

Report of the Canadian Cardiovascular Society's Consensus Conference on the Management of the Postmyocardial Infarction Patient

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In October 1989, the Canadian Cardiovascular Society announced a program to achieve consensus on important issues in the care of patients with cardiovascular disease. This report on the management of the postmyocardial infarction patient represents the first in a series of these consensus conferences. The process for establishing consensus recommendations involved several steps. A primary panel of 11 experts from various fields was selected to review the available clinical evidence and to make a list of recommendations about management decisions in the postmyocardial infarction period.

The initial report was distributed to a secondary panel of 16 reviewers* representing allied health care constituencies from across Canada. On the basis of the critical reviews and feedback from these reviewers, a revised report was distributed to all members (over 800) of the Canadian Cardiovascular Society for further review and feedback.

This iterative approach resulted in a penultimate report that was presented at a plenary session of the annual scientific meeting of the Canadian Cardiovascular Society on Oct. 18, 1990, in Halifax, NS. On the basis of discussion and feedback from this symposium, the consensus review was completed.

— Ernest L. Fallen, MD, FRCPC
Chairman, Consensus Conference

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Of all patients admitted to a coronary care unit (CCU) with acute myocardial infarction (MI), an estimated 85% survive until hospital discharge.¹ Death from heart disease will claim 10% to 15% of these survivors in the following year, most within the first 3 to 6 months.² A 1986 Statistics Canada Health Report³ estimated cardiac-related disability costs, excluding physician fees, to be about \$3 billion annually. Although overall cardiovascular mortality rates have declined 10% to 15% in Canada over the last decade, coronary artery disease remains Canada's number one health care problem; an estimated 60 000 new cases of acute MI occur annually.⁴

However, there is some encouraging news. First, a better understanding of the pathophysiologic processes within affected arteries has revealed that atherosclerosis is not so much a degenerative disorder as an active proliferative process that can be slowed or even reversed.⁵ Second, there is now conclusive evidence from well-designed, large-scale clinical trials that modification of certain risk factors and the use of health-promotion strategies and certain secondary prophylactic agents can substantially reduce both morbidity and mortality in survivors of an acute MI. Potentially, 30% to 50% more lives could be saved in the first year if the recommendations from these clinical trials were followed in practice. Also, specific interventions may help to restore patients' functional capacity so that they can lead an acceptable and useful life.

This report is intended as a guide for the management of the post-MI patient. It makes practical recommendations based on critical analysis of available evidence about cardiac management, risk-factor modification and rehabilitative interventions. The physician and health care worker are advised to use the recommendations as guidelines for minimum standards of care, recognizing that consensus, at best, represents an ongoing active process subject to continual revision as new and effective therapeutic strategies emerge.

Definitions and principles

In this report, consensus is defined as an agreement among informed people when the evidence is sufficiently persuasive to make a collective statement without having to wait for definitive scientific corroboration.

The goal of biomedical research is to advance knowledge through a continuous process of scientific discovery; it rarely involves a search for consensus. Indeed, scientific conclusions, by their very nature, should always remain tenuous. However, the medical practitioner's goal is to alleviate discomfort, help the sick and promote health — activities that depend

on many factors, including the patient's psychosocial, socioeconomic and educational status, health expectations, local values, availability of medical resources and work status. Therefore, expectations of consensus recommendations should be realistic and include expert interpretation of scientific evidence, realistic goals for patient management and input from medical practitioners. Any consensus statement represents a distillation of opinions. Any one recommendation may not always be applicable. Also, the answers to many questions still lack sufficient scientific support.

Our recommendations were governed by four principles:

- They should adhere to rigorous rules of evidence.⁶
- All recommended investigative procedures and therapy should be safe and the least harmful to patients.
- They should be cost effective.
- They should be applicable to every community and type of practice.

The definition of the term "post" in post MI refers to the time between transfer of the patient from the coronary care unit to the ward (3 to 6 days after the infarction) and 1 year after the acute event.

Coronary atherosclerosis and left ventricular function in the postinfarction period

Acute MI is often related to rupture of an atherosclerotic plaque and consequent formation of an occlusive intracoronary thrombus. Thrombosis within the affected artery may aggravate or be associated with localized changes in coronary vasomotor activity. There is often recurrence of spontaneous thrombosis, partial clot dissolution and reocclusion.⁷ The anatomic evolution of the coronary lesion depends on a complex interaction between residual intraluminal thrombus, coronary spasm and endothelial dysfunction.

