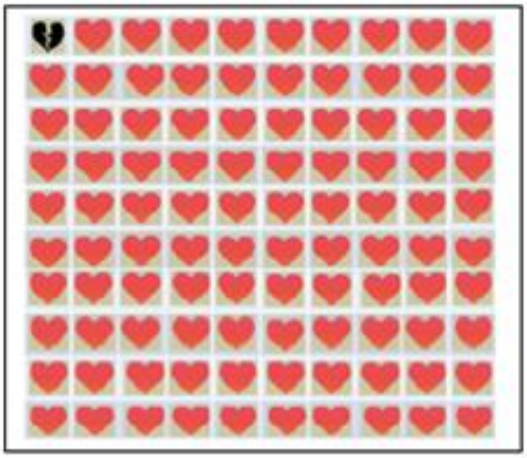
Your Risk of a Heart Attack in the next 30 Days...

Of every 100 people with low cardiac risk factors like yours, who had negative ECG and High-Sensitivity Troponin blood testing...

...within 30 days of their Emergency Department visit:

Less than 1 had a heart attack or heart complication

While 99 did not.



Deciding the Next Step:

Examining your risk will help you and your health care provider decide together whether or not you should have additional heart testing or monitoring.

Your provider may decide to recommend discharging you from the Emergency Department at this point.

or

In some cases, your provider may also decide with you that further monitoring and testing during this visit is needed.

This shared decision tool is intended to help you understand your Personal Risk Evaluation.

If you will be going home at this point, you need to understand the importance of following up with your primary provider within 1 week, or whatever other instructions you have been given.

If your chest pain or heart related symptoms return or worsen, you should call 911 or return to the Emergency Department immediately!

Current 02/11/22

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Intermediate Risk Chest Pain Shared Decision Tool
...For those evaluated with High-Sensitivity Cardiac Troponin I Testing

Essentia Health

Your Chest Pain Diagnosis:

Testing has NOT shown clear evidence of a current heart attack.
However, your chest pain may be an early warning sign of a possible FUTURE heart attack or heart complication.

This is based on electrocardiogram(s), also known as an ECG, as well as High-Sensitivity Cardiac Troponin I lab testing of your blood, which can detect early heart damage.

A HEART Score* was also calculated to consider at you at Intermediate Risk for a heart attack.

Your Personal Risk Evaluation:

Of every 100 people with INTERMEDIATE risk factors like yours who came to the Emergency Department with chest pain, and had negative ECG testing, negative High-Sensitivity Troponin blood testing, and a low HEART Score, there is possibly a 13% risk of an adverse cardiac event or heart attack in the next 30 days.

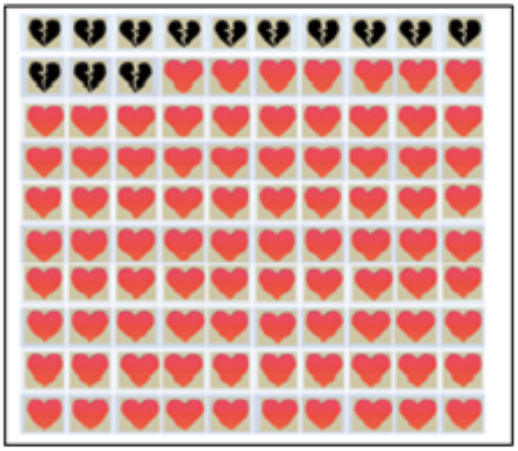
Your Risk of a Heart Attack in the next 30 Days...

Of every 100 people with INTERMEDIATE cardiac risk factors like yours, who had negative ECG's and High-Sensitivity Troponin blood testing...

...within 30 days of their Emergency Department visit:

Less than 13 had a heart attack or heart complication

While 87 did not.



Deciding the Next Step:

Examining your risk will help you and your health care provider decide together how and when you should have additional heart testing or monitoring.

Your provider may decide with you that further observation, monitoring and testing during this visit is needed.
It is also possible that you might be discharged from the Emergency Department at this point but would need to come back to the hospital or clinic for a cardiac stress test within the next 1 to 3 days.

This shared decision tool is intended to help you understand your Personal Risk Evaluation.

If you will be going home at this point, you need to understand the importance returning for your cardiac stress test within then next 1 to 3 days and following up with your primary provider within 1 week, or whatever other instructions you have been given.

If your chest pain or heart related symptoms return or worsen, you should call 911 or return to the Emergency Department immediately!

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High Risk Chest Pain Shared Decision Tool

For those evaluated with High-Sensitivity Troponin I Testing

Essentia Health

Your Chest Pain Diagnosis:

Testing has NOT shown clear evidence of a current heart attack.
However, your chest pain may be an early warning sign of a possible FUTURE heart attack or heart complication.

This is based on electrocardiogram(s), also known as an ECG, as well as High-Sensitivity Cardiac Troponin I lab testing of your blood, which can detect early heart damage.

A HEART Score* was also calculated to consider at you at High Risk for a heart attack.
*Based on History, ECG, Age, Risk factors for heart disease, and Troponin

Your Personal Risk Evaluation:

Of every 100 people with HIGH risk factors like yours who came to the Emergency Department with chest pain, and initially had negative ECG testing, negative High-Sensitivity Troponin blood testing, and a high HEART Score, there is possibly a 50% risk of an adverse cardiac event or heart attack in the next 30 days.

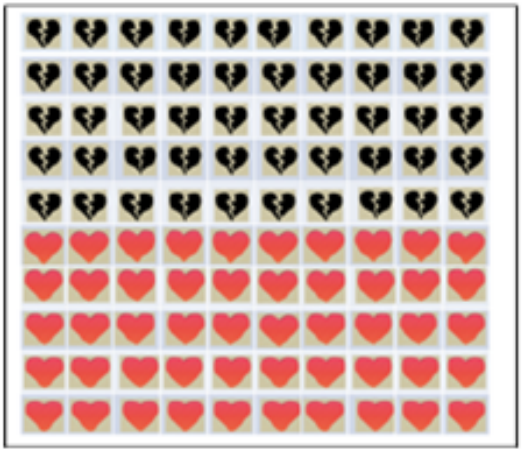
Your Risk of a Heart Attack in the next 30 Days...

