

GUIDELINES & PROTOCOLS

ADVISORY COMMITTEE

Heart Failure Care

Effective Date: February 15, 2008

Scope

This guideline provides strategies for the improved diagnosis and management of adults (19 years and older) with heart failure (HF). It is intended for primary care practitioners, and focuses on approaches needed to provide care to patients with this complex syndrome.

Diagnostic Code: 428

Major updates

- Microalbuminuria added to routine investigations as it has been shown to be a marker of underlying endothelial dysfunction.
- The brain natriuretic peptide (BNP) section is expanded.
- Flow charts on diagnosis and management reflect 2007 Canadian Cardiovascular Society (CCS) guidelines.
- Non-pharmacologic management is given its own recommendation.
- Pharmacotherapy section is standardized, expanded and updated to reflect current evidence.
- Distinction between HF with preserved systolic function (HF with PSF, previously called diastolic dysfunction) and HF with reduced systolic function (systolic HF) is de-emphasized.
 - Evidence of benefit for angiotensin converting enzyme inhibitors (ACE-I) and beta-blockers (BB) in HF with PSF without ischemic heart disease remains controversial (**see Recommendations 2, 3 and 4**).
- Emphasis is placed on management of comorbidities.
- New sections on the management of HF during intercurrent illness are added.

Clinical Highlights

HF is a complex syndrome associated with a high rate of hospitalization and short-term mortality, especially in elderly patients with comorbidities. Early diagnosis and treatment can prevent complications.

- Successful HF management begins with an accurate diagnosis.
 - All patients should have an objective determination of left ventricular ejection fraction (LVEF) by echocardiogram, or radionuclide ventriculogram (RNV) if echocardiogram is unavailable (**see Recommendation 2**).
- Treat underlying vascular risk factors (see guidelines on Hypertension and Diabetes Care), comorbidities and other chronic diseases (**see Recommendation 4**).
- Patient and caregiver education should be tailored and repeated (**see Recommendation 3**)
 - Encourage the patient to accept responsibility for their HF care through an individualized management plan with self-care objectives, including salt restriction, weight monitoring and medication adherence strategies.
 - Reinforce the importance of healthy lifestyle modifications, including healthy eating, regular exercise, weight management, social support and smoking cessation.

- Treatment requires combination drug therapy (**see Recommendation 4**)
 - All systolic HF Patients should receive an ACE-I and a BB at target dose unless contraindicated. These therapies should be considered in all patients with HF with PSF.
 - Additional therapy should be guided by clinical situation.
 - As polypharmacy remains a concern - match drugs to goals of treatment.
- Care should be individualized based on symptoms, underlying cause, disease severity and goals of care.
- Plan effective systems to ensure follow-up and patient education to improve outcomes (**see Recommendation 10**).
- Engage patients in open discussions on the prognosis of HF at the earliest appropriate time (**see Recommendations 11, 12 and 13**).

RECOMMENDATION 1

Prevention of Heart Failure

Assess all patients for known or potential risk factors for HF (hypertension, ischemic heart disease, diabetes mellitus, dyslipidemia and tobacco use). Modifiable risk factors should be treated according to current British Columbia guidelines.

Routine screening for asymptomatic LV dysfunction is currently not recommended. For selected patients at high risk for heart failure due to multiple risk factors, the decision to screen (such as by echocardiography) should be individualized.

In patients with asymptomatic LV dysfunction

- ACE-I should be used in all asymptomatic patients with LV dysfunction and LVEF < 40%
- BB should be considered in all patients with asymptomatic LV dysfunction and LVEF < 40% (especially if there is a history of ischemic heart disease)

RECOMMENDATION 2

Diagnosis of Heart Failure

HF is underdiagnosed in its early stages. Diagnostic accuracy improves when there is a high index of suspicion and a consistent approach to diagnosis.

Definition of heart failure

HF is a clinical syndrome defined by symptoms suggestive of impaired cardiac output and/or volume overload with concurrent cardiac dysfunction. While a normal LVEF is >60%, the threshold of 40% is used for the purposes of diagnostic classification. As such, HF can be classified into **systolic heart failure**, as defined by the presence of signs and symptoms of HF with an LVEF <40%, and **heart failure with preserved systolic function (HF with PSF** – previously called diastolic dysfunction) is defined by the presence of signs and symptoms of HF in the absence of systolic dysfunction (LVEF ≥ 40%). Prognosis for systolic HF is significantly worse than HF with PSF. Research evidence for treatment is best established for systolic HF but, in general, the pharmacologic and non-pharmacologic strategies are similar for both.

