The Management of Patients With Acute Myocardial Infarction

(A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines)

April, 2000
I. Introduction

The classification of indications for a diagnostic procedure or a specific therapy is expressed in the standard ACC/AHA format:

**Class I**
Conditions for which there is evidence and/or general agreement that a given procedure or treatment is beneficial, useful, and effective.

**Class II**
Conditions for which there is conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of a procedure or treatment.

**Class IIa**
Weight of evidence/opinion is in favor of usefulness/efficacy.

**Class IIb**
Usefulness/efficacy is less well established by evidence/opinion.

**Class III**
Conditions for which there is evidence and/or general agreement that a procedure/treatment is not useful/effective and in some cases may be harmful.

This pocket guideline is a distillation of the publication ACC/AHA Guidelines for the Management of Patients with Acute Myocardial Infarction. The guidelines were initially published in the Journal of the American College of Cardiology in 1996 (J Am Coll Cardiol 1996; 28:1328-428) and updated in September 1999. The revised text and recommendations are published in the J Am Coll Cardiol 1999;34:890-911 and Circulation 1999;100:1016-1030 (recommendations only).

The full text guidelines incorporating the updates and revisions are available on the Web sites of both the ACC (http://www.acc.org) and the AHA (http://www.americanheart.org) with deleted text indicted by strikethroughs and new text presented in highlighted typeface.

This pocket guideline provides rapid prompts for appropriate patient management that is outlined in much greater detail in the full-text guidelines. It is not intended as a replacement for understanding the caveats and rationales carefully stated in the full-text guidelines. Users should consult the full-text document for more information.
II. Initial Assessment and Evaluation

Emergency Department (ED) Algorithm/Protocol for Patients with Symptoms and Signs of AMI

Onset of symptoms

Ambulance presents patient to ED lobby

Patient presents to ED lobby

ED triage or charge nurse triages patient
- AMI symptoms and signs
- 12-lead ECG
- Brief, targeted history

Emergency nurse initiates emergency nursing care in acute care area of ED
- Cardiac monitor
- Oxygen therapy
- IV D5W
- Blood studies
- Nitroglycerin
- Aspirin

Emergency physician evaluates patient
- History
- Physical exam
- Interpret ECG

AMI patient?

Consult

Candidate for fibrinolytic therapy?

Consult

Yes

No

Fibrinolytic therapy

Other indicated treatment:
- Other drugs for AMI (beta-blockers, heparin, aspirin, nitrates)
- Transfer to cath lab for PTCA or surgery for CABG

Evaluate further

Conduct education and follow-up instruction

Release

Admit

Assessment

Differential Diagnosis of Prolonged Chest Pain

AMI
Aortic dissection
Pericarditis
Atypical anginal pain associated with hypertrophic cardiomyopathy
Esophageal, other upper gastrointestinal, or biliary tract disease
Pulmonary disease
Pneumothorax
Embolus with or without infarction
Pleurisy: infectious, malignant, or immune disease-related
Hyperventilation syndrome
Chest wall
Skeletal
Neuropathic
Psychogenic
Algorithm for Initial Assessment and Evaluation of the Patient with Acute Chest Pain

The emergency department should be organized to facilitate the rapid triage of chest pain patients so that the initial evaluation, obtaining a 12-lead electrocardiogram (ECG), and establishing intravenous access and continuous monitoring are accomplished within 10 minutes. The path in the decision tree is determined by the results of the 12-lead ECG. The presence of ST-segment elevation diagnostic of AMI or of presumptively new bundle branch block (BBB) suggestive of this diagnosis should lead to the immediate consideration of the suitability of the patient for reperfusion therapy, which, if indicated, should be initiated within 30 minutes of the patient’s arrival. The primary PTCA option is applicable only in those settings in which it is immediately available and can be performed by highly qualified interventional cardiologists. In general, patients should not be transferred for angioplasty if fibrinolysis is an option. Fibrinolysis is not indicated in patients with only ST-segmented depression.
**Chest Pain Checklist**

**for Use by EMT/Paramedic for Diagnosis of Acute Myocardial Infarction and Fibrinolytic Therapy Screening**

Check each finding below. If all [yes] boxes are checked and ECG indicates ST elevation or new BBB, reperfusion therapy with fibrinolysis or primary PTCA may be indicated. Fibrinolysis is generally not indicated unless all [no] boxes are checked and BP ≤ 180/110 mm Hg.