Of every 100 people with high cardiac risk factors like yours, who initially had negative ECG's and High-Sensitivity Troponin blood testing...

...within 30 days of their Emergency Department visit:

Roughly 50 had a heart attack or heart complication

While 50 did not.



Deciding the Next Step:

You are at high risk of having a heart attack or complication in the near future.
We recommend you stay in the hospital for observation and further testing.
Your provider will evaluate current options and explain how this will occur.

This shared decision tool is intended to help you understand your Personal Risk Evaluation.

If you do decide to leave the hospital at this point, it may be against medical advice.

If you do leave against medical advice, and your chest pain or heart related symptoms return or worsen, you should call 911 or return to the Emergency Department immediately!

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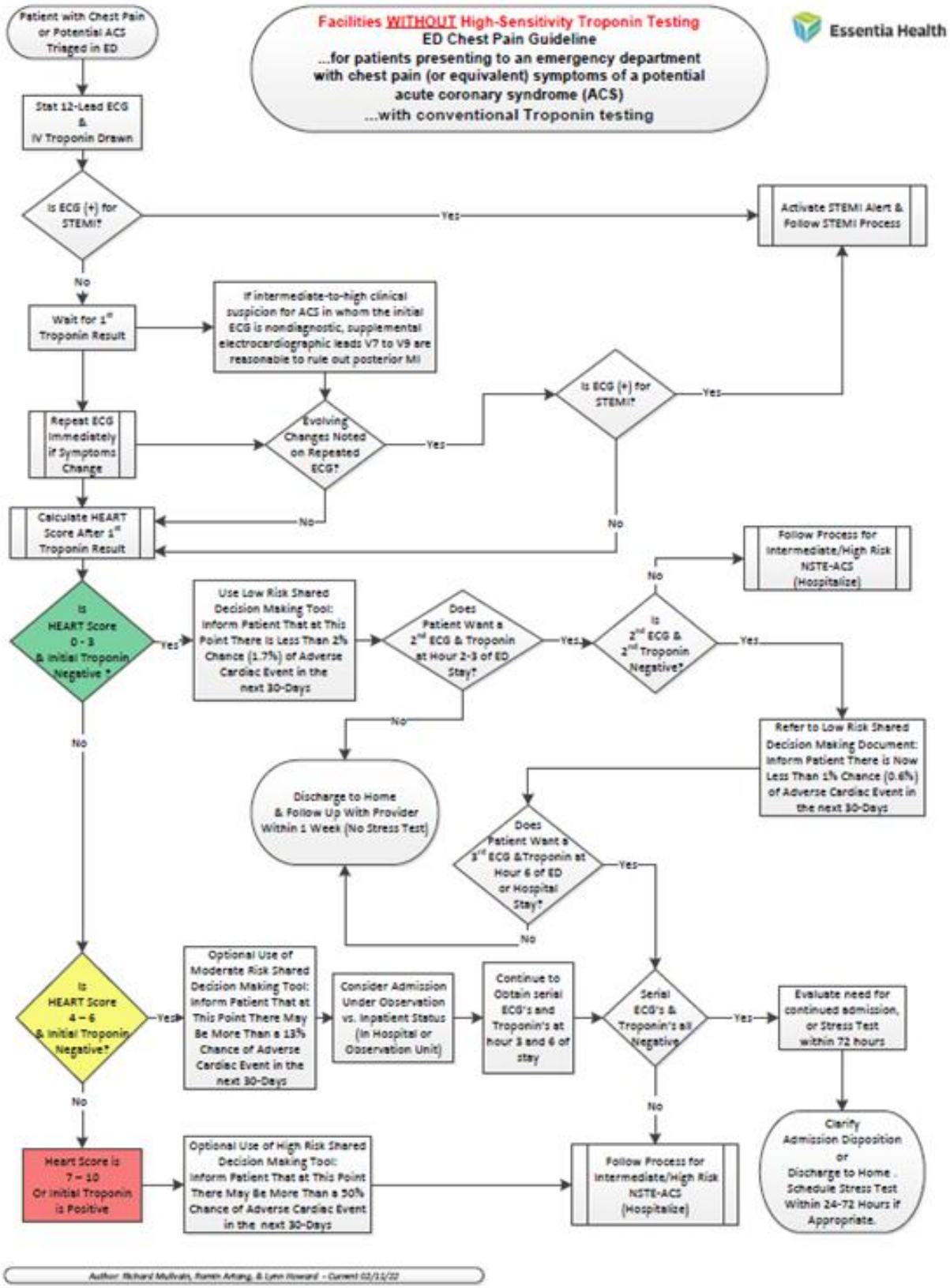