Evaluation of HF should include:

- A thorough history and physical exam focusing on:
 - Current and past symptoms of HF (i.e. fatigue, shortness of breath, diminished exercise capacity and fluid retention/weight gain)
 - Functional limitation by New York Heart Association (NYHA) Class (**see Figure 1**)
 - Cardiovascular risk factors, cardiovascular disease, and other comorbid conditions
 - Assessment of a patient's endurance, cognition, and ability to perform activities of self-management and daily living
 - Assessment of volume status (e.g. peripheral edema, rales, hepatomegaly, ascites, weight, jugular venous pressure, and postural hypotension)

- Initial investigations in all patients (where available):
 - Complete blood count, serum electrolytes, creatinine (Cr), eGFR, urinalysis, microalbuminuria, fasting blood glucose, fasting lipid profile, AST, albumin and thyroid-stimulating hormone (TSH)
 - 12-lead electrocardiogram and chest radiograph
 - All patients should have an objective determination of LVEF by transthoracic echocardiogram (preferred as it also provides information on cardiac dimensions, valvular function and may suggest the underlying etiology of HF) or RNV if echocardiogram is unavailable
 - BNP has high diagnostic value for both types of HF and is recommended where available, when diagnosis is unclear (**See Table 1**). The use of BNP in non-acute heart failure and community outpatient practice remains to be clarified.
- In cases where there is doubt, or an objective determination of LVEF is not immediately available, response to a therapeutic trial may increase the diagnostic accuracy
- When the etiology of HF is uncertain, consider referral for more specialized cardiac testing as clinically indicated (**see Recommendation 5**)

Figure 1. Diagnosis of heart failure (Adapted from CCS Guidelines)