<table>
<thead>
<tr>
<th>Finding</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ongoing chest discomfort (≥ 20 minutes and &lt; 12 hrs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oriented, can cooperate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age &gt; 35 y (&gt; 40 if female)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>History of stroke or TIA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Known bleeding disorder</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active internal bleeding in past 2 weeks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surgery or trauma in past 2 weeks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terminal illness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jaundice, hepatitis, kidney failure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of anticoagulants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systolic/diastolic blood pressure</td>
<td></td>
<td>/</td>
</tr>
<tr>
<td>ECG done</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High-risk profile*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heart rate ≥ 100 bpm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BP ≤ 100 mm Hg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulmonary edema (rales greater than one half-way up)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shock</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Transport to hospital capable of angiography and revascularization if needed.

**Serum Cardiac Markers**

- CK-MB subforms for Dx within 6 hrs of MI onset
- cTnI and cTnT efficient for late Dx of MI
- CK-MB subform plus cardiac-specific troponin best combination
- Do not rely solely on troponins because they remain elevated for 7-14 days and compromise ability to diagnose recurrent infarction

**Enzymatic Criteria for Diagnosis of Myocardial Infarction***

- Serial increase, then decrease of plasma CK-MB, with a change > 25% between any two values
- CK-MB > 10-13 U/L or > 5% total CK activity
- Increase in MB-CK activity > 50% between any two samples, separated by at least 4 hrs
- If only a single sample available, CK-MB elevation > twofold
- Beyond 72 hrs, an elevation of troponin T or I or LDH-1 > LDH-2

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EMT indicates emergency medical technician; ECG, electrocardiogram; BBB, bundle branch block; PTCA, percutaneous transluminal coronary angioplasty; BP, blood pressure; TIA, transient ischemic attack. Adapted from the Seattle/King County EMS Medical Record.
**III. Initial Management**

**Recommendations for the Management of Patients with ST Elevation**

All patients with ST-segment elevation on the electrocardiogram should receive aspirin (ASA). Beta-adrenergic receptor blockers (in the absence of contraindications), and an antithrombin (particularly if alteplase/reteplase is used for fibrinolytic therapy). Whether heparin is required in patients receiving nonselective fibrinolytic agents remains a matter of controversy; the small additional risk for intracranial hemorrhage may not be offset by the survival benefit afforded by adding heparin to SK therapy. Patients treated within 12 hours who are eligible for fibrinolytics should expeditiously receive either fibrinolytic therapy or be considered for primary percutaneous transluminal coronary angioplasty (PTCA). Primary PTCA is also to be considered when fibrinolytic therapy is absolutely contraindicated. Coronary artery bypass graft (CABG) may be considered if the patient is less than 6 hours from onset of symptoms. Individuals treated after 12 hours should receive the initial medical therapy noted above and, on an individual basis, may be candidates for reperfusion therapy or angiotensin-converting enzyme (ACE) inhibitors (particularly if left ventricular function is impaired). Modified from Antman EM. Medical therapy for acute coronary syndromes: an overview. In: Califf RM. ed. Atlas of Heart Diseases, VIII. Philadelphia, Pa; Current Medicine: 1996.