Facilities WITHOUT High-Sensitivity Troponin Testing
ED Chest Pain Guideline
...for patients presenting to an emergency department with chest pain (or equivalent) symptoms of a potential acute coronary syndrome (ACS)
...with conventional Troponin testing
Essentia Health
Patient with Chest Pain or Potential ACS Triaged in ED
Stat 12-Lead ECG & IV Troponin Drawn
Is ECG (+) for STEMI?
Yes
Activate STEMI Alert & Follow STEMI Process
No
Wait for 1st Troponin Result
If intermediate-to-high clinical suspicion for ACS in whom the initial ECG is nondiagnostic, supplemental electrocardiographic leads V7 to V9 are reasonable to rule out posterior MI
Repeat ECG Immediately if Symptoms Change
Evolving Changes Noted on Repeated ECG?
Yes
Is ECG (+) for STEMI?
Yes
No
Calculate HEART Score After 1st Troponin Result
No
Follow Process for Intermediate/High Risk NSTE-ACS (Hospitalize)
Is HEART Score 0 - 3 & Initial Troponin Negative *
Yes
Use Low Risk Shared Decision Making Tool: Inform Patient That at This Point There is Less Than 2% Chance (1.7%) of Adverse Cardiac Event in the next 30-Days
Does Patient Want a 2nd ECG & Troponin at Hour 2-3 of ED Stay?
Yes
Is 2nd ECG & 2nd Troponin Negative?
Yes
No
Refer to Low Risk Shared Decision Making Document: Inform Patient There is Now Less Than 1% Chance (0.6%) of Adverse Cardiac Event in the next 30-Days
No
Discharge to Home & Follow Up With Provider Within 1 Week (No Stress Test)
Does Patient Want a 3rd ECG &Troponin at Hour 6 of ED or Hospital Stay?
Yes
No
Is HEART Score 4 – 6 & Initial Troponin Negative?
Yes
Optional Use of Moderate Risk Shared Decision Making Tool: Inform Patient That at This Point There May Be More Than a 13% Chance of Adverse Cardiac Event in the next 30-Days
Consider Admission Under Observation vs. Inpatient Status (In Hospital or Observation Unit)
Continue to Obtain serial ECG's and Troponin's at hour 3 and 6 of stay
Serial ECG's & Troponin's all Negative
Yes
Evaluate need for continued admission, or Stress Test within 72 hours
No
Clarify Admission Disposition or Discharge to Home . Schedule Stress Test Within 24-72 Hours if Appropriate.
No
Heart Score is 7 – 10 Or Initial Troponin is Positive
Optional Use of High Risk Shared Decision Making Tool: Inform Patient That at This Point There May Be More Than a 50% Chance of Adverse Cardiac Event in the next 30-Days
Follow Process for Intermediate/High Risk NSTE-ACS (Hospitalize)
Author: Richard Mullvain, Ramin Artang, & Lynn Howard - Current 02/11/22

What To Expect Next?

1 Your Chest Pain Diagnosis

Initial testing has NOT shown any evidence of a heart attack. This is based on a blood test, an electrocardiogram (ECG), your exam, and your risk factors.*

It is recommended that a repeat blood test (Troponin), and electrocardiogram (ECG) both be performed approximately 2 to 3 hours after initial tests to further rule out a heart attack.

However, even if everything today is normal, your chest pain may still be an early warning sign of a possible FUTURE heart attack or heart complication.

2 Further Evaluation

Further evaluation and testing will help check if your heart is working correctly.

Understanding your risk of having a heart attack or heart complication can help decide how to best proceed with your care in the Emergency Department.

3 Your Personal Risk Evaluation

If a second Troponin blood test and ECG are both negative, your risk of having a heart attack or heart complication within the next 30 days can be determined by comparing you to people with similar factors* who also came to an Emergency Department with chest pain.

4 The Next Step

Another ECG and Troponin blood test should be repeated 2 to 3 hours after your initial blood test, and if they are also negative, your Emergency Department Provider and you may both decide that you could be discharged to home, and recommend you follow up with a primary care provider or cardiologist.

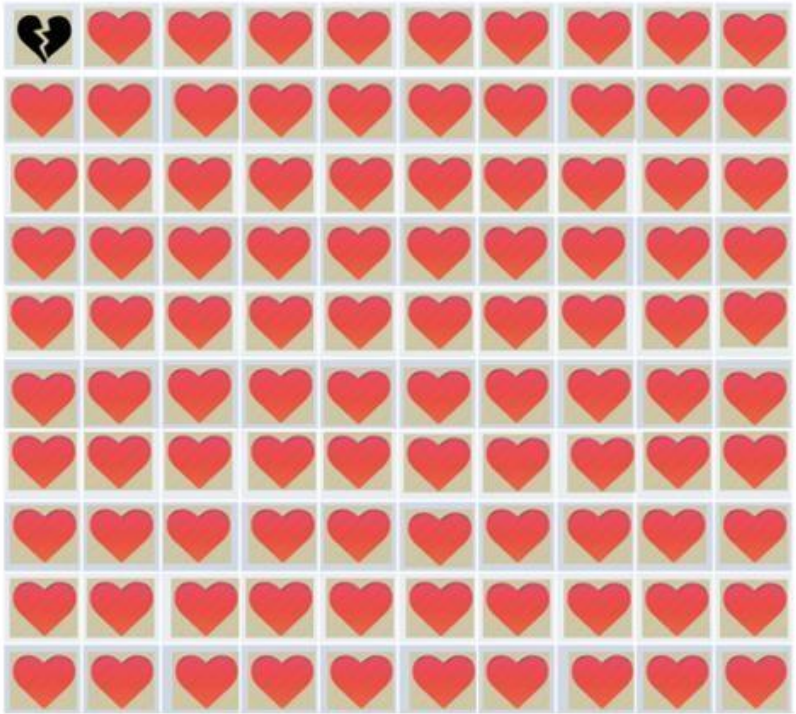
If you refuse, and go home before a second set of tests, your risk for a heart attack may be doubled, up to 2 out of every 100 patients.

For Chest Pain patients whom:
Initial ECG and Troponin are negative, and
HEART Score* is **Low Risk**

Of every **100** people with factors* like yours who came to the Emergency Department with chest pain, and had 2 negative ECG and Troponin tests...
...within 30 days of their Emergency Department visit:

Only **1** had a heart attack or a heart complication.

While **99 did not**.



*Factors used to determine your risk:

History
ECG
Age
Risk Factors for Heart Disease
Troponin

Notes:

This shared decision tool was intended to help you understand your Personal Risk Evaluation.
Even though you might be going home, you need to understand the importance of following up with your primary provider, or a cardiologist within 1 week.

If your chest pain or heart related symptoms return or worsen, you should call 911 or return to the Emergency Department immediately.

What To Expect Next?

1 Your Chest Pain Diagnosis

Initial testing has NOT shown any evidence of a heart attack. This is based on a blood test, an electrocardiogram (ECG), your exam, and your risk factors.*

It is recommended that a repeat blood test (Troponin), and electrocardiogram (ECG) both be performed approximately 2 to 3 hours after initial tests to further rule out a heart attack, and possibly again 3 hours later. However, even if everything today is normal, your chest pain may still be an early warning sign of a possible FUTURE heart attack or heart complication.

