



**Advanced
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Clinical Guidelines in Primary Care: A Reference and Review Book

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CARDIOVASCULAR DISORDERS

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**Denotes pediatric diagnosis*

CONSULTATION/REFERRAL

- Referral to cardiologist for children with significant or severe hypertension
- Refer as needed for secondary causes of hypertension

FOLLOW-UP

- Inquire about compliance, side effects
- Monthly, until patient reaches goal; then every 3-6 months as appropriate

EXPECTED COURSE

- Only 25% of patients who are treated for hypertension are actually at goal; expect complications if inadequately managed
- Most patients require more than one medication to reach goal

POSSIBLE COMPLICATIONS

- Stroke
- Coronary artery disease
- Myocardial infarction
- Renal failure
- Heart failure
- Eclampsia (seizures)
- Pulmonary edema
- Hypertensive crisis

CHRONIC HEART FAILURE

DESCRIPTION

The heart is unable to meet the metabolic demands of the tissues. The left heart, right heart or both may be involved. Patients are classified using the New York Heart Association's (NYHA) classification system.

- ◇ Cardiomyopathy
- ◇ Coronary artery disease
- ◇ Cardiac drugs
- ◇ Arrhythmias (especially atrial fibrillation)
- ◇ Valvular abnormalities
- ◇ Hyperthyroidism/hypothyroidism

New York Heart Association Functional Classification	
Class I (none)	physical activity does not cause limitations
Class II (slight)	physical activity brings about "slight limitation" (fatigue, palpitations, dyspnea, anginal pain)
Class III (moderate)	physical activity brings about "marked limitations"; symptoms brought about by "less than ordinary activity"
Class IV (severe)	unable to participate in any physical activity without discomfort; symptoms at rest

Source: New York Heart Association Classification for CHF

INCIDENCE

- Depends on etiology
- Males > Females until age 75 years, then Males = Females
- More common in the elderly
- Most frequent cause of hospitalization in the U.S.

RISK FACTORS

ETIOLOGY

- Systolic and/or diastolic failure due to:
 - ◇ Left ventricular dysfunction
 - ◇ Volume overload
 - ◇ Myocardial infarction

- Underlying heart disease
- Noncompliance with medication and/or dietary modifications
- Pregnancy or postpartum cardiomyopathy
- Fluid or sodium excess
- Hyperthyroidism
- Long-standing hypertension
- Use of negative inotropic medications

ASSESSMENT FINDINGS

Mild failure symptoms	Crackles in lung bases S3 gallop Jugular vein distention Dyspnea on exertion Nocturia Tachycardia Diminished exercise capacity Fatigue and/or weakness Peripheral edema Weight gain
Moderate failure symptoms	Cough, especially nocturnal Crackles in lung bases Paroxysmal nocturnal dyspnea Tachypnea/shortness of breath (especially at rest) Tachycardia Hepatomegaly/ascites Edema (extremities, presacral, and scrotal)
Severe failure symptoms	Ascites Cyanosis Decreased level of consciousness Frothy sputum and/or pink sputum Hypotension

DIFFERENTIAL DIAGNOSIS

- Chronic obstructive pulmonary disease
- Asthma
- Cirrhosis
- Peripheral vascular disease with edema
- Dependent edema
- Pulmonary embolism

DIAGNOSTIC STUDIES

- Diagnosis can be made on clinical presentation but diagnostic studies may indicate complications
- BNP (B type natriuretic peptide): > 100 pg/mL (other conditions can elevate BNP levels e.g., renal failure, acute coronary syndromes, pulmonary embolism)
- Transthoracic echo and 2-D Doppler flow studies: mechanically evaluate heart and establish ejection fraction; if < 35-40%, then HF (best test for initial workup of HF)
- 12 lead EKG: assesses for arrhythmias, left ventricular hypertrophy, atrial arrhythmias, recent myocardial infarction
- Chest x-ray: establishes heart size, presence of pulmonary edema, pulmonary disease
- CBC: assesses anemia, infection
- Electrolytes: potassium, calcium, sodium, magnesium

- BUN/Creatinine: elevated Cr indicates renal failure and volume overload
- Urinalysis: proteinuria (less than one gram present)