The natural progression of coronary atherosclerosis and left ventricular (LV) dysfunction in the postinfarction period are often related. The extent of initial impairment of the LV myocardium is related to the site of obstruction of the occluded artery, the size of the LV region at risk and the presence of coronary collaterals.⁸⁻¹⁰ In the absence of multivessel disease, the noninfarcted myocardial territory may undergo compensatory hyperkinesia. Although the infarction process is segmental, the global ejection fraction has major predictive implications.¹¹ The infarct territory does not necessarily evolve into a permanent scar, but improvement of its function may not occur immediately because of myocardial stunning (transient LV dysfunction), which may last for days or weeks following the infarct.¹² Therefore,

reassessment of LV function 2 to 4 weeks post MI may be wise before final assignment of a risk category. Patency of the infarct-related artery is associated with better preservation of LV function, limitation of infarct expansion, enhanced electrical stability and opportunity for collateral vessel formation.

Assessment of LV function and the presence or absence of symptomatic ischemia in the early postinfarction period is critical for determining the patient's risk category (risk stratification profile).

Developing a risk stratification profile

Patients recovering from acute MI have a first-year mortality rate ranging from 2% to 60%.^{13,14} This wide range emphasizes the need to develop a risk stratification profile. *It is just as important to identify very low-risk patients, thus sparing them unnecessary aggressive investigation and therapy, as it is to identify high-risk patients for whom early intervention may be beneficial and, indeed, life saving.* Prognosis depends on three major factors: LV function, residual myocardial ischemia and dysrhythmias.^{1,15} Psychologic distress and social isolation have also been shown to contribute to a poor prognosis.¹⁶

Most MI patients can be stratified according to risk using early, inexpensive clinical measurements with only a slight sacrifice of accuracy. Between 30% and 40% of patients have uncomplicated infarcts and will be at low risk at the time of discharge.¹⁷ These patients will have an exercise tolerance usually greater than 6 METs (metabolic equivalents) and a 1-year mortality rate of less than 5%. METs is a convenient term for expressing energy expenditure; 1 MET is the amount of energy expended by a person at rest. It is normalized for body weight and is equivalent to 3.5 mL O₂/kg/min.

About 25% of patients will be at intermediate risk or have the potential for continuing ischemia.^{18,19} They may have recurrent angina at rest or on effort, or they may have presumed incomplete infarcts such as those with non-Q-wave infarctions or those who have received thrombolytic therapy.

Patients with poor LV function and an inability to perform more than 4 METs on a standard exercise test are at high risk and have a 1-year mortality rate from 30% to 60%.¹⁴

Simple clinical measurements and a properly timed exercise test are the most useful, cost-effective approaches to separate low-, intermediate- and high-risk patients.^{17,20,21} The first step: develop a risk stratification profile for the post-MI patient.

Recommendations (Fig. 1)

Determination of relative risk should be made

at three stages: early stratification (on first transfer from the CCU [day 3 to 5]), predischARGE stratification (1 to 2 days before discharge) and postdischarge stratification (2 to 6 weeks after discharge following a maximum symptom-limited exercise test).

Early stratification (day 3 to 5): Three groups can be identified during this early phase:

- Low risk: age less than 70 years, first MI, Killip I or IIa (Killip classification,²² Table 1).
- Intermediate risk (potential for residual ischemia): non-Q infarction, recipient of thrombolytic therapy or early recurrent angina now controlled.
- High risk: Age greater than 70 years, previous MI, Killip IIb to IV, persistent systolic blood pressure less than 100 mm Hg.

PredischARGE stratification

• If a patient from any risk group experiences and continues to experience recurrent angina at rest, consideration should be given to coronary angiography for further stratification and possible revascularization.

• If a patient from any risk group experiences recurrent angina while ambulating (up to 3 to 4 METs or walking back and forth along a hospital corridor), a predischARGE submaximal exercise test would be useful.²³ The test is stopped at 5 METs, at 70% maximum predicted heart rate or when angina occurs, whichever comes first. If there is significant ST-segment depression (more than 2.0 mm for at least 80 msec compared with the at-rest tracing) or a flat or decreased systolic blood pressure response to exercise at a low workload (less than 4 METs) the patient should undergo coronary angiography. If not, the patient should remain in the intermediate (watchful) category until further stratification with a maximum symptom-limited exercise test is done 2 to 6 weeks after discharge.²⁴

• If there is no further chest pain during this early ambulatory phase, patients should remain in their risk groups until the maximum symptom-limited exercise test is done.