2 Further Evaluation

Further evaluation and testing will help check if your heart is working correctly.

Understanding your risk of having a heart attack or heart complication can help decide how to best proceed with your care in the Emergency Department.

3 Your Personal Risk Evaluation

If your second Troponin blood test and ECG are both negative, your risk of having a heart attack or heart complication within the next 30 days can be determined by comparing you to people with similar factors* who also came to an Emergency Department with chest pain.

4 The Next Step

You have a moderate (intermediate) risk of a heart attack or complication in the near future.

Your Emergency Department Provider may want you to agree to stay for observation and further testing.

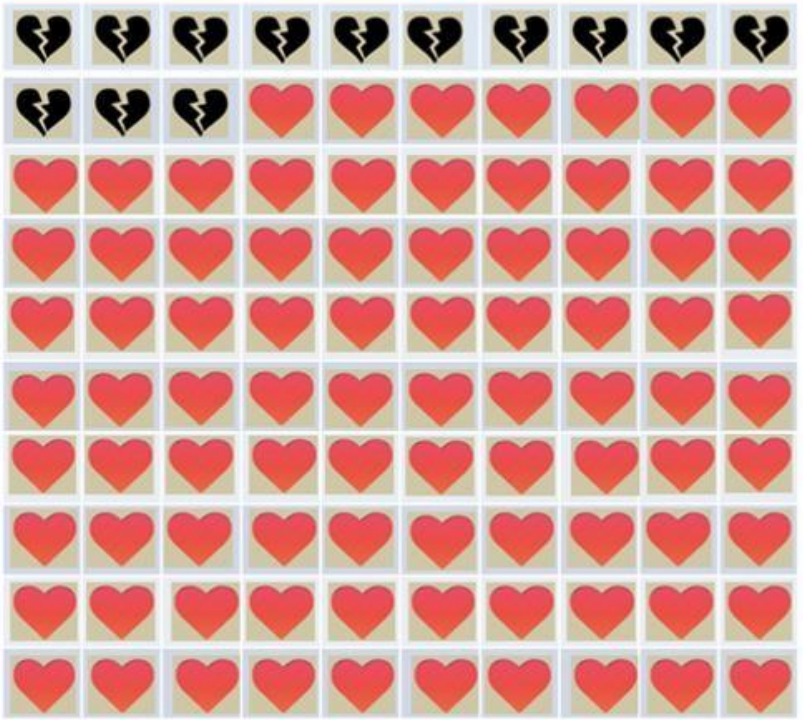
If you decline repeated tests and go home now, your current risk for a heart attack may be even greater than 13 out of 100 patients.

For Chest Pain patients whom:
Initial ECG and Troponin are negative, and
HEART Score* is **Moderate Risk**

Of every **100** people with factors* like yours who came to the Emergency Department with chest pain, and had 2 negative ECG and Troponin tests
...within 30 days of their Emergency Department visit:

13 had a heart attack or a heart complication.

While **87 did not**.



*Factors used to determine your risk:

History
ECG
Age
Risk Factors for Heart Disease
Troponin

Notes:

This shared decision tool was intended to help you understand your Personal Risk Evaluation.
Further observation and testing may be necessary during this visit to the Emergency Department.
If you do end up going home, you may still need further testing as an out-patient.
You need to understand the importance of following up with your primary provider, or a cardiologist, hopefully within 1 week, or whatever is recommended by your Emergency Department Provider.

If you do end up going home, and your chest pain or heart related symptoms return or worsen, you should call 911 or return to the Emergency Department immediately.

What To Expect Next?

1 Your Chest Pain Diagnosis

Our testing so far has NOT shown any evidence of a heart attack. This is based on a blood test, an electrocardiogram (ECG), your exam, and your risk factors.*

It is recommended that a repeat blood test (Troponin), and electrocardiogram (ECG) both be performed approximately 2 to 3 hours after initial tests to further rule out a heart attack, and likely again 3 hours later. However, even if everything today is normal, your chest pain may still be an early warning sign of a possible FUTURE heart attack or heart complication.

2 Further Evaluation

Further evaluation and testing will help check if your heart is working correctly.

Understanding your risk of having a heart attack or heart complication can help decide how to best proceed with your care in the Emergency Department.

3 Your Personal Risk Evaluation

If your second Troponin blood test and ECG are both negative, your risk of having a heart attack or heart complication within the next 30 days can be determined by comparing you to people with similar factors* who also came to an Emergency Department with chest pain.

4 The Next Step

You have a high risk of a heart attack or complication in the near future.

Your Emergency Department Provider will likely recommend you stay for observation and further testing.

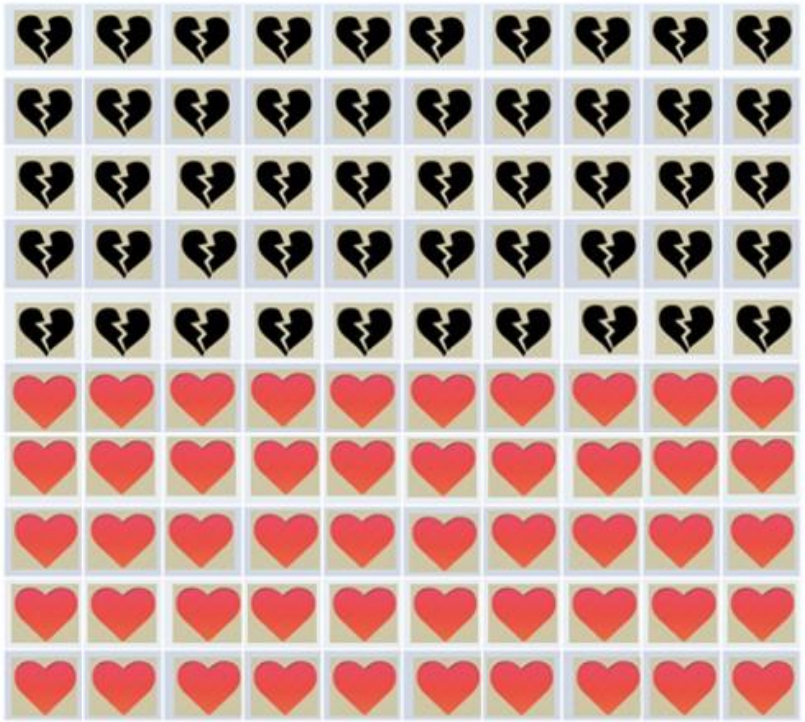
If you decline repeated tests and go home now, your current risk for a heart attack may be even greater than 50 out of every 100 patients.

