Symptoms of Possible ACS

- Chest discomfort with or without radiation to the arm(s), jaw, or epigastrium
- Short of breath
- Weakness
- Diaphoresis
- Nausea
- Lightheadedness

Atypical:

Females:
- Fatigue
- Pain between shoulderblades or epigastric area
- Jaw pain

Note: Females may have more atypical symptoms.

Diabetics
- May be short of breath only

Activate Early Recognition Team (ERT) for inpatients

ACS Assessment

- Order immediate ECG. **Goal:** Physician to interpret within 10 minutes of presentation.
  - If ST elevation, go to STEMI pathway
- Establish IV access
- Measure vital signs, including pulse oximetry

ACS General Treatment

*(To be done while waiting for ECG interpretation)*

- Oxygen 2 liters nasal cannula, maintain O2 sat greater than 95%
- Aspirin 81 mg x4 (chew)**

*Acceptable reasons for not ordering nitroglycerin: symptomatic hypotension, phosphodiesterase inhibitor (sildenafil, tadalafil)

**Acceptable reason for not ordering aspirin: allergy

ECG Interpretation

See Page 2
**STEMI (ST ELEVATION MYOCARDIAL INFARCTION)**

Must meet one of the following criteria:
- 1 mm ST elevation in ≥ 2 contiguous limb leads
- ≥ 2 mm ST elevation in 2 contiguous precordial leads
- New left bundle branch block (LBBB)

**Physician calls STEMI Hotline at 6-8111 and identifies if ED patient or inpatient**

(If physician not at bedside within 5 minutes, the Licensed Independent Practitioner (LIP) may call the STEMI Hotline)

- If inpatient:
  - STEMI Hotline calls Interventional Cardiologist
- If ED patient
  - STEMI Alert activated

Only Interventional Cardiologist or ED physician can determine need for STEMI Alert

**Additional Medications (unless contraindicated)**

- **Clopidogrel** 600 mg oral OR **prasugrel** 60 mg oral OR **ticagrelor** 180 mg oral (prasugrel or ticagrelor only if approved by on-call interventional cardiologist attending).
- **Nitroglycerin** (sublingual, spray, and/or consider IV infusion if delay to cath lab).
- **Heparin** 60 units/kg bolus (max dose of 4,000 unit bolus). If a delay to the Cath Lab, consider IV infusion 12 units/kg/hr.

**Potential Adjunctive Medications to be given in the Cath Lab:**

**Abciximab**
- 0.25 mg/kg IVP bolus (max dose 20 mg), followed by 10 mcg/min infusion for 12 hours.

**Eptifibatide**
- 180 mcg/kg IVP bolus (max dose 20 mg)
- Within 10 minutes, may repeat second bolus of 180 mcg/kg (max dose 20 mg)
- For CrCl > 50 ml/min, initiate infusion at 2 mcg/kg/min
- For CrCl ≤ 50 ml/min, initiate infusion at 1 mcg/kg/min (contraindicated if end state renal disease or on dialysis)

**Bivalirudin**
- 0.75 mg/kg IVP bolus - then 1.75 mg/kg/hr. Dose to be adjusted for renal dysfunction.

**Do not delay transport to Cath Lab to administer medications**

**Goal**
Patient to be in Cath Lab within 20 minutes
Acute Coronary Syndrome (ACS) Clinical Algorithm (Continued)

**UA / NSTEMI**

**Focused H&P**
To include:
- TIMI risk assessment*
- Contraindication to anticoagulation
- Possible alternate diagnosis

*See UA / NSTEMI TIMI Risk Score below.

**Diagnostics**
- CBC, Chem 7, INR, Troponin
- Chest X-ray
- Serial ECGs

**HIGH RISK / INTERMEDIATE / LOW RISK**
(Positive troponins, ischemic ECG changes and/or clinical symptoms highly suggestive of an acute coronary syndrome)

**Medications (unless contraindicated)**
- **Clopidogrel** 600 mg oral OR **prasugrel** 60 mg oral or **ticagrelor** 180 mg oral (**prasugrel** or **ticagrelor** only if approved by on-call interventional cardiologist attending).
- Oral **beta-blocker** in all patients without contraindications in first 24 hours
- **Heparin** 60 units/kg IVP then 12 units/kg/hr (max dose 4000 unit bolus) or
  - **Enoxaparin** 1 mg/kg SQ q12h, unless CrCl < 50 ml/min