Postdischarge stratification

A symptom-limited maximum exercise test (treadmill or cycle ergometer) should be performed on any ambulatory post-MI patient about 2 to 6 weeks after discharge.²⁴

• If the low-risk patient achieves more than 8 METs or completes stage 2 or 6 minutes of the Bruce protocol²⁵ without any ST changes, chest pain or decreased systolic blood pressure, he or she is at very low risk and need undergo no further testing or treatment.²⁶ The negative predictive accuracy of an event-free clinical course for this group is very high.²⁶

• If the low-risk patient has significant ST depression (equal to or more than 2 mm for at least 80 msec in leads remote from the infarct) or experiences angina at a low workload (less than 6 METs or

during stage 1 of the Bruce protocol), or a flat systolic blood pressure response for any two successive incremental work levels, he or she should be considered for coronary angiography.^{24,27}

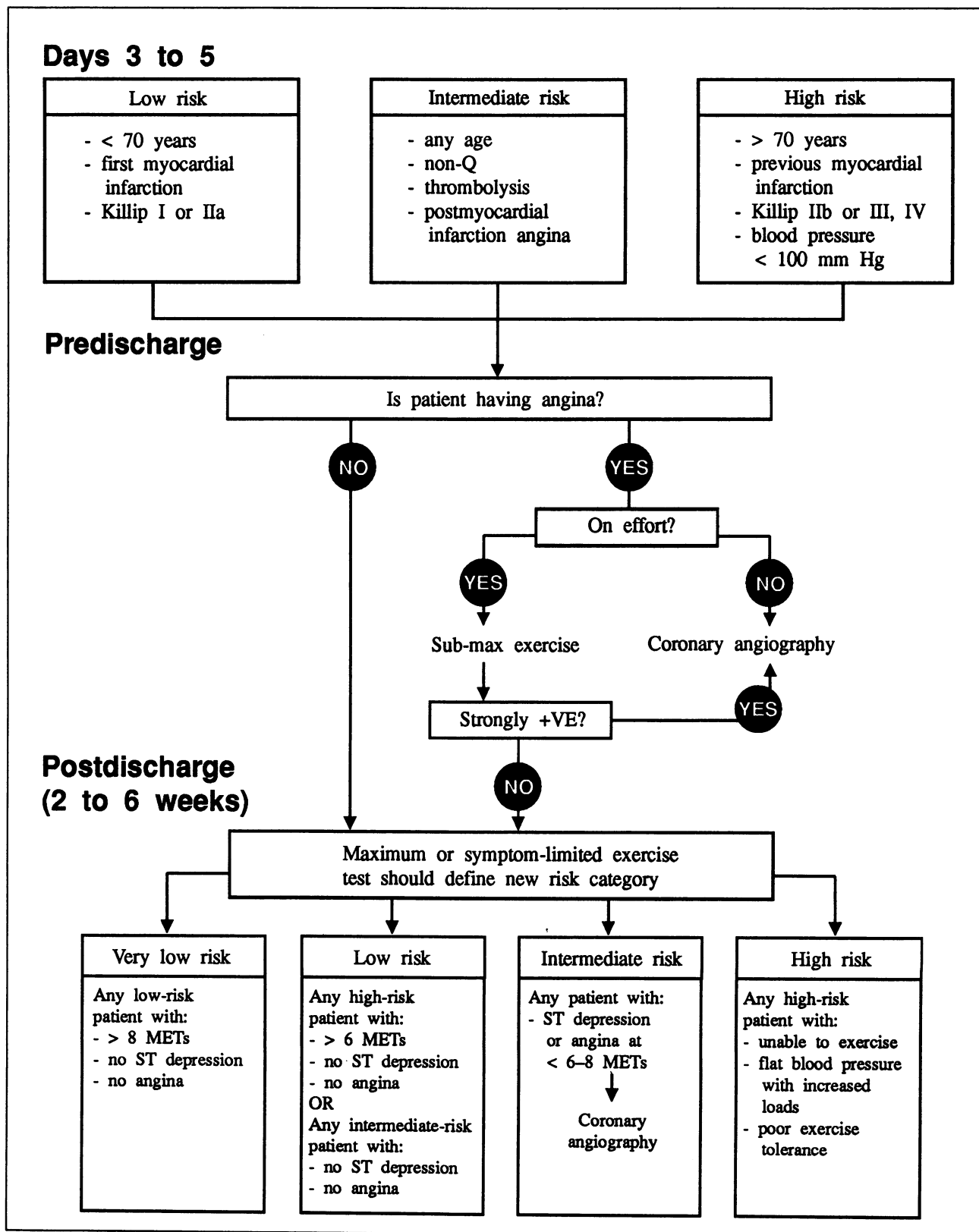


Fig. 1: Risk stratification decision tree

- If an intermediate-risk patient shows significant ST depression (as above) or chest pain at any workload, consideration should be given to further stratification by coronary angiography.

- If a high-risk patient exercises more than 6 METs without ST changes or a blood pressure drop or complex ventricular ectopy, he or she can be moved into the low- or intermediate-risk group. This may represent recovery from stunned myocardium.²⁸

- If a high-risk patient cannot exercise at all because of poor LV function or ischemia, he or she should continue to be classified as high risk and may require further specialized investigation and treatment.

- If the exercise test is equivocal or uninterpretable for any group, further evaluation with either exercise thallium scintigraphy or radionuclide angiography should be considered.²⁴

Management of early complications

Although a patient may have been transferred safely from the CCU, he or she may experience complications while ambulating in the ward. It is important to identify and manage these complications quickly. In the absence of recurrent ischemic pain, there is little or no evidence that routine prophylactic coronary balloon angioplasty or bypass surgery is effective in reducing morbidity or mortality when performed the first week or two following an acute MI.²⁹

Recommendations

Post-MI angina