**Comparison of Approved Fibrinolytic Agents**

<table>
<thead>
<tr>
<th></th>
<th>Streptokinase</th>
<th>Anistreplase</th>
<th>Alteplase</th>
<th>Reteplase</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dose</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.5 MU in 30-60 min</td>
<td>30 mg in 5 min</td>
<td>100 mg in 90 min</td>
<td>10 U x 2 over 30 min</td>
</tr>
<tr>
<td><strong>Bolus administration</strong></td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Antigenic</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td><strong>Allergic reactions</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td><strong>Systemic fibrinogen depletion</strong></td>
<td>Marked</td>
<td>Marked</td>
<td>Mild</td>
<td>Moderate</td>
</tr>
<tr>
<td><strong>90-min. patency rates (%)</strong></td>
<td>~50</td>
<td>~65</td>
<td>~75</td>
<td>~75</td>
</tr>
<tr>
<td><strong>TIMI grade 3 flow (%)</strong></td>
<td>32</td>
<td>43</td>
<td>54</td>
<td>60</td>
</tr>
<tr>
<td><strong>Mortality rate in most recent comparative trials (%)</strong></td>
<td>7.3</td>
<td>10.5</td>
<td>7.2</td>
<td>7.5</td>
</tr>
<tr>
<td><strong>Cost per dose (US)</strong></td>
<td>$294</td>
<td>$2116</td>
<td>$2196</td>
<td>$2196</td>
</tr>
</tbody>
</table>

TIMI flow indicates Thrombolysis in Myocardial Infarction study flow rate.
Primary Percutaneous Transluminal Coronary Angioplasty Recommendations

Class I Recommendations

1. As an alternative to fibrinolytic therapy if:
   - ST-segment elevation or new or presumed new LBBB
   - Within 12 hrs of symptoms or >12 hrs of persistent pain
   - In a timely fashion (90±30 min)
   - By experienced operators
   - In appropriate laboratory environment

2. In cardiogenic shock patients <75 yrs who are within 36 hrs of AMI and revascularization can be performed within 18 hrs of onset of shock

Class IIa Recommendations

1. As a reperfusion strategy in candidates for reperfusion who have a contraindication to fibrinolytic therapy.

Contraindications and Cautions for Fibrinolytic Use in Myocardial Infarction*

Absolute Contraindications
- Previous hemorrhagic stroke at any time: other strokes or cerebrovascular events within 1 yr
- Known intracranial neoplasm
- Active internal bleeding (does not include menses)
- Suspected aortic dissection

Cautions/Relative Contraindications
- Severe uncontrolled hypertension on presentation (blood pressure >180/110 mm Hg)†
- History of prior cerebrovascular accident or known intracerebral pathology not covered in contraindications
- Current use of anticoagulants in therapeutic doses (INR ≥ 2-3); known bleeding diathesis
- Recent trauma (within 2-4 wks), including head trauma
- Noncompressible vascular punctures
- Recent (within 2-4 wks) internal bleeding
- For streptokinase/anistreplase: prior exposure (especially within 5d-2y) or prior allergic reaction
- Pregnancy
- Active peptic ulcer
- History of chronic hypertension

INR indicates International Normalized Ratio.

* Viewed as advisory for clinical decision making and may not be all-inclusive or definitive.
† Could be an absolute contraindication in low-risk patients with myocardial infarction.
Class IIB Recommendations

1. In patients with AMI who do not present with ST elevation but who have reduced [less than TIMI (Thrombolysis in Myocardial Infarction) grade 2] flow of the infarct-related artery and when angioplasty can be performed within 12 hrs of onset of symptoms.

Class III Recommendations

1. This classification applies to patients with AMI who
   - Undergo elective angioplasty in a noninfarct-related artery at the time of AMI
   - Are beyond 12 hrs after the onset of symptoms and have no evidence of myocardial ischemia
   - Have received fibrinolytic therapy and have no symptoms of myocardial ischemia
   - Are fibrinolytic-eligible and are undergoing primary angioplasty by an unskilled operator in a laboratory that does not have surgical capability.