For Chest Pain patients whom:
Initial ECG and Troponin are negative, and
HEART Score* is **High Risk**

Of every **100** people with factors* like yours who came to the Emergency Department with chest pain, and had 2 negative ECG and Troponin tests
...within 30 days of their Emergency Department visit:

50 had a heart attack or a heart complication.

While **50** did not.



*Factors used to determine your risk:

History
ECG
Age
Risk Factors for Heart Disease
Troponin

Notes:

This shared decision tool was intended to help you understand your Personal Risk Evaluation.
Further observation and testing may be necessary during this visit to the Emergency Department.
If you do end up going home, you may still need further testing as an out-patient.
You need to understand the importance of following up with your primary provider, or a cardiologist, hopefully within 1 week, or whatever is recommended by your Emergency Department Provider.

If you do end up going home, and your chest pain or heart related symptoms return or worsen, you should call 911 or return to the Emergency Department immediately.

Conventional Troponin I (cTn) testing

Results are reported in ng/ML with no difference in the 99% Upper Limit of Normal (ULN) threshold between males or females.

Sample Conventional Troponin I assays utilized have a 99% cut off (ULN) as shown below

< normal limit	0-0.027 ng/mL	HEART Score Points = 0
1-3x normal limit	0.028-0.084 ng/mL	HEART Score Points = 1
>3x normal limit	0.085 ng/mL or greater	HEART Score Points = 2

Low Risk Patients (Heart Score 0-3) require a second ECG and Troponin after hour 2 that are negative to consider discharge without provocative stress test.

- Shared decision making should be considered, and at this point there may be roughly a 0.6% risk of adverse cardiac event in the next 30 days.

Intermediate Risk Patients (Heart Score 4-6) require serial ECG and Troponin at hour 3 and 6, and if all negative, still consider provocative stress test if appropriate.

High Risk Patients (Heart Score 7-10) or a "positive" Conventional Troponin I (CTn) are ruled in for Non-STEMI equivalent and should be admitted to the hospital.

High Sensitivity Cardiac Troponin I (hs-cTnl) testing

Results are reported in ng/L (One thousand times smaller than Conventional Troponin I testing, making the "number" appear much higher). Please note that there are different 99% Upper Limit of Normal (ULN) thresholds for males and females. Males require a much higher threshold than females to be considered "Positive". Please refer to your institution's specific assay recommendations.

Example* estimated thresholds:

< normal limit	Females <16 ng/L	Males <34 ng/L	HEART Score Points = 0
1-3x normal limit	Females 16-28 ng/L	Males 34-102 ng/L	HEART Score Points = 1
>3x normal limit	Females >48 mg/L	Males >102 ng/L	HEART Score Points = 2

**Note: Values above may change slightly based on your individual institution's assay. Please utilize the reference ranges as reported per your laboratory.*

Low Risk Patients (Heart Score 0-3): May allow a patient to be discharged home after only ONE hs-cTnl assay that is below 5 ng/L, without a provocative stress test. Exception: If chest pain started less than 3 hours from the first hs-cTnl, the assay and ECG should be repeated at **hour 2** before considering discharge.

- Shared decision making should be considered, and at this point there may be less than a 0.4% risk of adverse cardiac event in the next 30 days. If ED provider uncomfortable discharging, may still choose to observe longer, or admit under observation status.

Intermediate Risk Patients (Heart Score 4-6) or initial hs-cTnl is 5 ng/L to 99th Percentile of ULN, repeat ECG and hs-cTnl at **hour 2**.

- If hs-cTnl remains negative, and no longer suspicious for ACS, consider discharge with likely need for more follow-up and/or a provocative cardiac stress test.
- If clinical presentation is still suspicious for ACS, or diagnostic uncertainty remains, repeat ECG and hs-cTnl again at **hour 4**.
- If still negative, consider if admission for further observation is needed, or if clinically appropriate consider discharge with likely need for more follow-up and/or a stress test within 24-72 hours in an outpatient setting. (Feel free to consult Cardiology for assistance selecting provocative cardiac stress test)

OPTIONAL: While it may not be immediately available, consider transthoracic echocardiogram (TTE) if available as a rapid, bedside test to establish baseline ventricular and valvular function, evaluate for wall motion abnormalities, and to assess for pericardial effusion.

High Risk Patients (Heart Score 7-10) or a positive hs-cTnl are "ruled-in" for Non-STEMI equivalent and should be admitted to the hospital.

Cardiac Stress Testing

Can be conducted in an outpatient setting, within 24-72 hours of discharge from the emergency department. Selection of the proper diagnostic test may be beyond the scope of this guideline and could require input from a cardiology provider.