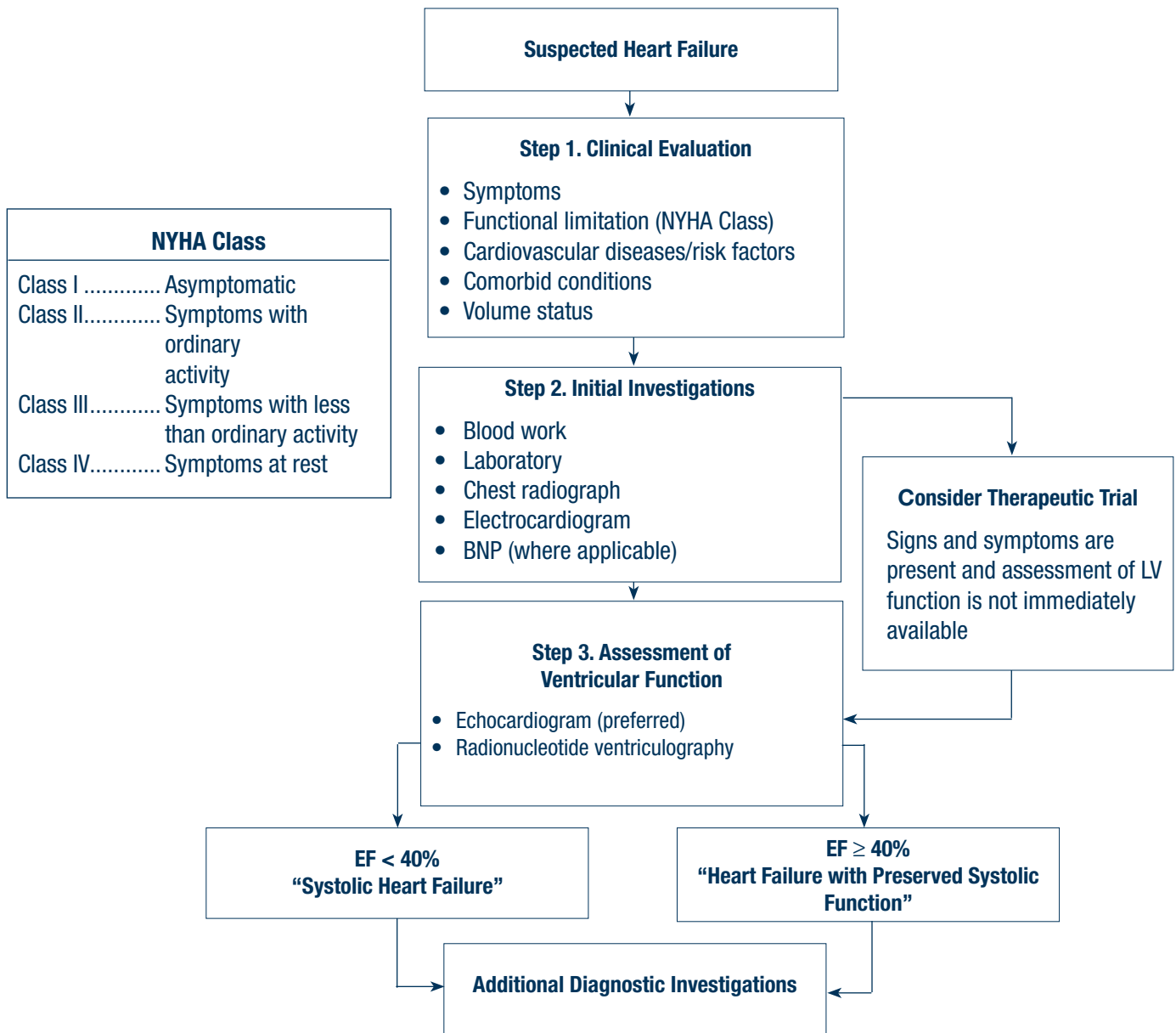


Table 1. Brain natriuretic peptide (BNP) and prohormone of BNP (NT-proBNP) assay cut-off points for the diagnosis of heart failure

	AGE	HF UNLIKELY	HF POSSIBLE BUT CONSIDER ALTERNATIVE DIAGNOSES	HF VERY LIKELY
BNP (pg/mL)	All	< 100	100- 500	>500
NT-proBNP (pg/mL)	< 50	< 300	300- 450	>450
	50-75	< 300	300- 900	>900
	>75	< 300	300- 1800	>1800

RECOMMENDATION 3

Non-Pharmacologic Management Strategies

HF care depends on the patient’s understanding of, and participation in, optimal care. Patients can be important partners in individualized goal setting, salt restriction, weight monitoring, and adherence.

Goals of care

- Determine the goals of managing their HF with the patient, i.e. aggressiveness from a goal of an advanced cardiac technology and transplantation through to a goal of symptom control and palliation (**see Recommendations 11, 12 and 13**)
 - Identify an appropriate substitute decision maker (health proxy)
 - Advance directives / Representation Agreements regarding end-of-life care should be addressed at the earliest appropriate time
 - Above decisions should be reviewed regularly and specifically when there is a change in the patient’s clinical status

Self-monitoring

- Discuss the importance of self-management with the patient and their network of support
- Work with the patient on the specifics of the plan as outlined below

Weight

- All patients should be encouraged to weigh themselves daily and recognize symptoms of worsening HF
 - Initially: Report a weight gain of 2.5 kg/week or a worsening of symptoms
 - Goal: Self-assessment and adjustment of fluid/sodium restriction and/or diuretic dosing in response to a weight gain of ≥ 1 kg (patient-based algorithm)

Salt intake (goal of 2-3 g of sodium per day)

- All HF patients should limit sodium intake, avoid processed foods and avoid adding salt
 - Review salt intake when weight gain is experienced

Fluid intake

- All HF patients with hyponatremia, or severe fluid retention/congestion that is not easily controlled with diuretics, should limit fluid intake to 6-8 cups of liquid/day (1 cup = 8 ounces = 240 mL), including frozen items and fruit (1 serving = 1/2 cup of liquid)

Alcohol

- Not more than one drink per day is recommended. This is equal to a glass of wine (5 oz./150 mL/12% alcohol), beer (12 oz./350 mL/5% alcohol), or one mixed drink (1 1/2 oz./50 mL/40% alcohol). In alcohol related heart failure, alcohol must be totally avoided.