Advantages of Fibrinolytic Therapy

- More universal access
- Shorter time to treatment
- Greater clinical trial evidence of:
  - reduction in infarct size
  - improvement of LV function
- Results less dependent on physician experience
- Lower system cost

Advantages of Primary PTCA

- Higher initial reperfusion rates
- Lower recurrence rates of ischemia/infarction
- Less residual stenosis
- Less intracranial bleeding
- Defines coronary anatomy and LV function
- Utility when fibrinolysis contraindicated
Recommendations for the Management of Patients with Non-ST Elevation MI

ST depression/T-wave inversion: Suspected AMI

Heparin + Aspirin
Nitrites for recurrent angina

Antithrombins: LMWH—high-risk patients
Anti-Platelets: GpIIb/IIIa inhibitor

Patients without prior beta-blocker therapy or who are inadequately treated on current dose of beta-blocker

Establish adequate beta-blockade

Assess clinical status

High-risk patient:
1. Recurrent ischemia
2. Depressed LV function
3. Widespread ECG changes
4. Prior MI

Catheterization: Anatomy suitable for revascularization?

Yes
Revascularization (PTCA, CABG)

No
Continued observation in hospital
Consideration of stress testing

Clinical stability

Persistent symptoms in patients with prior beta-blocker therapy or who cannot tolerate beta-blockers

Add calcium antagonist

Algorithm for the Management of Patients with Non-ST Elevation MI

All patients without ST elevation should be treated with an antithrombin and aspirin (ASA). Nitrates should be administered for recurrent episodes of angina. Adequate beta-adrenoceptor blockade should then be established; when this is not possible or contraindications exist, a calcium antagonist can be considered. Current data indicate that either an invasive or non-invasive treatment strategy is suitable for non-ST-elevation AMI patients. AMI indicates acute myocardial infarction; CABG, coronary artery bypass graft; ECG, electrocardiographic; GpIIb/GpIIIa, Glycoprotein IIb/IIIa receptor for platelet aggregation; LMWH, low molecular weight heparin; LV, left ventricular; PTCA, percutaneous transluminal coronary angioplasty.

Pharmacologic Management of Patients with MI

Heparin Recommendations

Class I Recommendations
1. In patients undergoing percutaneous or surgical revascularization.

Class IIa Recommendations
1. Intravenously in patients undergoing reperfusion therapy with alteplase/reteplase. See table below for dosing:

Change in Heparin (Unfractionated) Dose with alteplase/reteplase

<table>
<thead>
<tr>
<th></th>
<th>1999 Recommendations</th>
<th>1996 Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bolus Dose</td>
<td>60 U/kg</td>
<td>70 U/kg</td>
</tr>
<tr>
<td>Maintenance</td>
<td>≈12 U/kg/hr</td>
<td>≈15 U/kg/hr</td>
</tr>
<tr>
<td>Maximum</td>
<td>4000 U bolus</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>1000 U/h if &gt; 70 kg</td>
<td></td>
</tr>
<tr>
<td>aPTT</td>
<td>1.5-2.0 x control</td>
<td>1.5-2.0 x control</td>
</tr>
<tr>
<td></td>
<td>(50-70 sec) for 48 hrs</td>
<td>(50-70sec) for 48 hrs</td>
</tr>
</tbody>
</table>

2. Intravenous unfractionated heparin (UFH) or low molecular weight heparin (LMWH) subcutaneously for patients with non-ST elevation MI.

3. Subcutaneous UFH (eg, 7,500 U b.i.d.) or low molecular weight heparin (eg, enoxaparin 1 mg/kg b.i.d.) in all patients not treated with fibrinolytic therapy who do not have a contraindication to heparin. In patients who are at high risk for systemic emboli (large or anterior MI, AF, previous embolus, or known LV thrombus), intravenous heparin is preferred.

4. Intravenously in patients treated with nonselective fibrinolytic agents (streptokinase, anistreplase, urokinase) who are at high risk for systemic emboli (large or anterior MI, AF, previous embolus, or known LV thrombus).

