

## MYOCARDIAL INFARCTION

Myocardial infarction (MI) is caused by marked reduction/loss of blood flow through one or more of the coronary arteries, resulting in cardiac muscle ischemia and necrosis.

### CARE SETTING

Inpatient acute hospital, step-down, or medical unit.

### RELATED CONCERNS

Angina

Dysrhythmias

Heart failure: chronic

Psychosocial aspects of care

Thrombophlebitis: deep vein thrombosis

## Patient Assessment Database

### ACTIVITY/REST

**May report:** Weakness, fatigue, loss of sleep  
Sedentary lifestyle, sporadic exercise schedule

**May exhibit:** Tachycardia, dyspnea with rest/activity

### CIRCULATION

**May report:** History of previous MI, CAD, HF, hypertension, diabetes mellitus

**May exhibit:** BP may be normal, increased, or decreased; postural changes may be noted from lying to sitting/standing  
Pulse may be normal, full/bounding, or have a weak/thready quality with delayed capillary refill; irregularities (dysrhythmias) may be present  
Heart sounds S<sub>3</sub>/S<sub>4</sub> may reflect a pathological condition (e.g., cardiac failure, decreased ventricular contractility or compliance)  
Murmurs may reflect valvular insufficiency or papillary muscle dysfunction  
Friction rub (suggests pericarditis)  
Heart rate regular or irregular; tachycardia/bradycardia may be present  
Edema: Jugular vein distention, peripheral/dependent edema, generalized edema  
Color: Pallor or cyanosis/mottling of skin, nailbeds, mucous membranes, and lips may be noted

### EGO INTEGRITY

**May report:** Denial of significance of symptoms/presence of condition  
Fear of dying, feelings of impending doom  
Anger at inconvenience of illness/"unnecessary" hospitalization  
Worry about family, job, finances

**May exhibit:** Denial, withdrawal, anxiety, lack of eye contact  
Irritability, anger, combative behavior  
Focus on self/pain

### ELIMINATION

**May exhibit:** Normal or decreased bowel sounds

### FOOD/FLUID

**May report:** Nausea, loss of appetite, belching, indigestion/heartburn

**May exhibit:** Poor skin turgor; dry or diaphoretic skin  
Vomiting

## HYGIENE

**May report/exhibit:** Difficulty in performing self-care tasks

## NEUROSENSORY

**May report:** Dizziness, fainting spells in or out of bed (upright or at rest)

**May exhibit:** Changes in mentation  
Weakness

## PAIN/DISCOMFORT

**May report:** Sudden onset of chest pain unrelieved by rest or nitroglycerin (although most pain is deep and visceral, 20% of MIs are painless)  
Location: Typically anterior chest (substernal, precordium); may radiate to arms, jaw, face; may have atypical location such as epigastrium/abdomen; elbow, jaw, back, neck, between shoulder blades, severe sore throat; throat fullness (females)  
Quality: Crushing, constricting, viselike, squeezing, heavy, steady  
Intensity: Usually 10 on a scale of 0–10 or “worst pain ever experienced.” *Note:* Pain is sometimes absent in females, postoperative patients, those with prior stroke or heart failure, diabetes mellitus or hypertension, or the elderly. Studies indicate that up to one-third of persons experiencing MI do not have typical chest pain.

Precipitating factor: May/may not be associated with activity

**May exhibit:** Facial grimacing, changes in body posture, may place clenched fist on midsternum when describing pain  
Crying, groaning, squirming, stretching  
Withdrawal, lack of eye contact  
Autonomic responses: Changes in heart rate/rhythm, BP, respirations, skin color/moisture, level of consciousness

## RESPIRATION

**May report:** Dyspnea with/without exertion, nocturnal dyspnea  
Cough with/without sputum production  
History of smoking, chronic respiratory disease

**May exhibit:** Increased respiratory rate, shallow/labored breathing  
Pallor or cyanosis  
Breath sounds clear or crackles/wheezes  
Sputum clear, pink-tinged

## SOCIAL INTERACTION

**May report:** Recent stress, e.g., work, family  
Difficulty coping with recent/current stressors, e.g., money, work, family problems made worse by this illness/hospitalization

**May exhibit:** Difficulty resting quietly, overemotional responses (intense anger, fear)  
Withdrawal from family

## TEACHING/LEARNING

**May report:** Family history of heart disease/MI, diabetes, stroke, hypertension, peripheral vascular disease  
Use of tobacco

**Discharge plan** **DRG projected length of inpatient stay: 4.9–7.0 days (2–4 days/critical care unit [CCU])**

**considerations:** May require assistance with food preparation, shopping, transportation, homemaking/maintenance tasks; physical layout of home

## DIAGNOSTIC STUDIES

**ECG:** ST elevation signifying ischemia; peaked upright or inverted T wave indicating injury; development of Q waves signifying prolonged ischemia or necrosis.

**Cardiac enzymes and isoenzymes:** *CPK-MB (isoenzyme in cardiac muscle):* Elevates within 4–8 hr, peaks in 12–20 hr, returns to normal in 48–72 hr.