**HIGH RISK ONLY (Only if approved by Interventional cardiology attending):**
- **Eptifibatide**
  - 180 mcg/kg IVP bolus (max dose 20 mg)
  - Within 10 minutes, may repeat second bolus of 180 mcg/kg (max dose 20 mg)
  - For CrCl > 50 ml/min, initiate infusion at 2 mcg/kg/min
  - For CrCl ≤ 50 ml/min, initiate infusion at 1 mcg/kg/min (contraindicated if end stage renal disease or on dialysis)

**ED:** Admit to Cardiology

**Inpatient:** Call Cardiology Fellow

---

**UA / NSTEMI TIMI RISK SCORE**
(One point for each qualifying bullet below)

**HISTORICAL**
- Age > 65 yrs
- > 3 CAD risk factors (family history, HTN, increased cholesterol, DM, smoker)
- Known CAD stenosis > 50%
- ASA use in past 7 days

**PRESENTATION**
- Recent (< 23 hrs) severe angina (≥ 2 episodes within 24 hrs)
- Increased cardiac markers
- ST deviation greater than or equal to 0.5 mm

**RISK SCORE** = Total Points (0-7)

---

**14-Day Rates of All-Cause Mortality, Myocardial Infarction, and Severe Recurrent Ischemia Prompting Urgent Revascularization**

<table>
<thead>
<tr>
<th>Risk Score</th>
<th>Event Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1</td>
<td>4.7</td>
</tr>
<tr>
<td>2</td>
<td>8.3</td>
</tr>
<tr>
<td>3</td>
<td>13.2</td>
</tr>
<tr>
<td>4</td>
<td>19.9</td>
</tr>
<tr>
<td>5</td>
<td>26.2</td>
</tr>
<tr>
<td>6-7</td>
<td>40.9</td>
</tr>
</tbody>
</table>
**EARLY HOSPITAL CARE**

<table>
<thead>
<tr>
<th>Patient Status</th>
<th>Plan of Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEMI</td>
<td>• Call STEMI Hotline 6-8111.</td>
</tr>
<tr>
<td>UA / NSTEMI</td>
<td>• Consult Cardiology</td>
</tr>
</tbody>
</table>

**LATE HOSPITAL / DISCHARGE / FOLLOW-UP CARE**

<table>
<thead>
<tr>
<th>Considerations</th>
<th>Plan of Care</th>
<th>Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invasive Evaluation</td>
<td>• Angiography</td>
<td></td>
</tr>
<tr>
<td>Post-Angiographic Management Strategy</td>
<td>• CABG</td>
<td></td>
</tr>
<tr>
<td>• PCI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Medical therapy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessment of Ejection Fraction</td>
<td>• If EF &lt; 35%, repeat assessment after 40 days and follow up with Cardiovascular Medicine.</td>
<td></td>
</tr>
<tr>
<td>Antiplatelet / Anticoagulant Therapy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discharge based upon treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>See OSUWMC’s Management of Antiplatelet Therapy in Patients with Arterial Stents guideline</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical Therapy:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Aspirin 81 mg daily life-long <strong>plus</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Clopidogrel 75 mg daily OR ticagelor 90 mg twice daily for at least 12 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bare metal stent:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Aspirin 81 mg daily life-long <strong>plus</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Clopidogrel 75 mg daily, Prasugrel 10 mg daily, or ticagelor 90 mg twice daily for 12 months*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drug-eluting stent:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Aspirin 81 mg daily life-long <strong>plus</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Clopidogrel 75 mg daily, Prasugrel 10 mg daily, or ticagelor 90 mg twice daily for 12 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*A minimum of 1 month is preferred; but if the patient is at high risk for bleeding, a minimum of 2 weeks can be considered.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Warfarin only if clinically indicated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Discontinue NSAIDs on admission for ACS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood Pressure</td>
<td>• Beta-blockers</td>
<td></td>
</tr>
<tr>
<td>• ACE / ARB</td>
<td>• &lt; 140/90 mmHg or &lt; 130/80 mmHg if chronic kidney disease or diabetes.</td>
<td></td>
</tr>
<tr>
<td>Diabetes Management</td>
<td>• Diabetes consult</td>
<td></td>
</tr>
<tr>
<td>• LDL-C &lt;100 mg/dL, consider LDL-C &lt; 70 mg/dL (if triglycerides ≥ 200 mg/dL, non-HDL-C &lt; 130 mg/dL, and consider non-HDL-C &lt;100 mg/dL.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lipid Management</td>
<td>• Statins</td>
<td></td>
</tr>
<tr>
<td>• 30 min 7 days/week; minimum 5 days/week.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily Physical Activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Considerations</td>
<td>Plan of Care</td>
<td>Goals</td>
</tr>
<tr>
<td>------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Weight Management      |                                                                                                                                                                                                             | • BMI 18.5 to 24.9 kg/m²  
• Waist circumference:  
  • women: < 35 in. (89 cm)  
  • men: < 40 in. (102 cm)                                                                 |                                                                                                                                                                                                         |
| Influenza Immunization |                                                                                                                                                                                                             | • Annual influenza vaccination for patients with cardiovascular disease                                                                                                                                 |
| Smoking                | • Ask / advise / assess / assist patients to stop smoking                                                                                                                                                     | • Complete cessation and no exposure to environmental tobacco smoke.                                                                                                                                 |
| Cardiac Rehabilitation | • Make referral                                                                                                                                                                                                 |                                                                                                                                                                                                         |
| Post-Discharge         | • Follow up in 14-42 days with Cardiovascular Medicine                                                                                                                                                         |                                                                                                                                                                                                         |