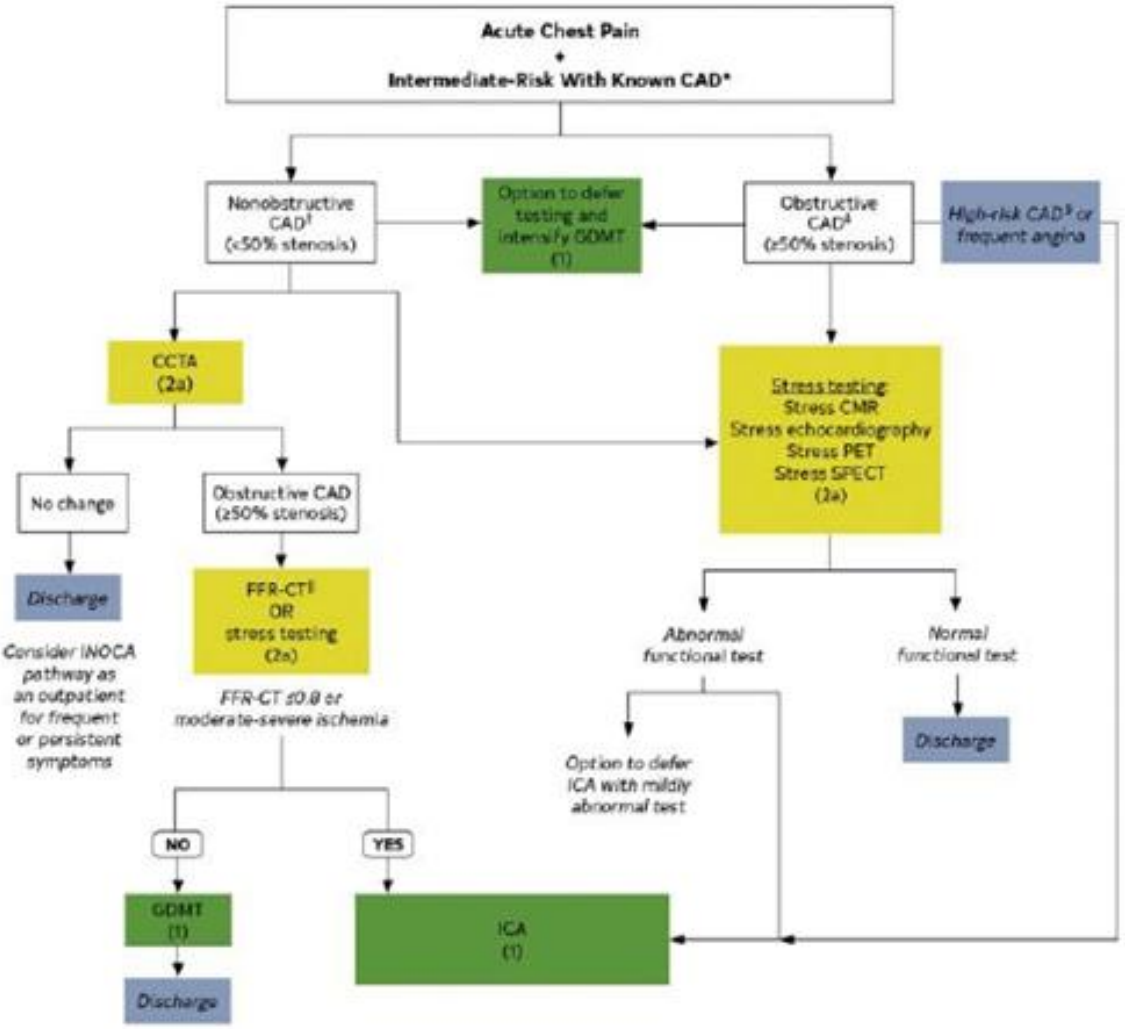
Anatomic Testing may include – Invasive Coronary Angiography or Coronary Computed Tomography Angiography

Diagnostics Testing may include – Exercise ECG, Echocardiography/Stress Echocardiography, Stress Nuclear (PET or SPECT) Myocardial Perfusion Imaging, or Cardiovascular Magnetic Resonance Imaging.

For further direction on choosing proper provocative testing, see attached algorithms on following pages from the 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR Chest Pain Guideline

- Patients with Suspected ACS at Intermediate Risk With Known CAD
- Patients with Suspected ACS at Intermediate Risk With No Known CAD

FIGURE 10 Evaluation Algorithm for Patients With Suspected ACS at Intermediate Risk With Known CAD