Exercise training

- All HF patients with stable symptoms and volume status should undertake regular, moderate intensity physical activity (aerobic and resistance exercises to maintain muscle mass)

- Aerobic physical activity - Start with 5-10 minute sessions every other day, working to a goal of 30-45 minutes per day 4-5 days per week
- Resistance exercises (Do 10-15 repetitions at 50-60% of normal effort)

Immunization

- All HF patients should be immunized for influenza (annually) and pneumococcal pneumonia (if not received in the last six years) to reduce the risk of respiratory infections

Collaboration with complementary health care providers

- Involve nurses, pharmacists, dietitians and cardiac exercise therapists for individual or group visits when possible
 - An experienced nurse can help the patient understand the pathophysiology of HF and help with self-management, weight monitoring and diuretic adjustment.
 - A dietician can provide valuable education regarding the practical aspects of implementing a salt and water restriction, how to make healthy food choices and/or a group grocery store tour to help facilitate low-salt food and drink selections.
 - A pharmacist may help patients remain on therapy when they are faced with side-effects and provide useful advice to help with medication compliance.
 - A cardiac exercise therapist may be instrumental in helping HF patients develop and continue a structured exercise program.

Note: Resources and reminders to support patients are attached and are available on the Ministry of Health Web site (www.health.gov.bc.ca/cdm/patients/chf). As well, in order to facilitate patient self-management, patients may obtain a copy of the booklet *Managing Congestive Heart Failure* from the Heart and Stroke Foundation Web site: www.heartandstroke.ca

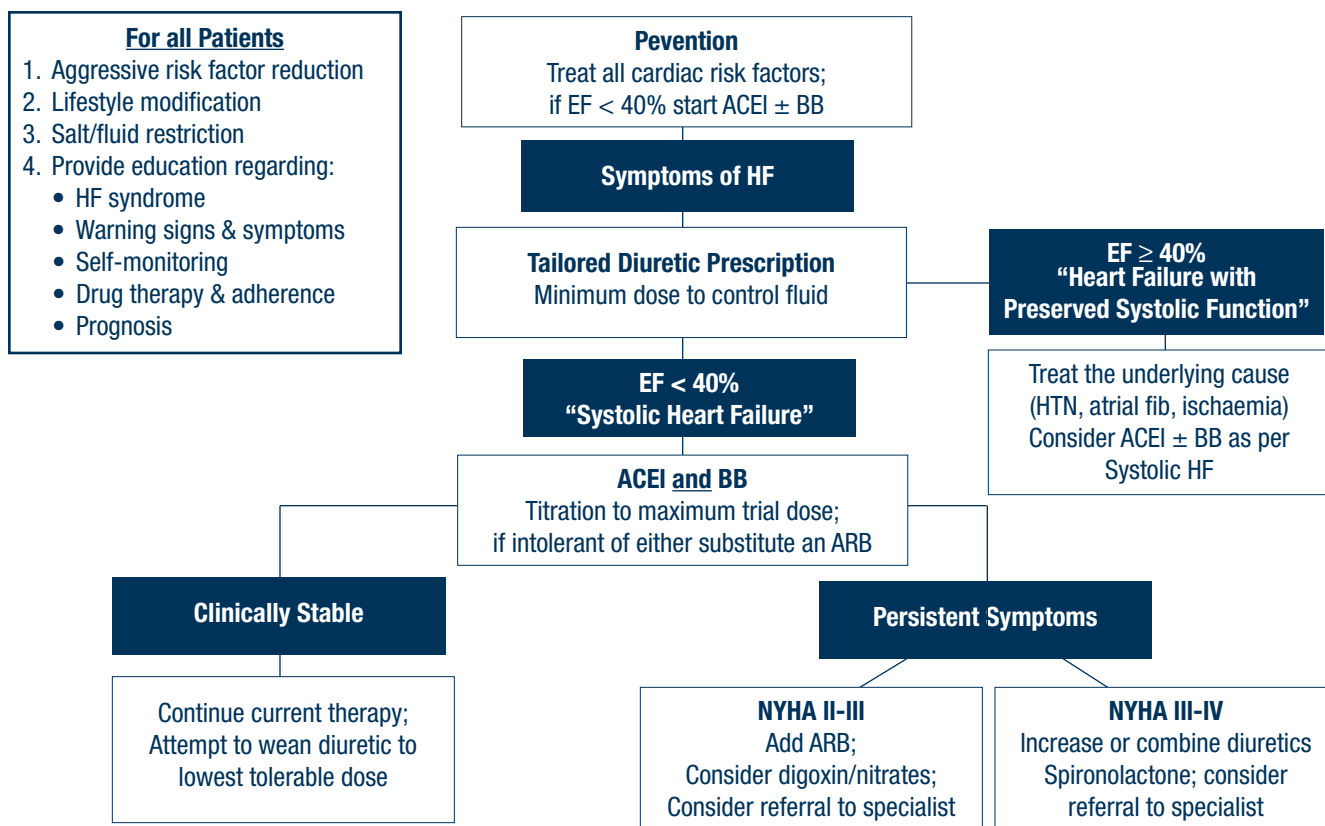
RECOMMENDATION 4 Pharmacotherapy for Heart Failure