**NOTE:** If ACS is ruled out, some alternative diagnoses to consider are:
- Aneurysm
- Pneumothorax
- Pulmonary Embolism
- Pericardial Effusion
- Gastroesophageal Reflux Disease

**AMI Quality Measures**
- Median time to fibrinolysis*
- Fibrinolytic agent received within 30 minutes of hospital arrival*
- Median time to PCI*
- Primary PCI received within 90 minutes of hospital arrival*
- Aspirin within 24 hours before or after arrival or clear documentation of reason for not ordering*
- ACEI or ARB for left ventricular systolic dysfunction (ejection fraction < 40) at discharge or clear documentation of reason for not ordering both medications*
- Aspirin at discharge or clear documentation of reason for not ordering*
- Beta-blocker at discharge or clear documentation of reason for not ordering*
- Statin prescribed at discharge or clear documentation of reason for not ordering*
- P2Y12 inhibitor at discharge or clear documentation of reason for not ordering*  
  o Contraindications:  
    - Prasugrel: > 75 years, history of stroke / TIA, active bleeding, CABG likely  
    - Clopidogrel: active bleeding  
    - Ticagrelor: active bleeding, history of intracranial hemorrhage, severe hepatic dysfunction, bradycardia

* For contraindications, see [Acute Myocardial Infarction (AMI) Hospital Quality Measures](#)
Order Sets

- ED Acute Coronary Syndrome
- HRT ADM Acute Coronary Syndrome
- ED Chest Pain
- ED STEMI
- ED CDU/OBS ROMI
- HRT DX Chest Pain
- Discharge Core Measures AMI

References


Test Measures

- LDL cholesterol assessment
- Statin therapy at discharge (CMS test measure)
- Excessive initial heparin dose
- Excessive initial enoxaparin dose
- Excessive initial abciximab dose
- Excessive initial epifibatide dose
- Anticoagulant dosing protocol
- Anticoagulant error tracking system
- Clopidogrel prescribed at discharge for medically treated AMI patients

Additional CMS Measures

- AMI 30-day mortality rate*
- AMI 30-day readmission rate*

* National Inpatient Hospital Quality Measures (publicly reported)

Guideline Authors

- Konstantinos Boudoulas, MD
- Danielle Blais, PharmD, BCPS

Guideline Approved

February 27, 2013. Fourth Edition

Disclaimer: Clinical practice guidelines and algorithms at The Ohio State University Wexner Medical Center (OSUWMC) are standards that are intended to provide general guidance to clinicians. Patient choice and clinician judgment must remain central to the selection of diagnostic tests and therapy. OSUWMC’s guidelines and algorithms are reviewed periodically for consistency with new evidence; however, new developments may not be represented.

Copyright © 2013, The Ohio State University Wexner Medical Center. No part of this publication may be reproduced in any form without permission in writing from The Ohio State University Wexner Medical Center

Quality Measures

2008 ACC/AHA STEMI/NSTEMI Measures

- Aspirin at arrival*
- Aspirin at discharge*
- Beta-blocker at discharge*
- Statin at discharge
- ACEI or ARB for LVSD*
- Time to fibrinolytic therapy*
- Fibrinolytic therapy received within 30 minutes of hospital arrival*
- Time to PCI*
- Smoking cessation advice/counseling*
- Evaluation of LVSF
- Reperfusion therapy
- Cardiac rehabilitation patient referral
- Statin therapy at discharge (CMS test measure)