Unstable Angina and Non–ST-Segment Elevation Myocardial Infarction:
Part II. Coronary Revascularization, Hospital Discharge, and Post-Hospital Care

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In the guideline developed by the American College of Cardiology and the American Heart Association, the management of suspected unstable angina and non–ST-segment elevation myocardial infarction (UA/NSTEMI) has four components: initial evaluation and management; hospital care; coronary revascularization; and hospital discharge and post-hospital care. Part II of this two-part article discusses coronary revascularization, hospital discharge, and post-hospital care. Decisions must be made about the use of coronary angiography and coronary revascularization in patients hospitalized with UA/NSTEMI. With an early conservative strategy, medical management is employed. Coronary angiography and revascularization are reserved for use in patients with evidence of ischemia at rest (or with minimal activity) and patients with a strongly positive stress test. With an early invasive strategy, coronary angiography and revascularization are recommended within 48 hours in patients without contraindications. Hospital discharge planning involves coordination of medical care, preparation of the patient for resumption of normal activities, and evaluation of the need for long-term risk factor reduction. Discharge medications should be continued to control ongoing symptoms (anti-ischemic agents) and prevent recurrent events (aspirin, clopidogrel, beta blocker, and an angiotensin-converting enzyme inhibitor or statins in selected patients). (Am Fam Physician 2004;70:535-8 Copyright© 2004 American Academy of Family Physicians.)

This is part II of a two-part article on unstable angina and non–ST-segment elevation myocardial infarction. Part I, "Initial Evaluation and Management, and Hospital Care," appears on p. 525 in this issue.

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See page 425 for definitions of strength-of-recommendation labels.

The updated guideline from the American College of Cardiology and the American Heart Association (ACC/AHA)[1,2] divides the assessment and treatment of patients with unstable angina and non–ST-segment elevation myocardial infarction (UA/NSTEMI) into four components. Part I[3] of this two-part article discusses initial evaluation, management, and hospital care for these patients. Part II reviews issues related to coronary revascularization, hospital discharge, and post-hospital care, using the ACC/AHA classification of strength of recommendations *(see Table 1 in part 1)*.

Coronary Revascularization

In patients hospitalized with UA/NSTEMI, one of the most important decisions is the early strategy of care regarding coronary angiography and revascularization. The goals of coronary angiography are to provide information about prognosis based on the location and extent of coronary atherosclerosis and to identify the patients who will benefit from percutaneous or surgical revascularization.

The term "early conservative strategy" refers to medical management, with the use of coronary angiography and revascularization reserved for patients who have evidence of recurrent ischemia at rest (or with minimal activity) or who have a strongly positive predischarge stress test. The term "early invasive strategy" refers to the routine use of coronary angiography and revascularization (within 12 to 48 hours of presentation) in patients without contraindications.

Recent trials employing modern antiplatelet and antithrombotic therapies and catheterization techniques have included the FRagmin and Fast Revascularization during InStability in Coronary artery disease II (FRISC II) study[4] and the Treat Angina with Aggrastat and determine Cost of Therapy with an Invasive or Conservative Strategy Thrombolysis

in Myocardial Infarction 18 (TACTICS-TIMI 18) trial.[5] These trials have demonstrated significant benefit from pursuing an early invasive strategy, especially in patients who have high-risk indicators, with the strongest benefit occurring in patients who have ST-segment deviation or an elevated cardiac-specific troponin level.

Based on the results of the FRISC II[4] and TACTICS-TIMI 18[5] studies, the 2002 ACC/AHA guideline[1,2] recommends an early invasive strategy in patients with UA/NSTEMI and any high-risk indicators *(ACC/AHA class I recommendation; see Table 4 in part I)*. In the absence of high-risk indicators, an equal recommendation is given for an early conservative strategy or an early invasive strategy. However, it should be noted that patients who initially are treated conservatively should be managed invasively if they develop high-risk indicators or have a strongly positive stress test before hospital discharge. In addition, the ACC/AHA recommendations apply only to patients with a strong likelihood of acute coronary syndrome.[1,2] Angiography is contraindicated in patients with acute chest pain and a low likelihood of acute coronary syndrome.[1,2]

When an invasive strategy is undertaken, the decision for revascularization follows from the results of coronary angiography, and indications are similar to those for revascularization in patients with chronic stable angina.[6] The decision and mode of revascularization (percutaneous coronary intervention or coronary artery bypass grafting) are influenced not only by coronary anatomy but also by anticipated life expectancy, ventricular function, comorbidity, functional capacity, severity of symptoms, and quantity of viable myocardium at risk.[1,2]

A mnemonic for remembering issues to consider at the time of discharge is "ABCDE" (*a*spirin and *a*nti-anginals, *b*eta blockers and *b*lood pressure, *c*holesterol and *c*igarettes, *d*iet and *d*iabetes, *e*ducation and *e*xercise).