If there is no contraindication, a β -blocker of the physician's choice should be tried first. Calcium blockers and organic nitrates can also be effective in patients with rest- or effort-induced post-MI angina. Further risk stratification, as described earlier, is recommended for these patients.

Table 1: Killip classification²² of patients with acute myocardial infarction

Class	Clinical findings	% of patients	Hospital mortality rate, %
I	No rales; no S-3	30-40	2-4
IIa	Rales < 50% of lungs; no S-3	20-30	3-5
IIb	Rales < 50%; S-3 present	10-20	10-15
III	Rales > 50%; pulmonary edema	5-10	45
IV	Shock	10	80-100

Dysrhythmias

- Asymptomatic premature ventricular contractions (PVCs) including nonsustained ventricular tachycardia do not require treatment with antiarrhythmic agents. There is, as yet, no evidence that any antiarrhythmic agent (except perhaps β -blockers) is effective in preventing sudden death in patients with ventricular irritability.³⁰ PVCs predict outcome but may not be causative.

- Symptomatic ventricular ectopy (i.e., palpitations, lightheadedness, angina) may require treatment. Caution is urged in the use of Class I_c agents (e.g., Flecainide and Encainide) in view of their proarrhythmic properties.³¹ Often, β -blockers are useful in this setting.

- In the late post-CCU phase, patients who experience sustained ventricular tachycardia that requires termination by pharmacologic or electrical means and survivors of sudden cardiac arrest due to ventricular fibrillation should be referred for special investigations including electrophysiologic studies with or without coronary angiography and ventriculography.³²

- If multiple or complex PVCs or ventricular tachycardia are precipitated during an exercise test, a β -blocker should be prescribed. The test may then be repeated while the patient is on treatment.

- Atrial fibrillation with a rapid heart rate should be treated with digitalis to reduce the ventricular rate to less than 90 beats/min. Small supplemental doses of a β -blocker (or a calcium blocker such as verapamil or diltiazem) may be used if the rapid rate persists in the absence of heart failure. If the atrial fibrillation is sustained, some patients benefit from elective electrical cardioversion.

- If symptomatic bradyarrhythmias occur, one should modify the dose or substitute for medications such as β -blockers, verapamil, diltiazem or digitalis. If the patient is taking no such medications, consideration should be given to implantation of a permanent pacemaker. In some cases of inferior MI, sinus bradycardia or atrioventricular block may not revert for up to 2 weeks.