Class IIb Recommendations
1. In patients treated with nonselective fibrinolytic agents, not at high risk, subcutaneous heparin, 7,500 U to 12,500 U twice a day until completely ambulatory.

Class III Recommendations
1. Routine intravenous heparin within 6 hrs to patients receiving a nonselective fibrinolytic agent (anistreplase, streptokinase, urokinase) who are not at high risk for systemic embolism.

GP IIb/IIIa Inhibitors—New Recommendations

Class IIa Recommendations
- For use in patients experiencing an MI without ST segment elevation who have some high-risk features and/or refractory ischemia, provided they do not have a contraindication due to a bleeding risk.
# A Classification of Inotropic Agents

<table>
<thead>
<tr>
<th>Agent</th>
<th>Mechanism</th>
<th>Inotropic</th>
<th>Vascular Effect</th>
<th>Major Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isoproterenol</td>
<td>β-1 receptor</td>
<td>++</td>
<td>Dilatation</td>
<td>Hypotension due to bradycardia; no pacing available</td>
</tr>
<tr>
<td>Dobutamine</td>
<td>β-1 receptor</td>
<td>++</td>
<td>Mild dilatation</td>
<td>Low output with SBP &gt; 90 mm Hg</td>
</tr>
<tr>
<td>Dopamine</td>
<td>Low dose: dopaminergic receptor</td>
<td>++</td>
<td>Renovascular dilatation</td>
<td>Hypoperfusion with SBP &lt; 90 mm Hg or ≥ 30 mm Hg below usual value</td>
</tr>
<tr>
<td></td>
<td>Medium dose: β-1 receptor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>High dose: α-receptor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Norepinephrine</td>
<td>α-receptor</td>
<td>++</td>
<td>Intense constriction</td>
<td>Extreme hypotension despite dopamine use</td>
</tr>
<tr>
<td>Amrinone</td>
<td>Phosphodiesterase inhibitor</td>
<td>++</td>
<td>Dilatation</td>
<td>Second-tier agent after failure of dopamine/dobutamine</td>
</tr>
<tr>
<td>Milrinone</td>
<td>Phosphodiesterase inhibitor</td>
<td>++</td>
<td>Dilatation</td>
<td></td>
</tr>
<tr>
<td>Digitalis</td>
<td>Inhibits NA⁺-K⁺ ATPase pump</td>
<td>+</td>
<td>Variable</td>
<td>Established systolic LV dysfunction and symptoms of heart failure for chronic therapy</td>
</tr>
</tbody>
</table>

SBP indicates systolic blood pressure; LV, left ventricular
### Sample Admitting Orders

<table>
<thead>
<tr>
<th><strong>Condition</strong></th>
<th>Serious</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IV</strong></td>
<td>NS or D₅W to keep vein open</td>
</tr>
<tr>
<td><strong>Vital signs</strong></td>
<td>q 1/2 hr until stable, then q 4 hrs and p.r.n. Notify if HR &lt; 60 or &gt; 110; BP &lt; 90 or &gt; 150; RR &lt; 8 or &gt; 22. Pulse oximetry x 24 hrs.</td>
</tr>
<tr>
<td><strong>Activity</strong></td>
<td>Bed rest with bedside commode and progress as tolerated after approximately 12 hrs.</td>
</tr>
<tr>
<td><strong>Diet</strong></td>
<td>NPO until pain free, then clear liquids. Progress to a heart-healthy diet (complex carbohydrates= 50-55% of kilocalories, monounsaturated and unsaturated fats (≤ 30% of kilocalories), including foods high in potassium (eg, fruits, vegetables, whole grains, dairy products), magnesium (eg, green leafy vegetables, whole grains, beans, seafood), and fiber (eg, fresh fruits and vegetables, whole-grain breads, cereals).</td>
</tr>
<tr>
<td><strong>Medications</strong></td>
<td>Nasal O₂ 2 L/min x 3 hrs Enteric-coated aspirin daily (165 mg) Stool softener daily Beta-adrenoceptor blockers? Consider need for analgesics, nitroglycerin, anxiolytics</td>
</tr>
</tbody>
</table>