PREVENTION

- Appropriate management of underlying conditions that can lead to CHF
- Compliance with medications and dietary modifications

NONPHARMACOLOGIC MANAGEMENT

- Surgery for underlying valve problems or other correctable etiologies
- Avoid smoking, alcohol
- Sodium restriction
- Fluid restriction when appropriate
- Daily weights for early identification of fluid overload
- Patient education regarding self-care, medication, diet, exercise, disease process
- Encourage exercise except in severe disease
- Consider evaluation for sleep apnea (if present, high pulmonary artery pressures evolve into pulmonary hypertension)

SPECIAL PHARMACOLOGICAL CONSIDERATIONS

- Most patients are managed on a combination of 3-4 drugs
- Mainstay of therapy is β -blockers and ACE inhibitors or ARBs
- Symptom relief may take several weeks once drug therapy begins
- Diuretics will provide quickest relief from HF symptoms but should be used in combination with other drugs
- Monitor potassium levels in patients taking diuretics and ACE inhibitors
- Monitor renal function and potassium 1-2 weeks after initiating ACE inhibitor, after dose increases; then periodically
- Initiate β -blockers at very low doses in a stable patient without evidence of fluid overload
- Do not initiate β -blockers or ACE inhibitors if systolic BP < 80 mm Hg; consider referral

CHRONIC HEART FAILURE PHARMACOLOGIC MANAGEMENT

Class	Drug Generic name (Trade name®)	Dosage How supplied	Comments
Angiotensin Converting Enzyme Inhibitors (ACEI) <i>Inhibit the action of angiotensin converting enzyme (ACE) which is responsible for conversion of angiotensin I to angiotensin II; Angiotensin II causes vasoconstriction & sodium retention. Prevents breakdown of bradykinin</i>	captopril	Adult: <i>Initial: 25 mg three times/day Usual: 50-100 mg three times/ day Max: 450 mg/day</i>	<ul style="list-style-type: none"> • Pregnancy Category D • Take 1 hour before meals and with diuretics • Adjust dose after 2 weeks to 50 mg three times/day if tolerated
		Children: not recommended	
		<u>For Patients with salt/volume depletion or low blood pressure</u> <i>Initial: 6.25-12.5 three times/ day Usual: Titrate for response</i>	
		General comments First line agent Commonly used post-MI for systolic dysfunction or in patients with clinical symptoms of CHF (SOB, fatigue, exercise intolerance) Monitor potassium levels: goal is 4-5 mmol/L Assess renal function and serum potassium within 1-2 weeks of drug initiation and after each dose change Start at low dose and titrate in 2-4 week increments Improvement of clinical symptoms is desired effect Preferred in patients with diabetes and CHF	Capoten <i>Tabs: 12.5 mg, 25 mg, 50 mg, 100 mg</i>
	enalapril maleate	Adult: <i>Initial: 2.5 mg twice/day Usual: 10-20 mg twice/day Max: 40 mg/day</i>	<ul style="list-style-type: none"> • Pregnancy Category D • Avoid potassium supplements • Use with caution in patients on lithium
		Children: not recommended	
	Vasotec	<i>Tabs: 2.5 mg, 5 mg, 10 mg, 20 mg</i>	
	fosinopril	Adult: <i>Initial: 5-10 mg/day Usual: 20-40 mg/day Max: 40 mg/day</i>	<ul style="list-style-type: none"> • Pregnancy Category D • Individualize therapy; increase over several weeks as needed • Use with caution in patients on lithium • Has been used in patients NOT currently taking digitalis
		Children: not recommended	
		<u>Moderate to Severe Renal Failure or Salt/Volume Depletion</u> <i>Initial: 5 mg/day Usual: Individualize Max: 40 mg/day</i>	
	Monopril	<i>Tabs: 10 mg, 20 mg, 40 mg</i>	