In general, research evidence for treatment is best established for systolic HF, although the underlying principles and pharmacotherapy also apply to HF with PSF. However, when treating HF with PSF, extra caution is required with ACE-I, vasodilators and diuretics to prevent symptomatic hypotension or pre-renal failure as LV filling pressures are volume dependent.

- It is important to treat the following underlying cause where possible, especially in the case of HF with PSF:
 - Hypertension (goal is blood pressure <140/90 mmHg)
 - Ischemic heart disease
 - Atrial fibrillation (goal ventricular rate between 60-80 at rest and <110 with exercise)
 - Hypertrophic cardiomyopathy (consider referral to specialist)
- **All patients with systolic HF should be on an ACE-I and a BB unless contraindicated (these medications should be strongly considered in patients with HF with PSF)**
 - Historically, an ACE-I was started first and titrated to target dose before starting a BB but current evidence suggests that it does not matter which drug is started first as long as both are titrated to target dose
 - See appendices regarding medication initiation and titration - BB should not be initiated in patients with volume overload
 - ARB can be substituted for BB or ACE-I if they are not tolerated
 - ARB can be cautiously added to patients with persistent symptoms despite optimal ACE-I and BB dose
 - In the elderly, initial doses should be low and titrated slowly (**see Recommendation 7**)
- Concerns may arise as these medications are titrated upwards
 - Blood Pressure:
 - When the systolic BP is below 80 mmHg, limit increase in medication if the patient shows symptoms of low BP (consider measuring postural vitals in the elderly)

- Take blood pressure lowering medication with food
- Separate the dosing of blood pressure lowering medications by at least 2 hours (i.e. give the ACE-I at noon and BB in the morning and at bedtime)
- If hypotension occurs during medication titration consider:
 - * Adding a higher dose at bedtime first, then increase the morning dose (if BID dosing)
 - * Decrease or discontinue the diuretic and/or vasodilator
 - * Consider temporarily reducing the ACE-I dose during BB titration
 - * Decrease the BB dose by 50% and reinitiate titration once condition stabilizes
- Renal Function:
 - if Cr increases by >30% evaluate the patient's volume status and consider reducing/holding diuretic (if volume deplete) before reducing/holding digoxin, ACE-I, ARB, spironolactone or BB
 - Referral to a nephrologist is encouraged when there is kidney impairment as defined by a Cr increase by >30%, an eGFR <30 mL/min or eGFR <45 mL/min if cause is unknown (**see Recommendation 8**)
 - If a drug with proven mortality benefit is not tolerated by the patient (because of hypotension, bradycardia or progressive renal dysfunction) then reduce or discontinue other drugs without proven mortality benefit (namely digoxin, diuretics, calcium channel blockers, amiodarone)
 - Diuretics are used to control fluid overload but the goal is to use the minimum effective dose. These drugs can sometimes be discontinued once the patient is asymptomatic.
 - An effective diuretic dose reduction is more often achieved after ACE-I and BB reach target doses
 - By using the minimum effective diuretic dose, it is more likely that symptomatic hypotension and/or unacceptable increases in Cr with ACE-I or BB can be avoided
- Aggressive management of cardiovascular (CV) risk factors (hypertension, diabetes, dyslipidemia, smoking, obesity) and other comorbid conditions is recommended (**see relevant GPAC guidelines** [www. BCGuidelines.ca](http://www.BCGuidelines.ca))
 - ASA 81 mg daily for patients with CV risk factors or established atherosclerosis
 - Treat comorbidities and risk factors as per current guidelines