Specific recommendations for mode of revascularization are as follows.[1,2] Coronary artery bypass grafting (CABG) is recommended for patients with left main coronary artery disease (ACC/AHA class I). CABG also is recommended for patients with three-vessel coronary artery disease or with two-vessel disease, including proximal left anterior descending coronary involvement with either decreased left ventricular function or diabetes mellitus (ACC/AHA class I). Percutaneous coronary intervention is recommended for other patients with multivessel coronary artery disease who have suitable anatomy for this technique and do not have depressed ventricular function or diabetes mellitus (ACC/AHA class I). Either percutaneous coronary intervention or coronary artery bypass grafting is considered suitable in patients with one- or two-vessel disease and none of the features mentioned above. As surgical procedures (e.g., minimally invasive surgery) and interventional procedures (e.g., drug-coated stents) improve, recommendations are likely to evolve.

Hospital Discharge and Post-Hospital Care

DISCHARGE PLANNING

After receiving initial care in the hospital, most patients with UA/NSTEMI but no complications can be discharged on the day after percutaneous coronary intervention or four to seven days after coronary artery bypass grafting. Low-risk patients who are treated conservatively can be discharged on the day of noninvasive stress testing or the day after such testing.

Goals during the discharge process include preparing the patient to resume usual activities, evaluating long-term medical therapy and risk factor reduction to prevent recurrent coronary events, and confirming or establishing long-term medical follow-up care. A multidisciplinary approach involving physicians, nurses, pharmacists, and rehabilitation specialists can help to achieve these goals.

A mnemonic for remembering issues to consider at the time of discharge is "ABCDE" (***a***spirin and ***a***ntianginals, ***b***eta blockers and ***b***lood pressure, ***c***holesterol and ***c***igarettes, ***d***iet and ***d***iabetes, ***e***ducation and ***e***xercise).[6] Because of current pressures for shorter hospitalizations, critical pathways and discharge planning protocols can help to avoid omission of important medications and instructions.

DISCHARGE MEDICATIONS AND RISK FACTOR MODIFICATION

Anti-ischemic medications (e.g., nitroglycerin, beta blocker) should be continued to control symptoms in patients with incomplete revascularization. The ACC/AHA guideline lists five medications as class I recommendations for long-term treatment of patients after UA/NSTEMI *(Table 1)*.[1]

The benefits of aspirin, clopidogrel (Plavix), and beta blockers were discussed in part I[3] of this article. Clinical trials have demonstrated benefit from the use of angiotensin-converting enzyme (ACE) inhibitors in patients with congestive heart failure; in addition, the Heart Outcomes Prevention and Evaluation study[7] has shown favorable effects from long-term use of ACE inhibitors in

TABLE 1
Recommended Discharge Medications for Patients with UA/NSTEMI

Aspirin, 75 to 325 mg per day
Clopidogrel (Plavix), 75 mg per day, in patients who cannot tolerate aspirin or in addition to aspirin, with treatment given for up to nine months
Beta blocker in patients without contraindications
Lipid-lowering agent (statin) and diet therapy in patients with an LDL cholesterol level above 130 mg per dL (3.40 mmol per L), or in patients with an LDL cholesterol level higher than 100 mg per dL (2.60 mmol per L) after diet therapy*
Angiotensin-converting enzyme inhibitor in patients with congestive heart failure, left ventricular dysfunction (ejection fraction below 40%), hypertension, or diabetes mellitus

UA/NSTEMI = unstable angina and non–ST-segment elevation myocardial infarction; LDL = low-density lipoprotein.

**—Recent trial data suggest benefit of LDL lowering in patients with LDL levels <100 mg per dL. Some experts have endorsed an LDL goal of <70 mg per dL following UA/NSTEMI.*

Information from reference 1.

patients with coronary artery disease (or patients at risk for the development of this disease).

The effectiveness of statins in the secondary prevention of coronary artery disease is well established.[8] However, the timing of the initiation of these agents remains controversial. Although not definitive, recent studies[9,10] have shown that early initiation of lipid-lowering therapy is safe and effective in both medically and invasively treated patients.