**LDH:** Elevates within 8–24 hr, peaks within 72–144 hr, and may take as long as 14 days to return to normal. An LDH<sub>1</sub> greater than LDH<sub>2</sub> (flipped ratio) helps confirm/diagnose MI if not detected in acute phase.

**Troponins:** Troponin I (cTnI) and troponin T (cTnT): Levels are elevated at 4–6 hr, peak at 14–18 hr, and return to baseline over 6–7 days. These enzymes have increased specificity for necrosis and are therefore useful in diagnosing postoperative MI when MB-CPK may be elevated related to skeletal trauma.

**Myoglobin:** A heme protein of small molecular weight that is more rapidly released from damaged muscle tissue with elevation within 2 hr after an acute MI, and peak levels occurring in 3–15 hr.

**Electrolytes:** Imbalances of sodium and potassium can alter conduction and compromise contractility.

**WBC:** Leukocytosis (10,000–20,000) usually appears on the second day after MI because of the inflammatory process.

**ESR:** Rises on second or third day after MI, indicating inflammatory response.

**Chemistry profiles:** May be abnormal, depending on acute/chronic abnormal organ function/perfusion.

**ABGs/pulse oximetry:** May indicate hypoxia or acute/chronic lung disease processes.

**Lipids (total lipids, HDL, LDL, VLDL, total cholesterol, triglycerides, phospholipids):** Elevations may reflect arteriosclerosis as a cause for coronary narrowing or spasm.

**Chest x-ray:** May be normal or show an enlarged cardiac shadow suggestive of HF or ventricular aneurysm.

**Two-dimensional echocardiogram:** May be done to determine dimensions of chambers, septal/ventricular wall motion, ejection fraction (blood flow), and valve configuration/function.

**Nuclear imaging studies: Persantine or Thallium:** Evaluates myocardial blood flow and status of myocardial cells, e.g., location/extent of acute/previous MI.

**Cardiac blood imaging/MUGA:** Evaluates specific and general ventricular performance, regional wall motion, and ejection fraction.

**Technetium:** Accumulates in ischemic cells, outlining necrotic area(s).

**Coronary angiography:** Visualizes narrowing/occlusion of coronary arteries and is usually done in conjunction with measurements of chamber pressures and assessment of left ventricular function (ejection fraction). Procedure is not usually done in acute phase of MI unless angioplasty or emergency heart surgery is imminent.

**Digital subtraction angiography (DSA):** Technique used to visualize status of arterial bypass grafts and to detect peripheral artery disease.

**Magnetic resonance imaging (MRI):** Allows visualization of blood flow, cardiac chambers/intraventricular septum, valves, vascular lesions, plaque formations, areas of necrosis/infarction, and blood clots.

**Exercise stress test:** Determines cardiovascular response to activity (often done in conjunction with thallium imaging in the recovery phase).

## NURSING PRIORITIES

1. Relieve pain, anxiety.
2. Reduce myocardial workload.
3. Prevent/detect and assist in treatment of life-threatening dysrhythmias or complications.
4. Promote cardiac health, self-care.

## DISCHARGE GOALS

1. Chest pain absent/controlled.
2. Heart rate/rhythm sufficient to sustain adequate cardiac output/tissue perfusion.
3. Achievement of activity level sufficient for basic self-care.
4. Anxiety reduced/managed.
5. Disease process, treatment plan, and prognosis understood.
6. Plan in place to meet needs after discharge.

**NURSING DIAGNOSIS: Pain, acute**

**May be related to**

Tissue ischemia (coronary artery occlusion)

**Possibly evidenced by**

Reports of chest pain with/without radiation

Facial grimacing

Restlessness, changes in level of consciousness

Changes in pulse, BP

**DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:**

**Pain Level (NOC)**

Verbalize relief/control of chest pain within appropriate time frame for administered medications.

Display reduced tension, relaxed manner, ease of movement.

**Pain Control (NOC)**

Demonstrate use of relaxation techniques.

ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Pain Management (NIC)</b></p> <p><b>Independent</b></p> <p>Monitor/document characteristics of pain, noting verbal reports, nonverbal cues (e.g., moaning, crying, restlessness, diaphoresis, clutching chest, rapid breathing), and hemodynamic response (BP/heart rate changes).</p> <p>Obtain full description of pain from patient including location, intensity (0–10), duration, characteristics(dull/crushing), and radiation. Assist patient to quantify pain by comparing it to other experiences.</p> <p>Review history of previous angina, anginal equivalent, or MI pain. Discuss family history if pertinent.</p> <p>Instruct patient to report pain immediately.</p> <p>Provide quiet environment, calm activities, and comfort measures (e.g., dry/wrinkle-free linens, backrub). Approach patient calmly and confidently.</p>	<p>Variation of appearance and behavior of patients in pain may present a challenge in assessment. Most patients with an acute MI appear ill, distracted, and focused on pain. Verbal history and deeper investigation of precipitating factors should be postponed until pain is relieved. Respirations may be increased as a result of pain and associated anxiety; release of stress-induced catecholamines increases heart rate and BP.</p> <p>Pain is a subjective experience and must be described by patient. Provides baseline for comparison to aid in determining effectiveness of therapy, resolution/progression of problem.</p> <p>May differentiate current pain from preexisting patterns, as well as identify complications such as extension of infarction, pulmonary embolus, or pericarditis.</p> <p>Delay in reporting pain hinders pain relief/may require increased dosage of medication to achieve relief. In addition, severe pain may induce shock by stimulating the sympathetic nervous system, thereby creating further damage and interfering with diagnostics and relief of pain.</p> <p>Decreases external stimuli, which may aggravate anxiety and cardiac strain, limit coping abilities and adjustment to current situation.</p>

ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Pain Management (NIC)</b></p> <p><b>Independent</b></p> <p>Assist/instruct in relaxation techniques, e.g., deep/slow breathing, distraction behaviors, visualization, guided imagery.</p> <p>Check vital signs before and after narcotic medication.</p> <p><b>Collaborative</b></p> <p>Administer supplemental oxygen by means of nasal cannula or face mask, as indicated.</p> <p>Administer medications as indicated:</p> <ul style="list-style-type: none"> <li>Antianginals, e.g., nitroglycerin (Nitro-Bid, Nitrostat, Nitro-Dur), isosorbide denitrate (Isordil), mononitrate (Imdur)</li> <li>Beta-blockers, e.g., atenolol (Tenormin), pindolol (Visken), propranolol (Inderal), nadolol (Corgard), metoprolol (Lopressor)</li> <li>Analgesics, e.g., morphine, meperidine (Demerol)</li> </ul>	<p>Helpful in decreasing perception of/ response to pain. Provides a sense of having some control over the situation, increase in positive attitude.</p> <p>Hypotension/respiratory depression can occur as a result of narcotic administration. These problems may increase myocardial damage in presence of ventricular insufficiency.</p> <p>Increases amount of oxygen available for myocardial uptake and thereby may relieve discomfort associated with tissue ischemia.</p> <p>Nitrates are useful for pain control by coronary vasodilating effects, which increase coronary blood flow and myocardial perfusion. Peripheral vasodilation effects reduce the volume of blood returning to the heart (preload), thereby decreasing myocardial workload and oxygen demand.</p> <p>Important second-line agents for pain control through effect of blocking sympathetic stimulation, thereby reducing heart rate, systolic BP, and myocardial oxygen demand. May be given alone or with nitrates. <i>Note:</i> beta-blockers may be contraindicated if myocardial contractility is severely impaired, because negative inotropic properties can further reduce contractility.</p> <p>Although intravenous (IV) morphine is the usual drug of choice, other injectable narcotics may be used in acute-phase/recurrent chest pain unrelieved by nitroglycerin to reduce severe pain, provide sedation, and decrease myocardial workload. IM injections should be avoided, if possible, because they can alter the CPK diagnostic indicator and are not well absorbed in underperfused tissue.</p>

**NURSING DIAGNOSIS: Activity intolerance**

**May be related to**

Imbalance between myocardial oxygen supply and demand  
Presence of ischemia/necrotic myocardial tissues  
Cardiac depressant effects of certain drugs (beta-blockers, antidysrhythmics)

**Possibly evidenced by**

Alterations in heart rate and BP with activity  
Development of dysrhythmias  
Changes in skin color/moisture  
Exertional angina  
Generalized weakness

**DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:**

**Activity Tolerance (NOC)**

Demonstrate measurable/progressive increase in tolerance for activity with heart rate/rhythm and BP within patient's normal limits and skin warm, pink, dry.  
Report absence of angina with activity.

ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Energy Management (NIC)</b></p> <p><b>Independent</b></p> <p>Record/document heart rate and rhythm and BP changes before, during, and after activity, as indicated. Correlate with reports of chest pain/shortness of breath. (Refer to ND: Cardiac Output, risk for decreased.)</p> <p>Encourage rest (bed/chair) initially. Thereafter, limit activity on basis of pain/ adverse cardiac response. Provide nonstress diversional activities.</p> <p>Instruct patient to avoid increasing abdominal pressure, e.g., straining during defecation.</p> <p>Explain pattern of graded increase of activity level, e.g., getting up to commode or sitting in chair, progressive ambulation, and resting after meals.</p> <p>Review signs/symptoms reflecting intolerance of present activity level or requiring notification of nurse/physician.</p>	<p>Trends determine patient's response to activity and may indicate myocardial oxygen deprivation that may require decrease in activity level/return to bedrest, changes in medication regimen, or use of supplemental oxygen.</p> <p>Reduces myocardial workload/oxygen consumption, reducing risk of complications (e.g., extension of MI). <i>Note:</i> American Heart Association/American College of Cardiology guidelines (1996) suggest that patients with cardiac conditions should not be kept in bed longer than 24 hr. Patients with uncomplicated MI are encouraged to engage in mild activity out of bed, including short walks 12 hr after incident.</p> <p>Activities that require holding the breath and bearing down (Valsalva maneuver) can result in bradycardia (temporarily reduced cardiac output) and rebound tachycardia with elevated BP.</p> <p>Progressive activity provides a controlled demand on the heart, increasing strength and preventing overexertion.</p> <p>Palpitations, pulse irregularities, development of chest pain, or dyspnea may indicate need for changes in exercise regimen or medication.</p>
<p><b>Collaborative</b></p> <p>Refer to cardiac rehabilitation program.</p>	<p>Provides continued support/additional supervision and participation in recovery and wellness process.</p>