### Treatment Strategy for Right Ventricular Ischemia/Infarction

**Maintain right ventricular preload**
- Volume loading (IV normal saline)
- Avoid use of nitrates and diuretics
- Maintain AV synchrony
  - AV sequential pacing for symptomatic high-degree heart block unresponsive to atropine
- Prompt cardioversion for hemodynamically significant SVT

**Inotropic support**
- Dobutamine (if cardiac output fails to increase after volume loading)

**Reduce right ventricular afterload with left ventricular dysfunction**
- Intra-aortic balloon pump
- Arterial vasodilators (sodium nitroprusside, hydralazine)
- ACE inhibitors

**Reperfusion**
- Fibrinolytic agents
- Primary PTCA
- CABG (in selected patients with multivessel disease)

Note: IV indicates intravenous; AV, atrioventricular; SVT, supraventricular tachycardia; ACE, angiotensin converting enzyme; PTCA, percutaneous transluminal coronary angioplasty; CABG, coronary artery bypass graft.
Clinical Profile of Mechanical Complications of Myocardial Infarction

<table>
<thead>
<tr>
<th>Variable</th>
<th>Ventricular Septal Defect</th>
<th>Free Wall Rupture</th>
<th>Papillary Muscle Rupture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (mean, years)</td>
<td>63</td>
<td>69</td>
<td>65</td>
</tr>
<tr>
<td>Days post MI</td>
<td>3-5</td>
<td>3-6</td>
<td>3-5</td>
</tr>
<tr>
<td>Anterior MI</td>
<td>66%</td>
<td>50%</td>
<td>25%</td>
</tr>
<tr>
<td>New murmur</td>
<td>90%</td>
<td>25%</td>
<td>50%</td>
</tr>
<tr>
<td>Palpable thrill</td>
<td>Yes</td>
<td>No</td>
<td>Rare</td>
</tr>
<tr>
<td>Previous MI</td>
<td>25%</td>
<td>25%</td>
<td>30%</td>
</tr>
</tbody>
</table>

Echo findings:
- Two-dimensional Doppler
  - Visualize defect
  - Detect shunt
  - May have pericardial effusion
  - Flail or prolapsing leaflet
  - Regurgitating jet in LA

- PA catheterization
  - Oxygen step up
  - Hi RV
  - Equalization of diastolic pressure
  - Prominent V wave in PCW tracing

Mortality
- Medical 90%
- Surgical 50%


IV. MI Management Summary

Initial Management in ED
- Initial evaluation with ECG in < 10 minutes
- O₂ by nasal prongs, IV access, continual ECG
- Sublingal TNG unless SBP< 90 or HR < 50 or > 100
- Analgesia (MS or meperidine)
- Aspirin (160-325 mg chewed)
- Lipid panel, electrolytes, magnesium, enzymes
- Fibrinolysis or PTCA if ST elevation > 1mV or LBBB (goal: door-needle < 30 minutes or door-dilatation < 90 minutes).

MI Management in 1st 24 hours
- Limited activity for 12 hrs, monitor ≥ 24 hrs
- No prophylactic antiarrhythmics
- IV heparin if: a) large anterior MI; b) PTCA; c) LV thrombus; or d) alteplase/reteplase use (for ~ 48hrs)
- SQ heparin for all other MI (7,500u b.i.d.)
- Aspirin indefinitely
- IV TNG for 24-48 hrs if no ↑/↓HR or ↓BP
- IV beta-blocker if no contraindications
- ACE inhibitor in all MI if no hypotension
In-Hospital Management