Heart failure

- If the patient continues to experience dyspnea associated with bilateral pulmonary rales, with or without cardiomegaly, salt restriction and diuretics should be prescribed. Serum potassium levels should be carefully monitored, especially if ventricular irritability is present. An ACE inhibitor should also be considered for these patients.³³

- If the patient is experiencing low-output symptoms such as effort fatigue, weakness and dyspnea an ACE inhibitor should be added, especially if the peak systolic blood pressure remains above 100 mm Hg.³³

- Digitalis should be used cautiously in patients with normal heart size, normal sinus rhythm and absence of an S-3 gallop and in those with ventricular ectopy in the presence of active ischemia.³⁴ Digitalis is useful for patients with rapid atrial fibrillation, dilated left ventricle and an S-3 gallop.

- Caution should be exercised with the use of calcium-channel blockers and β -blockers in patients with clear signs and symptoms of congestive heart failure.

Hypertension

- Patients with a persisting systolic pressure above 180 mm Hg or a diastolic pressure above 95 mm Hg should be treated with an ACE inhibitor.³⁵ A β -blocker³⁵ or a calcium-channel blocker^{36,37} or both may also be useful in normalizing the blood pressure of hypertensive post-MI patients.

Pericarditis

- The pain of pericarditis occurring within 72 hours of the acute event usually responds to treatment with acetylsalicylic acid (ASA), 650 mg *qid* for 1 to 2 weeks. If the ASA is ineffective in controlling the pain, a nonsteroidal agent or steroids may be added.

- Intravenous or subcutaneous administration of heparin or oral administration of anticoagulants need not be stopped if pericarditis is diagnosed within 4 days of the acute infarct.³⁸ However, caution with anticoagulants is urged when pericarditis with effusion first occurs weeks or months following the acute event (possible Dressler's syndrome).

Routine secondary prophylaxis

The use of secondary prophylactic therapy offers substantial benefits to post-infarction patients by preventing recurrent myocardial ischemia and decreasing overall cardiac morbidity and mortality. The following recommendations are based on the evidence to date from well-designed, large randomized clinical trials.

Recommendations

- All patients, regardless of risk category or age, should receive enteric-coated ASA (160 to 325 mg/d) unless contraindicated because of allergy or intolerance.³⁹

- All patients except very-low-risk patients (see page 1017) should be prescribed a β -blocker unless contraindicated.^{40,41} Benefit is greatest among those patients at highest risk.

(1) Absolute contraindications: (a) second- or third-degree heart block, sick sinus syndrome;

(b) overt congestive heart failure; (c) severe chronic obstructive lung disease.

(2) Relative contraindications: (a) insulin-dependent diabetes with a history of hypoglycemic attacks; (b) significant hypotension (systolic blood pressure less than 100 mm Hg); (c) heart rate less than 60 beats/min.

The physician should weigh the risk and benefit when a patient taking a β -blocker complains of sleep disturbance, excessive fatigue, impotence and loss of pep. Sometimes exchanging one type of β -blocker for another is helpful.

- There is no substantive evidence that any of the following agents provide sufficient benefit to warrant routine prophylaxis: (1) organic nitrates; (2) ACE inhibitors; (3) antiarrhythmic agents; (4) antiplatelet drugs other than ASA. Studies are still in progress for some of these agents.

- The routine use of calcium-channel blockers is not associated with beneficial effects except for a possible decrease in nonfatal reinfarction with diltiazem in patients with a non-Q infarction and well-preserved LV function.⁴²

- Among patients with large anterior MI, oral anticoagulation with warfarin for 1 to 3 months may prevent systemic emboli.⁴³ Benefit is likely to be greatest in those with mural thrombi identified on a day-7-to-10 echocardiogram.

Rehabilitation

Rehabilitation is best defined as the sum of activities required to ensure patients the best possible physical, psychologic and social conditions so that they may, by their own efforts, regain as normal as possible a place in the community and lead an active productive life.

This definition reinforces the importance of both patient responsibility and compliance in achieving an active lifestyle. The aim of rehabilitation is to relieve symptoms and to improve both cardiovascular performance and quality of life. Rehabilitation strategies should include services to help control weight, smoking, blood pressure and lipid disorders; to help manage emotional stress and facilitate social support; and an exercise prescription to help increase exercise tolerance. Although meta-analysis of comprehensive rehabilitative services following MI suggests a 20% to 25% reduction in all-cause and cardiovascular mortality, the immediate and long-term aims of rehabilitation are to relieve symptoms and to improve both cardiovascular performance and quality of life.⁴⁴

Risk factor and lifestyle modification

Health promotion and preventive medicine are

important aspects of post-MI care. There is increasing evidence that modifying risk factors such as hyperlipidemia, smoking and hypertension improves outcome, delays progression of atherosclerosis, reduces mortality and improves functional capacity even though they are secondary preventive measures.⁴⁵⁻⁴⁸ For example, some evidence exists that exsmokers can look forward to a 35% to 50% reduction in mortality, whereas the relative risk of sudden death is 1.6 to 2.2 times in those who continued to smoke.⁴⁶

Recommendation

- Every patient should be encouraged to discontinue smoking. For patients willing to comply, psychosocial support, education, exercise programs, relaxation therapy and special teaching programs may be used as adjunctive measures.