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<p><b>NURSING DIAGNOSIS: Anxiety [specify level]/Fear</b></p> <p><b>May be related to</b></p> <p>Threat to or change in health and socioeconomic status          Threat of loss/death          Unconscious conflict about essential values, beliefs, and goals of life          Interpersonal transmission/contagion</p> <p><b>Possibly evidenced by</b></p> <p>Fearful attitude          Apprehension, increased tension, restlessness, facial tension          Uncertainty, feelings of inadequacy          Somatic complaints/sympathetic stimulation          Focus on self, expressions of concern about current and future events          Fight (e.g., belligerent attitude) or flight behavior</p> <p><b>DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:</b></p> <p><b>Anxiety/Fear Control (NOC)</b></p> <p>Recognize feelings.          Identify causes, contributing factors.          Verbalize reduction of anxiety/fear.          Demonstrate positive problem-solving skills.          Identify/use resources appropriately.</p>
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ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Anxiety Reduction (NIC)</b></p> <p><b>Independent</b></p> <p>Identify and acknowledge patient’s perception of threat/situation. Encourage expressions of, and do not deny feelings of, anger, grief, sadness, fear.</p> <p>Note presence of hostility, withdrawal, and/or denial (inappropriate affect or refusal to comply with medical regimen).</p> <p>Maintain confident manner (without false reassurance).</p> <p>Observe for verbal/nonverbal signs of anxiety, and stay with patient. Intervene if patient displays destructive behavior.</p>	<p>Coping with the pain and emotional trauma of an MI is difficult. Patient may fear death and/or be anxious about immediate environment. Ongoing anxiety (related to concerns about impact of heart attack on future lifestyle, matters left unattended/unresolved, and effects of illness on family) may be present in varying degrees for some time and may be manifested by symptoms of depression.</p> <p>Research into survival rates between type A and type B individuals and the impact of denial has been ambiguous; however, studies show some correlation between degree/ expression of anger or hostility and an increased risk for MI.</p> <p>Patient and SO can be affected by the anxiety/uneasiness displayed by health team members. Honest explanations can alleviate anxiety.</p> <p>Patient may not express concern directly, but words/actions may convey sense of agitation, aggression, and hostility. Intervention can help patient regain control of own behavior.</p>

ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Anxiety Reduction (NIC)</b></p> <p><b>Independent</b></p> <p>Accept but do not reinforce use of denial. Avoid confrontations.</p> <p>Orient patient/SO to routine procedures and expected activities. Promote participation when possible.</p> <p>Answer all questions factually. Provide consistent information; repeat as indicated.</p> <p>Encourage patient/SO to communicate with one another, sharing questions and concerns.</p> <p>Provide privacy for patient and SO.</p> <p>Provide rest periods/uninterrupted sleep time, quiet surroundings, with patient controlling type, amount of external stimuli.</p> <p>Support normality of grieving process, including time necessary for resolution.</p> <p>Encourage independence, self-care, and decision making within accepted treatment plan.</p> <p>Encourage discussion about postdischarge expectations.</p>	<p>Denial can be beneficial in decreasing anxiety but can postpone dealing with the reality of the current situation. Confrontation can promote anger and increase use of denial, reducing cooperation and possibly impeding recovery.</p> <p>Predictability and information can decrease anxiety for patient.</p> <p>Accurate information about the situation reduces fear, strengthens nurse-patient relationship, and assists patient/SO to deal realistically with situation. Attention span may be short, and repetition of information helps with retention.</p> <p>Sharing information elicits support/comfort and can relieve tension of unexpressed worries.</p> <p>Allows needed time for personal expression of feelings; may enhance mutual support and promote more adaptive behaviors.</p> <p>Conserves energy and enhances coping abilities.</p> <p>Can provide reassurance that feelings are normal response to situation/perceived changes.</p> <p>Increased independence from staff promotes self-confidence and reduces feelings of abandonment that can accompany transfer from coronary unit/discharge from hospital.</p> <p>Helps patient/SO identify realistic goals, thereby reducing risk of discouragement in face of the reality of limitations of condition/pace of recuperation.</p>
<p><b>Collaborative</b></p> <p>Administer antianxiety/hypnotics as indicated, e.g., alprazolam (Xanax), diazepam (Valium), lorazepam (Ativan), flurazepam (Dalmane).</p>	<p>Promotes relaxation/rest and reduces feelings of anxiety.</p>

**NURSING DIAGNOSIS: Cardiac Output, risk for decreased**

**Risk factors may include**

Changes in rate, rhythm, electrical conduction  
Reduced preload/increased SVR  
Infarcted/dyskinetic muscle, structural defects, e.g., ventricular aneurysm, septal defects

**Possibly evidenced by**

[Not applicable; presence of signs and symptoms establishes *actual* diagnosis.]

**DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:**

**Cardiac Pump Effectiveness (NOC)**

Maintain hemodynamic stability, e.g., BP, cardiac output within normal range, adequate urinary output, decreased frequency/absence of dysrhythmias.  
Report decreased episodes of dyspnea, angina.  
Demonstrate an increase in activity tolerance.

ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Cardiac Care: Acute (NIC)</b></p> <p><b>Independent</b></p> <p>Auscultate BP. Compare both arms and obtain lying, sitting, and standing pressures when able.</p> <p>Evaluate quality and equality of pulses, as indicated.</p> <p>Auscultate heart sounds:     Note development of S<sub>3</sub>, S<sub>4</sub>;</p> <p>    Presence of murmurs/rubs.</p> <p>Auscultate breath sounds.</p>	<p>Hypotension may occur related to ventricular dysfunction, hypoperfusion of the myocardium, and vagal stimulation. However, hypertension is also a common phenomenon, possibly related to pain, anxiety, catecholamine release, and/or preexisting vascular problems. Orthostatic (postural) hypotension may be associated with complications of infarct, e.g., HF.</p> <p>Decreased cardiac output results in diminished weak/thready pulses. Irregularities suggest dysrhythmias, which may require further evaluation/monitoring.</p> <p>S<sub>3</sub> is usually associated with HF, but it may also be noted with the mitral insufficiency (regurgitation) and left ventricular overload that can accompany severe infarction. S<sub>4</sub> may be associated with myocardial ischemia, ventricular stiffening, and pulmonary or systemic hypertension.</p> <p>Indicates disturbances of normal blood flow within the heart, e.g., incompetent valve, septal defect, or vibration of papillary muscle/chordae tendineae (complication of MI). Presence of rub with an infarction is also associated with inflammation, e.g., pericardial effusion and pericarditis.</p> <p>Crackles reflecting pulmonary congestion may develop because of depressed myocardial function.</p>

ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Cardiac Care: Acute (NIC)</b></p> <p><b>Independent</b></p> <p>Monitor heart rate and rhythm. Document dysrhythmias via telemetry.</p> <p>Note response to activity and promote rest appropriately. (Refer to ND: Activity intolerance.)</p> <p>Provide small/easily digested meals. Limit caffeine intake, e.g., coffee, chocolate, cola.</p> <p>Have emergency equipment/medications available.</p>	<p>Heart rate and rhythm respond to medication, activity, and developing complications. Dysrhythmias (especially premature ventricular contractions or progressive heart blocks) can compromise cardiac function or increase ischemic damage. Acute or chronic atrial flutter/fibrillation may be seen with coronary artery or valvular involvement and may or may not be pathological.</p> <p>Overexertion increases oxygen consumption/demand and can compromise myocardial function.</p> <p>Large meals may increase myocardial workload and cause vagal stimulation, resulting in bradycardia/ectopic beats. Caffeine is a direct cardiac stimulant that can increase heart rate. <i>Note:</i> New guidelines suggest no need to restrict caffeine in regular coffee drinkers.</p> <p>Sudden coronary occlusion, lethal dysrhythmias, extension of infarct, and unrelenting pain are situations that may precipitate cardiac arrest, requiring immediate life-saving therapies/transfer to CCU.</p>
<p><b>Collaborative</b></p> <p>Administer supplemental oxygen, as indicated.</p> <p>Measure cardiac output and other functional parameters as appropriate.</p> <p>Maintain IV/Hep-Lock access as indicated.</p> <p>Review serial ECGs.</p> <p>Review chest x-ray.</p> <p>Monitor laboratory data, e.g., cardiac enzymes, ABGs, electrolytes.</p>	<p>Increases amount of oxygen available for myocardial uptake, reducing ischemia and resultant cellular irritation/dysrhythmias.</p> <p>Cardiac index, preload/afterload, contractility, and cardiac work can be measured noninvasively with thoracic electrical bioimpedance (TEB) technique. Useful in evaluating response to therapeutic interventions and identifying need for more aggressive/emergency care.</p> <p>Patent line is important for administration of emergency drugs in presence of persistent lethal dysrhythmias or chest pain.</p> <p>Provides information regarding progression/resolution of infarction, status of ventricular function, electrolyte balance, and effects of drug therapies.</p> <p>May reflect pulmonary edema related to ventricular dysfunction.</p> <p>Enzymes monitor resolution/extension of infarction. Presence of hypoxia indicates need for supplemental oxygen. Electrolyte imbalance, e.g., hypokalemia/hyperkalemia, adversely affects cardiac rhythm/contractility.</p>

ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Cardiac Care: Acute (NIC)</b></p> <p><b>Collaborative</b></p> <p>Administer antidysrhythmic drugs as indicated. (Refer to CP: Dysrhythmias.)</p> <p>Assist with insertion/maintain pacemaker, when used.</p>	<p>Dysrhythmias are usually treated symptomatically, except for PVCs, which are often treated prophylactically. Early inclusion of ACE inhibitor therapy (especially in presence of large anterior MI, ventricular aneurysm, or HF) enhances ventricular output, increases survival, and may slow progression of HF. <i>Note:</i> Use of routine lidocaine is no longer recommended.</p> <p>Pacing may be a temporary support measure during acute phase or may be needed permanently if infarction severely damages conduction system, impairing systolic function. Evaluation is based on echocardiography or radionuclide ventriculography.</p>

<p><b>NURSING DIAGNOSIS: Tissue Perfusion, ineffective</b></p> <p><b>Risk factors may include</b> Reduction/interruption of blood flow, e.g., vasoconstriction, hypovolemia/shunting, and thromboembolic formation</p> <p><b>Possibly evidenced by</b> [Not applicable; presence of signs and symptoms establishes an <i>actual</i> diagnosis.]</p> <p><b>DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:</b></p> <p><b>Cardiac Pump Effectiveness (NOC)</b> Demonstrate adequate perfusion as individually appropriate, e.g., skin warm and dry, peripheral pulses present/strong, vital signs within patient’s normal range, patient alert/oriented, balanced I&amp;O, absence of edema, free of pain/discomfort.</p>
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ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Hemodynamic Regulation (NIC)</b></p> <p><b>Independent</b></p> <p>Investigate sudden changes or continued alterations in mentation, e.g., anxiety, confusion, lethargy, stupor.</p> <p>Inspect for pallor, cyanosis, mottling, cool/clammy skin. Note strength of peripheral pulse.</p>	<p>Cerebral perfusion is directly related to cardiac output and is also influenced by electrolyte/acid-base variations, hypoxia, and systemic emboli.</p> <p>Systemic vasoconstriction resulting from diminished cardiac output may be evidenced by decreased skin perfusion and diminished pulses. (Refer to ND: Cardiac Output, risk for decreased, p. 000.)</p>

ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Hemodynamic Regulation (NIC)</b></p> <p><b>Independent</b></p> <p>Monitor respirations, note work of breathing.</p> <p>Monitor intake, note changes in urine output. Record urine specific gravity as indicated.</p> <p>Assess GI function, noting anorexia, decreased/absent bowel sounds, nausea/vomiting, abdominal distension, constipation.</p> <p><b>Circulatory Care: Venous Insufficiency (NIC)</b></p> <p>Encourage active/passive leg exercises, avoidance of isometric exercises.</p> <p>Assess for Homans' sign (pain in calf on dorsiflexion), erythema, edema.</p> <p>Instruct patient in application/periodic removal of antiembolic hose, when used.</p>	<p>Cardiac pump failure and/or ischemic pain may precipitate respiratory distress; however, sudden/continued dyspnea may indicate thromboembolic pulmonary complications.</p> <p>Decreased intake/persistent nausea may result in reduced circulating volume, which negatively affects perfusion and organ function. Specific gravity measurements reflect hydration status and renal function.</p> <p>Reduced blood flow to mesentery can produce GI dysfunction, e.g., loss of peristalsis. Problems may be potentiated/aggravated by use of analgesics, decreased activity, and dietary changes.</p> <p>Enhances venous return, reduces venous stasis, and decreases risk of thrombophlebitis; however, isometric exercises can adversely affect cardiac output by increasing myocardial work and oxygen consumption.</p> <p>Indicators of deep vein thrombosis (DVT), although DVT can be present without a positive Homans' sign.</p> <p>Limits venous stasis, improves venous return, and reduces risk of thrombophlebitis in patient who is limited in activity.</p>
<p><b>Hemodynamic Regulation (NIC)</b></p> <p><b>Collaborative</b></p> <p>Monitor laboratory data, e.g., ABGs, BUN, creatinine, electrolytes, coagulation studies (PT, aPTT, clotting times).</p> <p>Administer medications as indicated:</p> <p>    Antiplatelet agents, e.g., aspirin, abciximab (ReoPro), clopidogrel (Plavix);</p> <p>    Anticoagulants, e.g., heparin/enoxaparin (Lovenox);</p> <p>    Oral anticoagulants, e.g., anisindione (Miradon), warfarin (Coumadin);</p> <p>    Cimetidine (Tagamet), ranitidine (Zantac), antacids;</p>	<p>Indicators of organ perfusion/function. Abnormalities in coagulation may occur as a result of therapeutic measures (e.g., heparin/Coumadin use and some cardiac drugs).</p> <p>Reduces mortality in MI patients, and is taken daily. Aspirin also reduces coronary reocclusion after percutaneous transluminal coronary angioplasty (PTCA). ReoPro is an IV drug used as an adjunct to PTCA for prevention of acute ischemic complications.</p> <p>Low-dose heparin is given during PTCA and may be given prophylactically in high-risk patients (e.g., atrial fibrillation, obesity, ventricular aneurysm, or history of thrombophlebitis) to reduce risk of thrombophlebitis or mural thrombus formation.</p> <p>Used for prophylaxis and treatment of thromboembolic complications associated with MI.</p> <p>Reduces or neutralizes gastric acid, preventing discomfort and gastric irritation, especially in presence of reduced</p>