- Aspirin indefinitely
- Beta-blocker indefinitely
- ACE inhibitor (DC at ~ 6 wks if no LV dysfunction)
- If spontaneous or provoked ischemia—elective cath
- Suspected pericarditis—ASA 650 mg q4-6 hrs
- CHF—ACE inhibitor and diuretic as needed
- Shock—consider intra-aortic balloon pump + cath with PTCA or CABG
- RV MI-fluids (NS) + inotropics if hypotensive

Predictors of 30 day Mortality in Fibrinolysis Patients*

Proportion of Risk Associated with Variable

- Age 32%
- Systolic BP 24%
- Killip class 15%
- Heart rate 12%
- AMI location 6%
- Other 10%

(Height/Weight; Prior CVD; Time to Rx; Choice of fibrinolytic therapy; US hospital)

Does not total 100% due to rounding.

*Circulation 91: 1659, 1995
VI. Preparation for Discharge from the Hospital

Clinical Indications of High Risk at Predischarge

Strategies for exercise test evaluations soon after myocardial infarction (MI). If patients are at high risk for ischemic events based on clinical criteria, they should undergo invasive evaluation to determine if they are candidates for coronary revascularization procedures (Strategy I). For patients initially deemed to be at low risk at time of discharge after MI, two strategies for performing exercise testing can be used. One is a symptom-limited test at 14 to 21 days (Strategy II). If the patient is on digoxin or if baseline electrocardiogram precludes accurate interpretation of ST-segment changes (e.g., baseline left bundle branch block or left ventricular hypertrophy), then an initial exercise imaging study can be performed. Results of exercise testing should be stratified to determine need for additional invasive or exercise perfusion studies. A third strategy is to perform a submaximal exercise test at 5 to 7 days after MI or just before hospital discharge. The exercise test results could be stratified using the guidelines in Strategy I. If exercise test studies are negative, a second symptom-limited exercise test could be repeated at 3 to 6 weeks for patients undergoing vigorous activity during leisure or at work.
## Energy Levels Required to Perform Some Common Activities

<table>
<thead>
<tr>
<th>Energy Levels</th>
<th>&lt;3 METs</th>
<th>3-5 METs</th>
<th>5-7 METs</th>
<th>7-9 METs</th>
<th>&gt;9 METs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Self-Care</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Washing</td>
<td></td>
<td></td>
<td>Cleaning windows</td>
<td>Easy digging in garden</td>
<td>Carrying loads upstairs (objects &gt; 90 lb.)</td>
</tr>
<tr>
<td>Shaving</td>
<td></td>
<td></td>
<td>Raking</td>
<td>Hand lawn mowing (level)</td>
<td>Climbing stairs (quickly)</td>
</tr>
<tr>
<td>Dressing</td>
<td></td>
<td></td>
<td>Power lawn mowing</td>
<td>Heavy shoveling</td>
<td>Shoveling heavy snow</td>
</tr>
<tr>
<td>Desk work</td>
<td></td>
<td></td>
<td>Bedmaking/striping</td>
<td>Climbing stairs (moderately)</td>
<td></td>
</tr>
<tr>
<td>Washing dishes</td>
<td></td>
<td></td>
<td>Carrying objects (15-30 lb.)</td>
<td>Carrying objects (30-60 lb.)</td>
<td></td>
</tr>
<tr>
<td>Driving auto</td>
<td></td>
<td></td>
<td>Light housekeeping</td>
<td>Digging vigorously</td>
<td></td>
</tr>
<tr>
<td>Light housekeeping</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Occupational</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sitting</td>
<td></td>
<td></td>
<td>Stocking shelves (light objects)</td>
<td>Carrying objects (20-30 lb.)</td>
<td>Digging ditches (pick and shovel)</td>
</tr>
<tr>
<td>(clerical/assembly)</td>
<td></td>
<td></td>
<td>Auto repair</td>
<td>Carpentry (exterior)</td>
<td>Lumber jack</td>
</tr>
<tr>
<td>Typing</td>
<td></td>
<td></td>
<td>Light welding/carpentry</td>
<td>Shoveling dirt</td>
<td>Heavy laborer</td>
</tr>
<tr>
<td>Desk work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standing (store clerk)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Recreational</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Golf (cart)</td>
<td></td>
<td></td>
<td>Dancing (social)</td>
<td>Badminton (competitive)</td>
<td>Canoeing</td>
</tr>
<tr>
<td>Knitting</td>
<td></td>
<td></td>
<td>Golf (walking)</td>
<td>Tennis (singles)</td>
<td>Mountain climbing</td>
</tr>
<tr>
<td>Hand sewing</td>
<td></td>
<td></td>
<td>Sailing</td>
<td>Snow skiing (downhill)</td>
<td>Paddle ball</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tennis (doubles)</td>
<td>Light backpacking</td>
<td>Handball</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Volleyball (6 persons)</td>
<td>Basketball</td>
<td>Squash</td>
</tr>
<tr>
<td><strong>Physical conditioning</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walking (2 mph)</td>
<td></td>
<td></td>
<td>Level walking (3-4 mph)</td>
<td>Level walking (4.5-5.0 mph)</td>
<td>Level jogging (5 mph)</td>
</tr>
<tr>
<td>Stationary bike</td>
<td></td>
<td></td>
<td>Level biking (6-8 mph)</td>
<td>Bicycling (9-10 mph)</td>
<td>Swimming (crawling stroke)</td>
</tr>
<tr>
<td>Very light calisthenics</td>
<td></td>
<td></td>
<td>Light calisthenics</td>
<td>Swimming, breast stroke</td>
<td>Rowing machine</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Running (&gt; 6 mph)</td>
</tr>
</tbody>
</table>