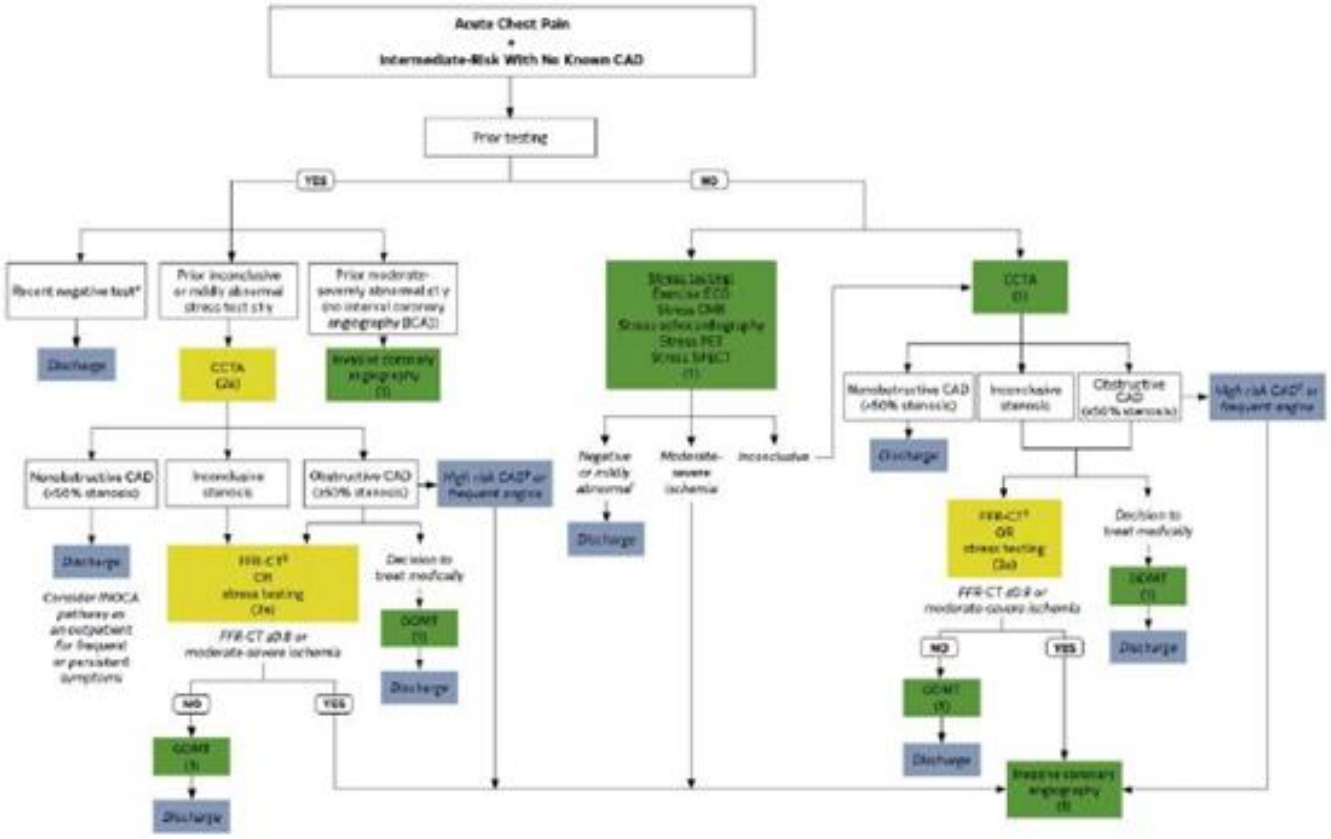


Test choice should be guided by local availability and expertise. *Known CAD is prior MI, revascularization, known obstructive or nonobstructive CAD on invasive or CCTA. †If extensive plaque is present a high-quality CCTA is unlikely to be achieved, and stress testing is preferred ‡Obstructive CAD includes prior coronary artery bypass graft/percutaneous coronary intervention. §High-risk CAD means left main stenosis ≥50%; anatomically significant 3-vessel disease (≥70% stenosis). ‖FFR-CT turnaround times may impact prompt clinical care decisions. ACS indicates acute coronary syndrome; CAD, coronary artery disease; CCTA, coronary CT angiography; CMR, cardiovascular magnetic resonance; CT, computed tomography; FFR-CT, fractional flow reserve with CT; GDMT, guideline-directed medical therapy; ICA, invasive coronary angiography; INOCA, ischemia and no obstructive coronary artery disease; PET, positron emission tomography; and SPECT, single-photon emission CT.

Selection of the proper diagnostic test may be beyond the scope of this guideline, and could require input from a cardiology provider.

2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR Guideline for the Evaluation and Diagnosis of Chest Pain: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines J Am Coll Cardiol. Oct 28, 2021. Epublished DOI: 10.1016/j.jacc.2021.07.053

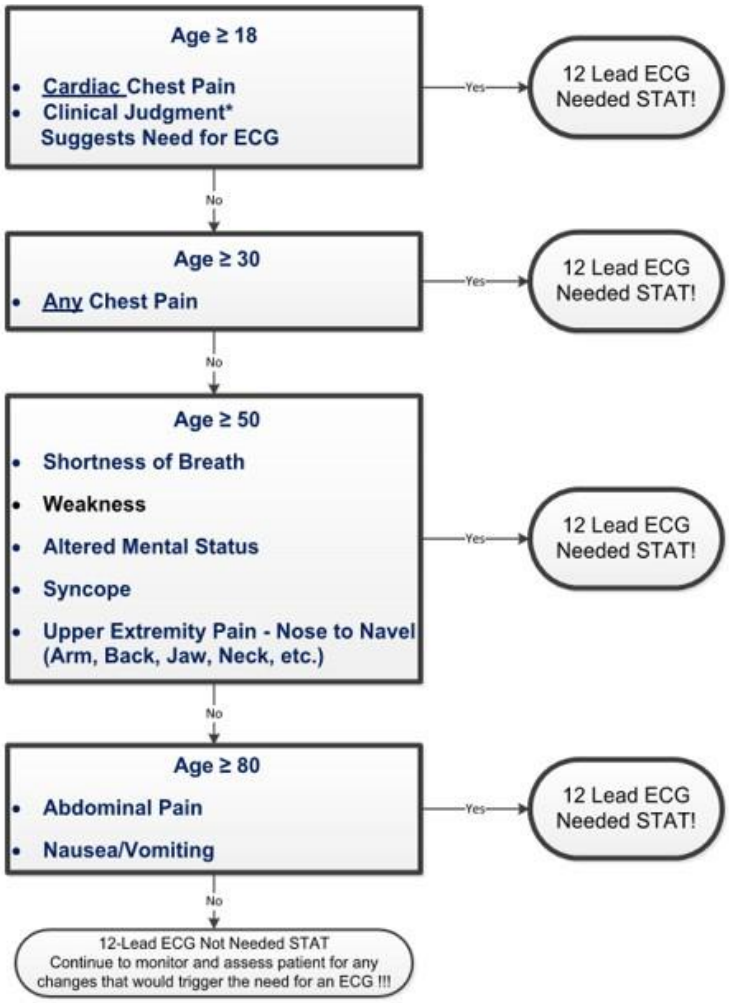
FIGURE 9 Evaluation Algorithm for Patients With Suspected ACS at Intermediate Risk With No Known CAD



Test choice should be guided by local availability and expertise. *Recent negative test: normal CCTA ≤2 years (no plaque/no stenosis) OR negative stress test ≤1 year, given adequate stress. †High-risk CAD means left main stenosis ≥ 50%; anatomically significant 3-vessel disease (≥ 70% stenosis). ‡For FFR-CT, turnaround times may impact prompt clinical care decisions. However, the use of FFR-CT does not require additional testing, as would be the case when adding stress testing. CAD indicates coronary artery disease; CCTA, coronary CT angiography; CMR, cardiovascular magnetic resonance imaging; CT, computed tomography; FFR-CT, fractional flow reserve with CT; GDMT, guideline-directed medical therapy; ICA, invasive coronary angiography; INOCA, ischemia and no obstructive coronary artery disease; PET, positron emission tomography; and SPECT, single-photon emission CT.

Selection of the proper diagnostic test may be beyond the scope of this guideline and could require input from a cardiology provider.

Who Needs A Stat 12-Lead ECG?