	mucosal circulation.
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ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Hemodynamic Regulation (NIC)</b></p> <p><b>Collaborative</b></p> <p>Assist with reperfusion therapy:</p> <p>Administer thrombolytic agents, e.g., alteplase (Activase, rt-PA), reteplase (Retavase), streptokinase (Streptase), anistreplase (Eminase), urokinase, (Abbokinase);</p> <p>Prepare for PTCA (balloon angioplasty), with/without intracoronary stents;</p> <p>Transfer to critical care.</p>	<p>Thrombolytic therapy is the treatment of choice (when initiated within 6 hr) to dissolve the clot (if that is the cause of the MI) and restore perfusion of the myocardium.</p> <p>This procedure is used to open partially blocked coronary arteries before they become totally blocked. The mechanism includes a combination of vessel stretching and plaque compression. Intracoronary stents may be placed at the time of PTCA to provide structural support within the coronary artery and improve the odds of long-term patency.</p> <p>More intensive monitoring and aggressive interventions are necessary to promote optimum outcome.</p>

<p><b>NURSING DIAGNOSIS: Fluid Volume, risk for excess</b></p> <p><b>Risk factors may include</b></p> <p>Decreased organ perfusion (renal)</p> <p>Increased sodium/water retention</p> <p>Increased hydrostatic pressure or decreased plasma proteins (sequestering of fluid in interstitial space/tissues)</p> <p><b>Possibly evidenced by</b></p> <p>[Not applicable; presence of signs and symptoms establishes an <i>actual</i> diagnosis.]</p> <p><b>DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:</b></p> <p><b>Fluid Balance (NOC)</b></p> <p>Maintain fluid balance as evidenced by BP within patient's normal limits.</p> <p>Be free of peripheral/venous distension and dependent edema, with lungs clear and weight stable.</p>
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ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Fluid Management (NIC)</b></p> <p><b>Independent</b></p> <p>Auscultate breath sounds for presence of crackles.</p> <p>Note JVD, development of dependent edema.</p>	<p>May indicate pulmonary edema secondary to cardiac decompensation.</p> <p>Suggests developing congestive failure/fluid volume excess.</p>

ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Fluid Management (NIC)</b></p> <p><b>Independent</b></p> <p>Measure I&amp;O, noting decrease in output, concentrated appearance. Calculate fluid balance.</p> <p>Weigh daily.</p> <p>Maintain total fluid intake at 2000 mL/24 hr within cardiovascular tolerance.</p> <p><b>Collaborative</b></p> <p>Provide low-sodium diet/beverages.</p> <p>Administer diuretics, e.g., furosemide (Lasix), spironolactone with hydrochlorothiazide (Aldactazide), hydralazine (Apresoline).</p> <p>Monitor potassium as indicated.</p>	<p>Decreased cardiac output results in impaired kidney perfusion, sodium/water retention, and reduced urine output.</p> <p>Sudden changes in weight reflect alterations in fluid balance.</p> <p>Meets normal adult body fluid requirements, but may require alteration/restriction in presence of cardiac decompensation.</p> <p>Sodium enhances fluid retention and should therefore be restricted during active MI phase and/or if heart failure is present.</p> <p>May be necessary to correct fluid overload. Drug choice is usually dependent on acute/chronic nature of symptoms.</p> <p>Hypokalemia can limit effectiveness of therapy and can occur with use of potassium-depleting diuretics.</p>