continued

CHRONIC HEART FAILURE PHARMACOLOGIC MANAGEMENT

Class	Drug Generic name (Trade name®)	Dosage How supplied	Comments
	lisinopril	Adult: <i>Initial:</i> 5 mg/day <i>Usual:</i> 5-40 mg/day <i>Max:</i> 40 mg/day Children: not recommended <u>For Patients with Renal Impairment (Glomerular Filtration < 30mL)</u> <i>Initial:</i> 2.5 mg/day <i>Usual:</i> 2.5-5 mg/day <i>Max:</i> 5 mg/day	<ul style="list-style-type: none"> • Pregnancy Category D • Individualize therapy; increase dose at 2 week intervals • Patients with significant renal impairment may require closer supervision
	Prinivil Zestril	<i>Tabs:</i> 2.5 mg, 5 mg, 10 mg, 20 mg, 40 mg	
	ramipril	Adult: <i>Initial:</i> 2.5 mg twice/day <i>Usual:</i> 5 mg twice/day <i>Max:</i> 10 mg/day Children: not recommended <u>For Patients with Renal Impairment (Cr Cl < 40 mL/min)</u> <i>Initial:</i> 1.25 mg twice/day <i>Usual:</i> 2.5-5 mg twice/day <i>Max:</i> 5 mg/day	<ul style="list-style-type: none"> • Pregnancy Category D • Requires initial titration of dosage schedule • May increase lithium levels
	Altace	<i>Caps:</i> 1.25 mg, 2.5 mg, 5 mg, 10 mg <i>Tabs:</i> 1.25 mg, 2.5 mg, 5 mg, 10 mg	
Loop Diuretics <i>Inhibit absorption of sodium and chloride in proximal/distal tubules and loop of Henle</i>	bumetanide	Adult: <i>Initial:</i> 0.25-2 mg/day <i>Usual:</i> 0.5-2 mg/day <i>Max:</i> 0.5-10 mg daily (split between 2-3 doses) Children: not recommended	<ul style="list-style-type: none"> • Pregnancy Category C • May use intermittent dosing • Contraindicated in anuric patients • Carries risk for ototoxicity • Caution in patients with allergies to sulfonamides • Contraindicated with lithium patients
<u>General comments</u> More potent diuretic action than thiazides			

continued

CHRONIC HEART FAILURE PHARMACOLOGIC MANAGEMENT

Class	Drug Generic name (Trade name®)	Dosage How supplied	Comments
Class of agents preferred in patients with reduced renal function	Bumex	<i>Tabs: 0.5 mg, 1 mg, 2 mg</i>	
Monitor for dehydration, electrolyte imbalances and hypotension	furosemide	Adult: <i>Initial: 20-80 mg/day</i> <i>Usual: Individualize for effect</i> <i>Max: 600 mg (split in 2-3 doses)</i>	<ul style="list-style-type: none"> • Pregnancy Category C • Contraindicated in anuric patients • Allow 6-8 hours between doses • Patients with doses > 80 mg/day warrant close observation • Carries risk for ototoxicity
May be used for patients who develop fluid overload		Children: <i>Initial: 2 mg/kg as single dose</i> <i>Usual: Individualize for effect</i> <i>Max: 6 mg/kg - do not exceed adult max</i>	
Increases calcium excretion	Lasix	<i>Tabs: 20 mg, 40 mg, 80 mg</i> <i>Solutions: 10 mg/mL, 40 mg/mL</i>	
	torseamide	Adult: <i>Initial: 10-20 mg/day</i> <i>Usual: Individualized for effect</i> <i>Max: 200 mg (either daily or split between doses)</i>	<ul style="list-style-type: none"> • Pregnancy Category B • May be given without regard to meals • Contraindicated in anuric patients • Contraindicated in patients with sulfonylurea allergy • Carries risk for ototoxicity • Titrate upwards by doubling dose to achieve desired effect
	Demadex	<i>Tabs: 5 mg, 10 mg, 20 mg, 100 mg</i>	
Digoxin <i>Increases intracellular concentration of calcium which increases force of myocardial contraction; decreases activation of the sympathetic nervous system</i>	digoxin	<u>Rapid Digitalization</u> Adult: <i>Initial: 1-1.5 mg split over 4 doses spanning 36 hours</i> <i>Usual: 0.125-0.5 mg/day</i>	<ul style="list-style-type: none"> • Pregnancy Category C • Individualize therapy based on lean body weight, renal function, age, and concomitant disease states, heart rate. All dosage selections must be based on clinical assessment of the patient. Half-life of drug is between 24-36 hours • If not on previous digitalization therapy, initiating oral therapy may take up to 3 weeks to achieve steady serum state (dependent upon renal function)
<u>General comments</u> Improved quality of life but no decrease in mortality		<u>Gradual Digitalization in Adults < 70 yr with intact renal function</u> Adult: <i>Initial: 0.25 mg/day</i> <i>Usual: 0.125-0.5 mg/day</i>	