Management of dyslipidemias post MI⁴⁹⁻⁵¹

The presence of lipoprotein disorders is common in patients with post MI. A fasting lipid profile should be obtained within 24 hours after admission to hospital for screening patients with severe lipid disorders. However, in-hospital lipoprotein levels after 24 hours may be unreliable and therefore should be repeated at least 6 to 12 weeks after discharge and preferably after an overnight fast. The value of knowing the lipid profile early enables one to recommend appropriate dietary advice at a time when the patient is most receptive to compliance with preventive measures. The decrease in cardiovascular morbidity is related to the degree of reduction in plasma cholesterol levels and, probably, to increases in high-density lipoprotein (HDL) cholesterol levels.

Recommendations

- A prudent diet comprising 30% of total energy intake in fats (equal proportions of saturated, monounsaturated and polyunsaturated fats), 55% in carbohydrates and 15% in protein should be recommended for most patients. The goals of treatment should be to lower the low-density lipoprotein (LDL) cholesterol level to 3.4 mmol/L or less and the triglyceride level to 2.0 mmol/L or less. The HDL cholesterol level should be above 0.9 mmol/L. Medication should be considered if, after 4 to 6 months of dietary control, weight reduction and exercise fail to reach these goals. The drugs of first choice are different from those recommended for primary prevention. In patients with an elevated LDL cholesterol level as the primary abnormality (type IIa and some type IIb hyperlipoproteinemias) the drugs of

first choice are the HMG CoA-reductase inhibitors (lovastatin, sinvastatin and pravastatin) or niacin. In patients with elevated triglyceride levels, especially in combination with low HDL cholesterol or elevated LDL cholesterol levels (hyperlipoproteinemia types IV and IIb), the drugs of first choice are niacin or the fibrate derivatives (e.g., gemfibrozil). The bile acid binding resins are also excellent hypolipidemic agents, but they can interfere with absorption of other drugs. During the first year of drug treatment hepatic function as well as serum creatine kinase levels should be checked every 3 months and twice yearly thereafter.

- Efforts should be made to have patients achieve as near an ideal weight as possible. The body mass index (BMI) is calculated as weight (kg)/height(m²) where a BMI of 20 to 25 is a reasonable goal for the post-MI patient. It can be extremely difficult to have an obese patient lose weight while sedentary and while attempting to stop smoking. Education, dietary advice, psychosocial support, positive reinforcement and a regular exercise program are helpful in this regard.

- Less rigid advice for all of the preceding may be given to the elderly patient.

Psychosocial factors

An estimated 20% to 50% of patients have high levels of psychosocial stress following an MI, including anxiety, depression, hostility, denial or social isolation.⁵² Although some of these emotions are situational and self-limiting, difficulties continue to persist in 10% to 20% of patients unless there is some form of intervention.

The physician or other health professional caring for the post-MI patient should have enough information to build a psychosocial risk profile so as to identify the patients most in need of help and support. Single patients and those who lack social support, patients who are highly distressed, anxious or depressed in hospital, or those who experience feelings of hostility or anger are all likely to be at increased risk.⁵²

Recommendations

- A preliminary psychosocial risk profile should be attempted during hospitalization, with ongoing assessment at follow-up visits. Factors to be examined include marital status and adequacy of social support; feelings of distress, anxiety and depression; education level; and level of hostility or anger. One can use clinical interviewing techniques or simple standardized self-administered questionnaires, or both, to construct such a profile. For example, scores of 5 or more out of 20 on the

General Health Questionnaire (GHQ-20) have proven useful in identifying patients at risk for long-term morbidity because of high levels of psychological distress.⁵³ Such patients deserve additional follow up including possible psychiatric consultation.