<p><b>NURSING DIAGNOSIS: Knowledge, deficient [Learning Need] regarding cause/treatment of condition, self-care, and discharge needs</b></p> <p><b>May be related to</b></p> <ul style="list-style-type: none"> <li>Lack of information/misunderstanding of medical condition/therapy needs</li> <li>Unfamiliarity with information resources</li> <li>Lack of recall</li> </ul> <p><b>Possibly evidenced by</b></p> <ul style="list-style-type: none"> <li>Questions; statement of misconception</li> <li>Failure to improve on previous regimen</li> <li>Development of preventable complications</li> </ul> <p><b>DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:</b></p> <p><b>Knowledge: Disease Process (NOC)</b></p> <ul style="list-style-type: none"> <li>Verbalize understanding of condition, potential complications, individual risk factors, and function of pacemaker (if used).</li> <li>Relate signs of pacemaker failure.</li> </ul> <p><b>Knowledge: Treatment Regimen (NOC)</b></p> <ul style="list-style-type: none"> <li>Verbalize understanding of therapeutic regimen.</li> <li>List desired action and possible adverse side effects of medications.</li> <li>Correctly perform necessary procedures and explain reasons for actions.</li> </ul>
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ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Teaching: Individual (NIC)</b></p> <p><b>Independent</b></p> <p>Assess patient/SO level of knowledge and ability/desire to learn.</p> <p>Be alert to signs of avoidance, e.g., changing subject away from information being presented or extremes of behavior (withdrawal/euphoria).</p> <p>Present information in varied learning formats, e.g., programmed books, audiovisual tapes, question-and-answer sessions, group activities.</p>	<p>Necessary for creation of individual instruction plan. Reinforces expectation that this will be a “learning experience.” Verbalization identifies misunderstandings and allows for clarification.</p> <p>Natural defense mechanisms, such as anger or denial of significance of situation, can block learning, affecting patient’s response and ability to assimilate information. Changing to a less formal/structured style may be more effective until patient/SO is ready to accept/deal with current situation.</p> <p>Using multiple learning methods enhances retention of material.</p>
<p><b>Cardiac Care: Rehabilitation (NIC)</b></p> <p><b>Independent</b></p> <p>Reinforce explanations of risk factors, dietary/activity restrictions, medications, and symptoms requiring immediate medical attention.</p> <p>Encourage identification/reduction of individual risk factors, e.g., smoking/alcohol consumption, obesity.</p> <p>Warn against isometric activity, Valsalva maneuver, and activities requiring arms positioned above head.</p> <p>Review programmed increases in levels of activity. Educate patient regarding gradual resumption of activities, e.g., walking, work, recreational and sexual activity. Provide guidelines for gradually increasing activity and instruction regarding target heart rate and pulse taking, as appropriate.</p> <p>Identify alternative activities for “bad weather” days, such as measured walking in house or shopping mall.</p> <p>Review signs/symptoms requiring reduction in activity and notification of healthcare provider. Differentiate between increased heart rate that normally occurs during various activities and worsening signs of cardiac stress (e.g., chest pain, dyspnea, palpitations, increased heart rate lasting more than 15 min after cessation of activity, excessive fatigue the following day).</p>	<p>Provides opportunity for patient to retain information and to assume control/participate in rehabilitation program. <i>Note:</i> Routine use of supplements/herbal remedies (e.g., ginkgo biloba, garlic, vitamin E) can result in alterations in blood clotting, especially when anticoagulant/ASA therapy is prescribed.</p> <p>These behaviors/chemicals have direct adverse effects on cardiovascular function and may impede recovery, increase risk for complications.</p> <p>These activities greatly increase cardiac workload and myocardial oxygen consumption and may adversely affect myocardial contractility/output.</p> <p>Gradual increase in activity increases strength and prevents overexertion, may enhance collateral circulation, and allows return to normal lifestyle. <i>Note:</i> Sexual activity can be safely resumed once patient can accomplish activity equivalent to climbing two flights of stairs without adverse cardiac effects.</p> <p>Provides for continuing daily activity program.</p> <p>Pulse elevations beyond established limits, development of chest pain, or dyspnea may require changes in exercise and medication regimen.</p>

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ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Cardiac Care: Rehabilitation (NIC)</b></p> <p><b>Independent</b></p> <p>Stress importance of follow-up care, and identify community resources/support groups, e.g., cardiac rehabilitation programs, “coronary clubs,” smoking cessation clinics.</p> <p>Emphasize importance of contacting physician if chest pain, change in anginal pattern, or other symptoms recur.</p> <p>Stress importance of reporting development of fever in association with diffuse/atypical chest pain (pleural, pericardial) and joint pain.</p> <p>Encourage patient/SO to share concerns/feelings. Discuss signs of pathological depression versus transient feelings frequently associated with major life events. Recommend seeking professional help if depressed feelings persist.</p>	<p>Reinforces that this is an ongoing/continuing health problem for which support/assistance is available after discharge. <i>Note:</i> After discharge, patients encounter limitations in physical functioning and often incur difficulty with emotional, social, and role functioning requiring ongoing support.</p> <p>Timely evaluation/intervention may prevent complications.</p> <p>Post-MI complication of pericardial inflammation (Dressler’s syndrome) requires further medical evaluation/intervention.</p> <p>Depressed patients have a greater risk of dying 6–18 mo following a heart attack. Timely intervention may be beneficial. <i>Note:</i> Selective serotonin reuptake inhibitors (SSRIs), e.g., paroxetine (Paxil), have been found to be as effective as tricyclic antidepressants but with significantly fewer adverse cardiac complications.</p>

**POTENTIAL CONSIDERATIONS following discharge from care setting (dependent on patient’s age, physical condition/presence of complications, personal resources, and life responsibilities)**

- Activity intolerance —imbalance between myocardial oxygen supply/demand.
- Grieving, anticipatory—perceived loss of general well-being, required changes in lifestyle, confronting mortality.
- Decisional Conflict (treatment)—multiple/divergent sources of information, perceived threat to value system, support system deficit.
- Family Processes, interrupted—situational transition and crisis.
- Home Management, impaired—altered ability to perform tasks, inadequate support systems, reluctance to request assistance.