continued

CHRONIC HEART FAILURE PHARMACOLOGIC MANAGEMENT

Class	Drug Generic name (Trade name®)	Dosage How supplied	Comments
<p>Use in patients with CHF secondary to poor myocardial contractility</p> <p>Correct hypokalemia before prescribing</p> <p>Do not use with heart block</p> <p>Cautious use with agent which decreases heart rate (β-blocker)</p> <p>Monitor for toxicity, anorexia, nausea, muscle weakness</p> <p>Consider in patients with atrial fibrillation with rapid ventricular response</p>	Lanoxin	<p><u>Gradual Digitalization in Adults > 70 yr or patients with impaired renal function</u> Adult: <i>Initial:</i> 0.125 mg/day</p> <p><u>Marked renal impairment</u> Adult: <i>Initial:</i> 0.0625 mg/day</p> <p>Children < 2 yrs: Consult references > 2 yrs of age <i>Initial:</i> 0.01 mcg/kg in divided doses <i>Max:</i> do not exceed maximum adult dose</p> <p style="text-align: center;"><i>Caps:</i> 0.1 mg, 0.2 mg <i>Elixir:</i> 0.05 mg/mL <i>Tabs:</i> 0.125 mg; 0.25 mg</p>	<ul style="list-style-type: none"> Requires regular laboratory monitoring of drug level and best obtained just prior to next dose or at least 6 hours after last dose. Consider more frequent lab monitoring in patients with marked renal impairment There is different bioavailability when moving patients from digoxin injection to oral dosages Patient must be able to monitor heart rate
<p><u>β-Blockers</u> <i>Decrease sympathetic stimulation by β-blockade in the heart</i></p> <p><u>General comments</u></p> <p>Decreases morbidity and mortality associated with CHF</p> <p>Do not prescribe in an unstable patient or in patients with fluid overload; cautious use or avoid use in respiratory patients</p> <p>Used in conjunction with ACEIs, diuretics with/without digoxin; titrate dose to improve clinical symptoms</p>	carvedilol	<p><u>Immediate Release</u> Adult: < 85 kg <i>Initial:</i> 3.125 mg twice/day <i>Usual:</i> 25 mg twice/day <i>Max:</i> 25 mg twice/day</p> <p>Adult: > 85 kg <i>Initial:</i> 3.125 mg twice/day <i>Usual:</i> 50 mg twice/day <i>Max:</i> 50 mg twice/day</p> <p><u>Extended Release</u> Adult: <i>Initial:</i> 10 mg/day <i>Usual:</i> Titrated <i>Max:</i> 80 mg/day</p> <p style="text-align: center;"><i>Tabs:</i> 3.125 mg, 6.25 mg, 12.5 mg, 25 mg</p> <p style="text-align: center;"><i>Ext. Rel. Caps:</i> 10 mg, 20 mg, 40 mg, 80 mg</p>	<ul style="list-style-type: none"> Pregnancy Category C but trimester specific risks exist Do not abruptly withdraw medication; allow 1-2 weeks Commonly used with diuretics, ACE inhibitors, and digitalis Individualized therapy; requires close monitoring during phases of titration (minimum intervals of 2 weeks) Reduce dose if pulse < 55/min Take daily in AM with food Do not crush or chew Avoid in patients with severe hepatic impairment Monitor glucose levels Immediate release to extended release, consult references for bioequivalence and dosing schedules
	Coreg (Immediate release)		
	Coreg CR (Extended release)		