- Denial occurring early in the hospital course may be an effective defence mechanism and should probably not be influenced but, rather, documented at this stage.⁵⁴

- For patients demonstrating social isolation and those with negative emotions such as depression or anxiety, resources should be mobilized to provide supportive and educational interventions, preferably beginning before and continuing after hospital discharge. In all such interventions the support and involvement of the spouse is important. Nurse practitioners, social workers, public health nurses, psychologists or other personnel involved in cardiac rehabilitation can be very helpful in dealing expertly with these high-risk patients.

- If available, combined exercise and rehabilitation programs with patient counselling and education should be offered, especially to patients with inadequate support systems.^{44,55}

Exercise prescription

Specific guidelines for graduated physical activity following an acute MI are provided by established cardiac rehabilitation programs in many communities. However, for general guidelines, the following recommendations are offered.

Recommendations

Phase I (ward activities until hospital discharge)

- Low- and intermediate-risk patients may increase their physical activities by 0.5 to 1 MET every 2 days until they are able to walk up one flight of stairs without symptoms just before discharge.⁵⁶ The same applies to high-risk patients except the process should be slower and guided by symptom limitation.

Table 2: Metabolic equivalents (METs) for self-care activities for a 70-kg man

Activity	METs*
Rest, sitting	1.0
Eating	1.0–1.5
Dressing, undressing	3.0
Walking 4 km/h	3.0
Showering	3.0–3.5
Walking 5 km/h	4.0
Mowing with hand mower	6.5
Shovelling snow	7.0

*Average demands, varying according to body weight and pace of activities. Upper extremity work or environmental stressors (change in temperature, etc.) may increase oxygen demands.

Phase II (from discharge up to 8 to 10 weeks, Table 2)

- Low- and intermediate-risk patients can increase their activity up to 4 to 6 METs, such as by walking at 5 to 7 km/h (2.3 to 4 METs) with a prescribed home program.⁵⁷

- High-risk patients should continue with the same level of activity prescribed at discharge until the symptom-limited exercise test is performed.

Phase III (beyond 2 months post discharge)

- If high- and intermediate-risk patients are capable of completing the symptom-limited exercise test without symptoms, dysrhythmias, significant ST-segment changes or blood pressure flattening, an activities protocol can be prescribed starting with a workload estimated at 40% of the patient's functional capacity.⁵⁸ For example, if a patient achieves 7 to 8 METs or completes stage 2 or 6 minutes on the Bruce protocol, then the patient may be encouraged to start regular activities at 3 to 4 METs or walking 4 to 6 km/h. The patient can then gradually increase his or her activity to 60% of functional capacity over the ensuing 3 to 6 months. Higher intensities may be possible depending on the response to exercise.

- Low-risk patients can begin at 60% of functional capacity unless severely deconditioned. They should be able to increase toward preinfarct activity by 4 to 6 months during Phase III.

- High-risk patients with reduced exercise capacity (less than 4 to 5 METs) can safely be prescribed a modified low-intensity supervised exercise program combined with relaxation therapy.⁵⁹

- Ideally, exercise at prescribed workloads should be done approximately 3 to 4 times per week for 15 to 30 minutes per session. If facilities are not available, walking at 3 to 4 METs (2 to 3 kilometers in 30 minutes) at least four times per week is recommended.⁵⁸

Some common questions from patients

Should I and when can I return to work?

The return to work decision is based on a constellation of factors including socioeconomic, educational status, self-efficacy and self-perception of abilities, physical exercise performance, job availability, employer's attitude, family attitude, and financial factors. The patient's in-hospital expectations of his or her future work capacity is an important determinant for work return.⁶⁰ If a post-MI patient has not returned to work by 6 months, further employment prospects are dim.⁶¹

The physician is part of the decision-making process in determining if or when patients are able to return to work. Cardiac impairment is assessed by

the physician. It can be determined as either limitation by cardiac symptoms or potential risk for sudden incapacitation. Disability, on the other hand, is mostly an administrative judgement based on the physician's assessment of the extent of impairment plus many other nonmedical factors such as age, sex, education, personal motivation, type of employment, and economic and social environment.

Recommendations

- Evaluation of occupational work capacity should be done within 6 to 8 weeks after an uncomplicated MI. If an exercise test is to be done at this stage for work evaluation it should be conducted while patients are taking their usual medication.

- The average workload that can be accomplished on an ongoing basis has been estimated at approximately 30% of the patient's functional capacity. Thus, if a patient accomplished 10 METs as peak capacity, then 3 to 4 METs should be an average safe workload during the day⁵⁸ (Table 3).