Another controversy has been the benefit of intensive therapy compared with moderate therapy. The recently published Pravastatin or Atorvastatin Evaluation and Infection Therapy–Thombolysis in Myocardial Infarction 22 (PROVE-IT–TIMI 22) study[11] compared intensive (atorvastatin, 80 mg per day) and moderate (pravastatin, 40 mg per day) statin therapy in patients stabilized from acute coronary syndromes. The median low-density lipoprotein cholesterol level achieved was 95 mg per dL (2.45 mmol per L) with pravastatin and 62 mg per dL (1.60 mmol per L) with atorvastatin. A highly statistically significant 16 percent reduction in deaths, myocardial infarctions, and readmissions for acute coronary syndromes or revascularization was observed in the patients who received intensive treatment. The findings of the PROVE-IT–TIMI 22 study suggest that intensive therapy is preferable in patients stabilized from acute coronary syndromes.

As a result of the publication of recent trials of cholesterol lowering, such as PROVE-IT—TIMI 22[11] and the Heart Protection Study (HPS),[12] cholesterol experts have reevaluated treatment goals in high-risk patients, including those who have had UA/NSTEMI. HPS showed a benefit from simvastatin compared with placebo in patients at high risk of coronary events (including those with established CAD) regardless of baseline cholesterol values. A position statement by the coordinating committee for the National Cholesterol Education Program (NCEP)[13] endorsed a lower goal (LDL levels less than 70 mg per dL [1.80 mmol per L]) and supported the initiation of cholesterol-lowering therapy in patients with LDL levels less than 100 mg per dL in high-risk and very-high-risk patients. It is likely that future versions of the UA/NSTEMI guidelines will reflect treatment goals and strategies similar to those of the NCEP.

Secondary prevention through the control or elimination of known risk factors for coronary artery disease (e.g., hyperglycemia in patients with diabetes mellitus, tobacco use, physical inactivity) also should be part of discharge planning.

Long-term anticoagulation with warfarin (Coumadin), a vitamin K antagonist, has been evaluated in recent studies[14-17] of patients with myocardial infarction or unstable angina. Results have been mixed, with some trials[14,15] showing benefit from the use of warfarin, when compared with aspirin alone in the prevention of recurrent cardiovascular events, and other trials[16,17] (predominantly involving low-intensity warfarin therapy) showing no significant benefit.

The routine use of warfarin in patients with acute coronary syndromes has been limited by the occurrence of bleeding and the need for frequent monitoring. The ACC/AHA guideline[1,2] does not recommend routine use of warfarin after hospitalization in patients with UA/NSTEMI. Warfarin therapy is recommended after acute coronary syndromes in patients with an additional indication for long-term anticoagulation, such as atrial fibrillation or a mechanical prosthetic heart valve.[1,2]

CONTINUING CARE AND FOLLOW-UP

At the time of hospital discharge, patients should have a clear plan for follow-up with a physician to assess recovery and symptoms and to reinforce secondary preventive measures. Low-risk medically treated patients and revascularized patients usually should be seen within two to six weeks, whereas higher-risk patients should be seen within one to two weeks.

Strength of Recommendation

Key clinical recommendation	SOR label	References
Based on the results of the FRISC II and TACTICS-TIMI 18 studies, the updated ACC/AHA guideline recommends an early invasive strategy in patients with UA/NSTEMI and any high-risk indicators (ACC/AHA class I recommendation).	A	1, 2, 4, 5

FRISC II = FRagmin and Fast Revascularization during InStability in Coronary artery disease II; TACTICS-TIMI = Treat Angina with Aggrastat and determine Cost of Therapy with an Invasive or Conservative Strategy Thrombolysis in Myocardial Infarction 18; ACC = American College of Cardiology; AHA = American Heart Association; UA/NSTEMI = unstable angina and non–ST-segment elevation myocardial infarction.

Despite the efforts of hospital staff to adhere to guidelines and evidence-based treatment, or because of temporary contraindications, important therapies may be omitted. Family physicians can provide an invaluable "safety net" to ensure that patients with UA/NSTEMI receive optimal medical care. Therefore, even though all family physicians may not provide acute care for patients with UA/NSTEMI, familiarity with the ACC/AHA guideline will facilitate optimal treatment of patients with UA/NSTEMI and those with a history of this syndrome.

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