continued

CHRONIC HEART FAILURE PHARMACOLOGIC MANAGEMENT

Class	Drug Generic name (Trade name®)	Dosage How supplied	Comments
	metoprolol succinate, extended release	<p><u>NYHA CLASS II</u> Adult: <i>Initial:</i> 25 mg/day <i>Usual:</i> Individualize <i>Max:</i> 200 mg/day</p> <p><u>NYHA > CLASS II</u> Adult: <i>Initial:</i> 25 mg/day <i>Usual:</i> Individualize <i>Max:</i> 200 mg/day</p> <p>Children: not recommended</p>	<ul style="list-style-type: none"> • Pregnancy Category C • DO NOT ABRUPTLY STOP DRUG; must be tapered over 2 weeks • Individualize for patient effect and advance dose at 2 week intervals • Avoid in patients with peripheral vascular disease
	Toprol-XL	<i>Ext. Rel. Tabs: 25 mg, 50 mg, 100 mg, 200 mg</i>	
<p>Angiotensin II Receptor Blockers (ARB) <i>Block vasoconstriction and sodium retention effects of AT II (angiotensin II) found in many tissues</i></p> <p>General comments End in "sartan"</p> <p>Does not effect bradykinin; therefore, no cough as seen in ACE inhibitors. Good renoprotective action; therefore, good alternative in diabetics who cannot tolerate ACE inhibitors</p> <p>Monitor for hypotension and possible renal failure</p>	<p style="text-align: center;">candesartan cilexetil</p> <p style="text-align: center;">Atacand</p> <p style="text-align: center;">valsartan</p> <p style="text-align: center;">Diovan</p>	<p>Adult: <i>Initial:</i> 4 mg/day <i>Usual:</i> 32 mg/day <i>Max:</i> 32 mg/day</p> <p>Children: not recommended</p> <p style="text-align: center;"><i>Tabs: 4 mg, 8 mg, 16 mg, 32 mg</i></p> <p>Adult: <i>Initial:</i> 40 mg twice/day <i>Usual:</i> 160 mg twice/day <i>Max:</i> 160 mg twice/day</p> <p style="text-align: center;"><i>Caps: 80 mg, 160 mg</i></p> <p style="text-align: center;"><i>Tabs: 40 mg, 80 mg, 160 mg</i></p>	<ul style="list-style-type: none"> • Pregnancy Category D • NYHA Classes II-IV • Dose is individualized for effect; double dose at 2 week intervals • Pregnancy Category D • May be taken without regard to food • Clinical effect seen within 2 weeks with maximum effect in 4 weeks • Caution when initiating in patients with hepatic or severe renal impairment

PREGNANCY/LACTATION CONSIDERATIONS

- Do not restrict sodium in diet
- Requires cardiology referral

CONSULTATION/REFERRAL

- Consult according to severity and patient objectives

FOLLOW-UP

- Variable depending on patient circumstances, but, generally daily, until exacerbation resolves, then 1-2 weeks until patient is symptom free; then, every 3-6 months

EXPECTED COURSE

- Chronic disease with frequent exacerbations
- Common diagnosis associated with frequent hospital admission
- 15% die within first year of diagnosis

HYPERLIPIDEMIA

DESCRIPTION

An elevated level of blood lipids: cholesterol, cholesterol esters, phospholipids, and/or triglycerides.

ETIOLOGY

- Inherited disorder of lipid metabolism
- High intake of dietary lipids
- Obesity, sedentary lifestyle
- Diabetes mellitus
- Hypothyroidism
- Anabolic steroid use
- Hepatic disorders: hepatitis, cirrhosis
- Renal disorders: uremia, nephrotic syndrome
- Stress
- Drug induced: thiazide diuretics, β -blockers, cyclosporine
- Alcohol and caffeine
- Metabolic Syndrome: characterized by hypertension, glucose intolerance, obesity, dyslipidemia, and/or coagulation abnormalities

INCIDENCE

- Hypercholesterolemia > 200 mg/dL; 100 million people in U.S.
- Hypercholesterolemia > 240 mg/dL; 35 million people in U. S.
- Males = Females; female onset delayed by 10-15 years compared to males

- Incidence increases as age increases

RISK FACTORS

- Family history of CHD [type 2 familial hypercholesterolemia (FH)]
- Physical inactivity
- Smoking
- Age: men > 45 years, women > 55 years or premature menopause without estrogen replacement
- Obesity
- Diet high in saturated fat
- Diabetes mellitus

ASSESSMENT FINDINGS

- Few physical findings
- Xanthomata
- Xanthelasma
- Corneal arcus prior to age 50 years
- Bruits
- Angina pectoris
- Myocardial infarction
- Stroke