- If the test is uninterpretable or equivocal, further non-invasive testing can be done using exercise thallium scintigraphy or radionuclide ventriculography at rest and during exercise.

- Functional capacity can be significantly increased by exercise training.⁶² Reevaluation of performance may be done after 3 to 4 months of training before a final decision is rendered on return to work.

When can I drive my car?

Recommendations

- The fitness to drive is an administrative decision under the auspices of provincial driving licensing bodies. The Canadian Medical Association has published a physicians' guide to drivers examination.⁶³ The standards vary in different provincial jurisdictions, and physicians are advised to refer to these standards.

Table 3: Occupational workload equivalents in METs

Occupation	METs
Receptionist	1.0–2.5
Clerk/secretary	1.5–3.0
Professional (sedentary)	1.5–3.5
Professional (active)	1.5–3.0
Houseworker	1.5–4.5
Mail carrier	2.5–5.0
Factory (assembly) worker	3.0–5.5
Farmworker	3.5–7.5
Construction worker	4.0–8.5
Miner	4.0–9.0
Steelworker	5.0–11.0

As a general guide, low-risk patients can be permitted to resume driving between 3 and 4 weeks after discharge. The physician should exercise personal judgement and use the provincial guidelines for intermediate- and high-risk patients.

When can I resume sexual activities?

The amount of work required by the heart of a middle-aged man during sexual intercourse is approximately 4 to 5 METs — the work equivalent to walking briskly or climbing two flights of stairs.⁶⁴

Recommendations

- Low-risk patients comfortable and asymptomatic on exercise up to 6 METs can resume sexual activities within 2 to 3 weeks after discharge.

- High-risk patients should have their functional capacity assessed first. If they are able to accomplish at least 4 METs of activity without ischemic symptoms, a drop in blood pressure or significant arrhythmia, sexual activity may be resumed gradually.

- There is the potential for overprotection, fear and possibly impotence.⁶⁵ It is therefore important that the spouse be actively involved in the decisions and reassurance regarding the safety of sexual activities based on the functional capacity and psychological preparedness of the patient.

- Superimposed myocardial stressors should be minimized before intercourse. These include a recent heavy meal, excessive ethanol intake, unusual fatigue and smoking.

What do I do if I have chest pain after hospital discharge?

Recommendations

- It is important that all patients prescribed nitroglycerin be instructed on exactly how to use the preparation, what side effects may be experienced if it is being used for the first time, and how it should be used prophylactically. An in-hospital trial of nitroglycerin is recommended after physician evaluation.

- If patients suffer anterior chest, arm or jaw discomfort they should be instructed to stop whatever they are doing, rest and take a nitroglycerin tablet sublingually or a dose of nitro spray. If this is ineffective and the pain persists for another 5 minutes, a second nitroglycerin tablet or spray should be used. If pain persists for more than 10 minutes following a third tablet or spray, the patient should seek medical attention at once and proceed to the nearest emergency department should the attending physician be unavailable.

A word about cost effectiveness

Throughout the deliberations of this consensus conference every effort was made to be cost conscious of any statement or recommendation proposed. In this regard, the potential cost implications of a "routine" maximum exercise test were considered. There is general agreement with the recent study by Laupacis and colleagues²¹ that the cost effectiveness of a routine post-MI exercise test has not yet been fully established. They rightfully point out that a relatively inexpensive test such as exercise testing may not be costly in itself but may lead to other expensive clinical actions and thus consume significant resources. As indicated in this report, the routine post-infarction exercise test may also identify a very-low-risk group of patients and thus spare them any further costly investigation and treatment. Moreover, the test may identify patients who, by virtue of their exercise performance, can be advised to return to work earlier than expected, at an appreciable savings in cost.

No attempt was made to subject each of the recommendations in this report to a formal evaluation of cost effectiveness. Such an evaluation, properly done, would require considerable expertise in time and intensive work. This is a desirable objective, and it is hoped that both the recommendations contained herein and their consequences regarding potential resource utilization will eventually be the subject of a formal economic analysis.

Conclusion

The recommendations contained herein should be helpful to the practising physician and health care worker caring for post-MI patients. They should be viewed as guidelines only. Consensus represents an ongoing active process subject to continual revision. Because of the wealth of new, but as yet untested, information emerging, it is recommended that these guidelines be reviewed and updated approximately 2 years from the date of publication. When following these recommendations the physician should always exercise clinical judgement based on individual patient needs.

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