Figure 2. Management



RECOMMENDATION 5

Indications for Referral to a Medical Specialist

- Cause of heart failure unknown
- Suspicion of ischemia or valvular disease as the primary cause
- Severe heart failure that is refractory or difficult to control
- Symptomatic arrhythmias
- LVEF ≤ 35% (consideration of cardioverter-defibrillator implantation)
- Consideration for heart transplantation/implantable defibrillator/cardiac resynchronization
- Serum sodium <132 mmol/L (persistent after water restriction)
- Refer to a nephrologist when renal function is impaired and/or deteriorating and the reason is not apparent (see chronic kidney disease guideline)
- Refer to the Heart Function Clinics, Cardiac Rehabilitation or Risk Reduction Centres, and to a local Chronic Disease Management Program where available
- Refer to a geriatric medicine specialist or to Long-Term Care managers when an elderly patient has significant medical comorbidity, medication management issues, and/or significant cognitive, psychological and functional issues.

Note: Advanced practice nurses provide integral specialist support of cardiac care in HF clinics where they provide nursing case management for ongoing surveillance and education of patients and family members.

HF is characterized by recurrent exacerbations and decompensations. The following should serve as a brief resource for the management of an acute decompensation. For further information please refer to the CCS consensus conference recommendations on heart failure care 2007 (www.hfcc.ca).

Clinical Evaluation

- Clinical assessment of Perfusion (cold or warm) and Volume Status (wet or dry)
- Initial Investigations
 - Complete blood count, electrolytes, Cr, eGFR, troponin, BNP, ECG, chest x-ray
 - Repeat frequently if patient presents in shock with renal dysfunction
 - An echocardiogram should be performed if no recent echocardiogram is available

Initial Management

- General Principles:
 - Promptly identify and treat the precipitating cause when possible
 - Tachyarrhythmia, ischemia, infection, anemia, thyroid dysfunction
 - Compliance issues (excessive sodium intake, medication non-adherence)
 - Monitoring
 - Reassess heart rate, blood pressure, oxygen saturation and response to therapy frequently
 - Consider bladder catheterization to monitor fluid balance (urine output)
 - Consider invasive monitoring (arterial lines, central venous pressure) for patients in shock or for those who require inotropes or vasopressors
- Initial therapy should be directed at the clinical situation
 - Oxygen should be given initially to all patients presenting with AHF and hypoxia
 - Consider bilevel positive airway pressure ventilation (BiPAP) if patient does not appear to be responding to progressive increases in fraction of inspired oxygen (FiO₂) but do not delay intubation if required
 - Warm (well perfused, stable blood pressure) and Wet (volume overloaded)
 - IV Diuretics (furosemide) - first-line for patients with AHF and congestion
 - * Initial dose is based on clinical judgment, however, a good starting point is to double the patients usual oral dose and give it through IV
 - * Reassess response after 60-90 minutes and titrate as necessary
 - Vasodilators (nitroglycerin SL, IV, or PO; nitroprusside IV)
 - Morphine - as an adjunct may help to relieve subjective dyspnea with the increased risk of respiratory and circulatory depression
 - Cold (poor perfusion, hypotensive) and Wet – i.e. Cardiogenic shock
 - Positive inotropes for short-term therapy to stabilize the patient
 - * Dobutamine 2-5 µg/kg/min (preferred) or milrinone 0.25 µg/kg/min and titrated to effect
 - * Consider early transfer to a tertiary care centre for patients in cardiogenic shock with a low comorbid disease burden for circulatory mechanical support and transplantation consideration
- Once Stabilized:
 - Consider combined IV diuretics and inotropes
 - Consider initiation of vasodilators (ACE-I, hydralazine, nitrates)
 - Patient education regarding HF care
 - Return to **Recommendation 3 and 4** regarding on-going management of HF
- For patients with concomitant renal failure
 - Consider early nephrology consultation

RECOMMENDATION 7**Heart Failure in the Elderly**

- Elderly patients constitute one of the largest groups of patients with HF.
 - In general, HF medications are underprescribed despite the fact that this group derives a greater absolute benefit from these medications.
- Treatment strategies in the elderly patient with HF are the same as other groups. However, care must be taken with respect to medication initiation and up-titration.
 - A gentle strategy to maximize long-term adherence is preferred because of the propensity for adverse events in this group (especially postural hypotension and digoxin toxicity).
- Assess for relevant comorbid conditions, such as cognitive impairment, that may affect treatment, adherence, follow-up and prognosis.
 - Identify a capable caregiver.
 - Consider referral to a specialist in geriatric medicine and/or community support staff.