*Clinical Judgment requires assessment beyond the chief complaint. This list of rules is simply a guide. Clinical history, and evaluation of multiple symptoms beyond chest pain, may be present that should trigger concern for potential Acute Coronary Syndrome. Some of these include things like: Pressure, Discomfort, Tightness, Radiating Pain, Pounding, Racing, Beating Fast, Sweating, etc. Be suspicious of patients with cardiac risk factors, like high blood pressure, high cholesterol, diabetes, smoking history, and patient's with a known cardiac history or with recent cardiac surgery or intervention.

If in doubt, always err on the side of caution, and obtain a STAT 12-Lead ECG!

*Based on over 3.5 million ED visits

Adapted from: Development and Validation of a Prioritization Rule for Obtaining an Immediate 12-lead Electrocardiogram in the Emergency Department to Identify ST-elevation Myocardial Infarction Seth W. Glickman, MD, MBA, Frances S. Shofer, PhD, Michael C. Wu, PhD, Matthew J. Scholer, MD, PhD, Adanma Ndubuizu, MD, MPH, Eric D. Peterson, MD, MPH, Christopher B. Granger, MD, Charles B. Cairns, MD, Lawrence T. Glickman, VMD, DrPH, Chapel Hill, Durham, NC. Am Heart J. 2012;163(3):372-382.

Top 10 Take-Home Messages for the Evaluation and Diagnosis of Chest Pain*:

1. Chest Pain Means More Than Pain in the Chest. Pain, pressure, tightness, or discomfort in the chest, shoulders, arms, neck, back, upper abdomen, or jaw, as well as shortness of breath and fatigue should all be considered anginal equivalents.

2. High-Sensitivity Troponins Preferred. High-sensitivity cardiac troponins are the preferred standard for establishing a biomarker diagnosis of acute myocardial infarction, allowing for more accurate detection and exclusion of myocardial injury.

3. Early Care for Acute Symptoms. Patients with acute chest pain or chest pain equivalent symptoms should seek medical care immediately by calling 9-1-1. Although most patients will not have a cardiac cause, the evaluation of all patients should focus on the early identification or exclusion of life-threatening causes.

4. Share the Decision-Making. Clinically stable patients presenting with chest pain should be included in decision-making; information about risk of adverse events, radiation exposure, costs, and alternative options should be provided to facilitate the discussion.

5. Testing Not Needed Routinely for Low-Risk Patients. For patients with acute or stable chest pain determined to be low risk, urgent diagnostic testing for suspected coronary artery disease is not needed.

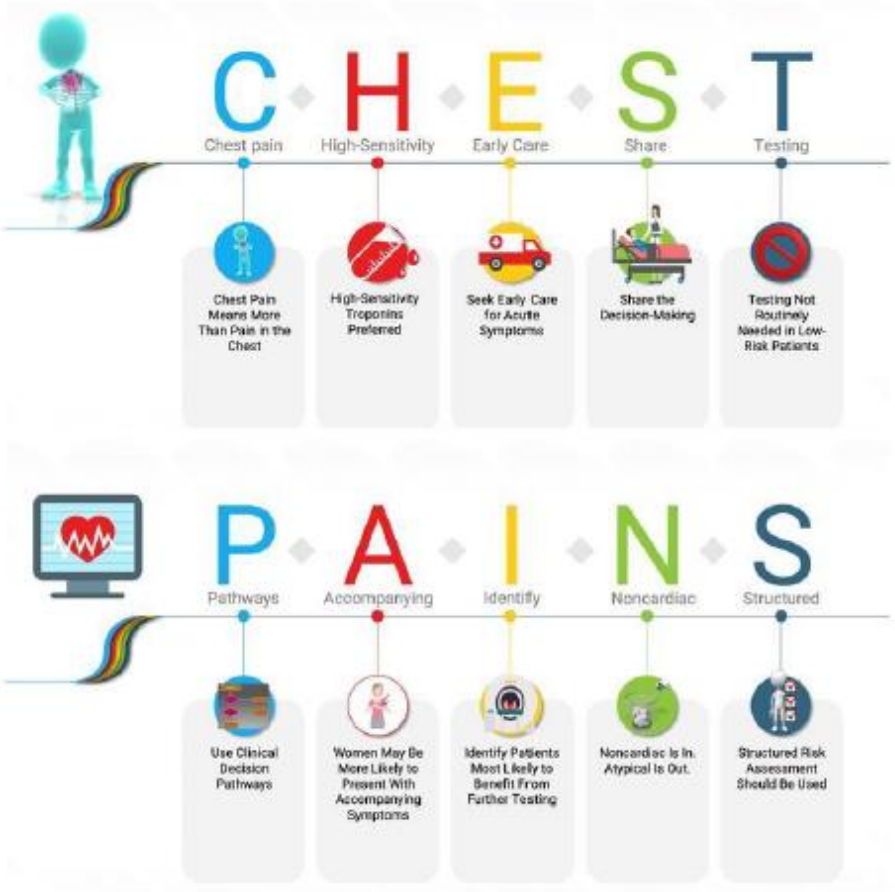
6. Pathways. Clinical decision pathways for chest pain in the emergency department and outpatient settings should be used routinely.

7. Accompanying Symptoms. Chest pain is the dominant and most frequent symptom for both men and women ultimately diagnosed with acute coronary syndrome. Women may be more likely to present with accompanying symptoms such as nausea and shortness of breath.

8. Identify Patients Most Likely to Benefit From Further Testing. Patients with acute or stable chest pain who are at intermediate risk or intermediate to high pre-test risk of obstructive coronary artery disease, respectively, will benefit the most from cardiac imaging and testing.

9. Noncardiac Is In. Atypical Is Out. "Noncardiac" should be used if heart disease is not suspected. "Atypical" is a misleading descriptor of chest pain, and its use is discouraged.

10. Structured Risk Assessment Should Be Used. For patients presenting with acute or stable chest pain, risk for coronary artery disease and adverse events should be estimated using evidence-based diagnostic protocols.



*2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR Guideline for the Evaluation and Diagnosis of Chest Pain: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines J Am Coll Cardiol. Oct 28, 2021. Epublished DOI: 10.1016/j.jacc.2021.07.053