Recommendations for Hormone Replacement Therapy (HRT) After Acute MI*

Class Ila Recommendations

1. HRT with estrogen and progestin for secondary prevention of coronary events should not be given de novo to postmenopausal women after AMI.

2. Postmenopausal women who are already taking HRT with estrogen plus progestin at the time of AMI can continue their therapy.

*HERS Study: JAMA 1998;280:605-13

Sample Patient Education Form

Acute Coronary Syndrome:

- Acute Myocardial Infarction (Heart Attack)
- Unstable Angina
- Other

Diagnosis

I understand that I have Coronary Heart Disease and that my diagnosis was confirmed by:

- symptoms
- changes in my ECG
- heart catheterization

Cholesterol  TC ___  LDL ___  HDL ___. Ejection Fraction ___%

Medication I understand there are certain medications which may help to prevent a future attack and may help to extend my life.

- Aspirin: 81 mg qd indefinitely
- Beta-blocker -
- Sublingual nitroglycerin tablets
- ACE Inhibitor -
- Cholesterol lowering -

I understand that I have not received a prescription for one or more of these medications because ________________________________

Smoking I understand that smoking increases my chances of suffering a future heart attack and that smoking causes other illnesses which can shorten my life.

I smoke and have been counseled to stop.  Yes  No
I do not smoke.  Yes  No
**Diet**

I understand that a diet that is low in cholesterol and fat may help to reduce my chances of suffering a future heart attack and may help to extend my life.

☐ I have received  ☐ I have not received counseling about a low fat diet.

**Exercise**

*Heart Attack Patients Only: I have undergone an exercise test during my hospitalization or I am scheduled to undergo an exercise test to help determine whether I can safely participate in a cardiac rehabilitation program.*

☐ I have received  ☐ I have not received activity instructions for the next 4-6 weeks, before I start cardiac rehabilitation.

☐ I have received  ☐ I have not received a referral to an outpatient cardiac rehabilitation program.

**Education**

☐ I have received  ☐ I have not received cardiac education during my hospitalization.

☐ I know  ☐ I do not know warning signs and symptoms of heart attack and action to take if they occur.

☐ I have received  ☐ I have not received instructions on my discharge medications.

Patient Signature  Date

Nurse Signature  Date