RECOMMENDATION 8**Management of Heart Failure with Comorbid Conditions****Chronic Kidney Disease**

- HF patients with stable renal function (Cr < 200 µmol/L and eGFR >30 mL/min) should receive standard therapy with an ACE-I, ARB or spironolactone (use digoxin with extreme caution)
 - Monitor serum K⁺ and Cr levels more frequently, especially with combination therapy or in the case of an acute intercurrent illness
- HF patients with persistent volume overload or deteriorating renal function should be assessed for reversible causes - medications (especially NSAIDs), hypovolemia, hypotension, urinary tract obstruction or infection
 - Stable oliguric HF patients - daily evaluation of the dose of diuretics, ACE-I, ARB, spironolactone and non-HF drugs that impair renal function is recommended (preferably as an inpatient)
 - Stable non-oliguric HF and Cr increase >30% from baseline - consider reducing the dose of diuretics, ACE-I, ARB and spironolactone until renal function stabilizes
- Referral to a nephrologist is encouraged when there is kidney impairment as defined by a Cr increase of >30%, an eGFR <30 mL/min or eGFR <45 mL/min if cause is unknown

Anemia (hemoglobin <110 g/L; generally symptomatic if <90 g/L)

- Investigations and treatment should be directed at the underlying cause
- Substrate deficiencies should also be replaced (iron, vitamin B12 or folate)
- There is no evidence to support the use of erythropoietin (or darbepoietin) in HF
- Consider blood transfusion if, after substrate deficiencies have been corrected, anemia and advanced symptoms persist

Further information can be found at:

http://ccs.ca/download/consensus_conference/consensus_conference_archives/2007_HFCC_update.pdf

A downloadable pocket reference card is available from CCS. It can be found at:

http://www.hfcc.ca/downloads/educational_tools/pocket_card/pocket_card.html

RECOMMENDATION 9**Management during Intercurrent Illness**

- During acute intercurrent illness (i.e. pneumonia, COPD exacerbation) BB, ACEI and ARBs should be continued at their usual dose unless they are not tolerated
 - If there is a concern about their use, then the dose can be halved during the illness and then up-titrated rapidly as soon as safely possible
 - Only with a life-threatening complication should BB, ACEI and ARBs be discontinued abruptly

- HF patients with acute dehydrating illness should have prompt evaluation of their renal function and electrolytes even if they are not overtly volume depleted or overloaded
 - If renal function worsens, adjust doses of diuretics, spironolactone, digoxin, ACEI, ARB as necessary
- If surgery is required, then patients with HF should be evaluated by a physician experienced in HF management perioperatively
- If a patient with HF develops a gout exacerbation, the preferred treatment would include oral colchicine ± prednisone; avoid NSAIDs due to their role in exacerbating HF. Gout can be prevented with the use of allopurinol and/or a reduction in diuretic dose (as tolerated).

RECOMMENDATION 10 **Practice Management Strategies**

Management strategies such as recall and regular review can improve the care of patients with HF. Physicians are encouraged to:

- Identify all patients in your practice with HF (use an electronic medical record, file card system or the CDM toolkit)
- Flag patient chart covers with a label (red dot or heart) identifying the patient as a HF patient (this may be used as an alert to the medical office assistant to weigh and obtain BP of patients when they are brought into the examining room)
- Monitor key clinical indicators of HF: a flow sheet or EMR template is recommended
- Make use of planned visits and recall systems to ensure that patients with HF are seen at appropriate intervals
- Review patient records to ensure the goals of care have been met
- Visit the chronic disease management web site: www.primaryhealthcarebc.ca

RECOMMENDATION 11 **Ongoing Management**

Comprehensive HF management is based on setting treatment goals and monitoring the effectiveness of management:

- Define and monitor cardiovascular goals and the key clinical indicators using a systematic approach (e.g. electronic medical record, flow sheet, file cards)
 - Reverse congestion
 - Control arrhythmia and ischemia
 - Prevent emboli
 - Stabilize vital signs (pulse, sit/stand blood pressure, weight)
- Use current drug and non-drug therapy for HF and for cardiovascular and non-cardiovascular comorbidity
- Review medications for intended and unintended effects (inappropriate polypharmacy, potential drug interactions, inadvertent aggravation of comorbid conditions)
- Monitor serum biochemistry (electrolytes, Cr/eGFR) over the short-term if the clinical condition or medications have changed (days to two weeks) and at least every six months when stable.
 - Monitor serum digoxin only if toxicity is suspected or for checking adherence
- Monitor and treat psychosocial consequences (i.e. non-compliance, anxiety, depression, fear, delirium, dementia, social isolation, home supports and need for respite care)
- Define and re-define the goals of treatment over time with the patient

RECOMMENDATION 12 **Prognosis of Heart Failure**

Outcomes in heart failure are highly variable and it is important to provide accurate information to patients about prognosis to enable them to make informed decisions about medications, devices, transplantation and end-of-life care.

- Poor prognostic factors include:
 - Recurrent hospitalization for acute heart failure
 - Advanced age (>75 years)
 - Female gender
 - Ventricular arrhythmias (non-sustained ventricular tachycardia) and atrial fibrillation
 - NYHA HF Classes 3 and 4
 - LVEF (<35%) or combined systolic and diastolic left ventricular dysfunction
 - Marked left ventricular dilatation (LVEDD > 70 mm)
 - High BNP levels (**see Table 1**) use of BNP for prognostication requires further study
 - Low-serum sodium (< 132 mmol/L)
 - Hypocholesterolemia

The Seattle Heart Failure model is a valuable resource for prognostication found at: <http://depts.washington.edu/shfm/>

RECOMMENDATION 13

Palliative and End-of-Life Care

Predicting time of death in HF is challenging given the cyclical nature of the disease. Helpful clinical prediction tools have been established (**see Recommendation 12**). Discussions regarding end-of-life care should be initiated with patients who have persistent NYHA Class IV symptomatology or an EF < 25% despite maximal medical therapy (at target doses of study drugs as mentioned above).

Prior to initiating end-of-life care ensure that:

- All precipitating factors have been addressed including:
 - Residual angina and hypertension
 - Adherence to salt and fluid restrictions
 - Adherence to medications
 - Contributory conditions (arrhythmias, anemia, infections, thyroid dysfunction)
- All active therapeutic options have been appropriately considered:
 - The patient is taking maximal medical therapy (target doses of study drugs)
 - Biventricular pacing (possibly indicated with QRS > 120 ms)
 - Implantable defibrillator (possibly indicated with LVEF < 30%)
 - Revascularization (percutaneous intervention or bypass surgery)
 - Transplantation options have been explored

Once the decision to initiate end-of-life care is made, the goal of therapy is to manage all symptoms (including those of comorbid conditions, e.g. chronic pain) and address function and quality of life issues.

Subsequent care should be based on the following principles:

- **Support of dying patients and their families.**
 - Caregivers should be consulted to determine their degree of burden.
 - It is important to ensure that advance care planning has been carried out, including for financial and health care decisions (e.g. Representation Agreement).
- **Control of pain and other symptoms**
 - Symptoms related to volume overload:
 - Adequate diuretic use (sometimes more than one agent) is important.
 - ACE-I dose may need to be reduced if limited by symptomatic hypotension and renal impairment (Cr > 250 µmol/L or > 30% from baseline).
 - Consider narcotic use with uncontrolled angina, or as a first-line for dyspnea
 - Consider choice and dose of narcotic as renal function is likely impaired – i.e. Hydromorphone for narcotic naïve, Duragesic patch.

- Consider home oxygen (See COPD Guideline for indications)
- **Decisions on the use of life-sustaining therapies**
 - Decisions need to be made as to whether and when to pursue hospital admission
 - Consider referral to palliative care/hospice teams if available in the community

Rationale

Heart failure (HF) is a clinical syndrome defined by symptoms suggestive of impaired cardiac output and/or volume overload in the setting of objective evidence of cardiac dysfunction. Most patients with cardiac dysfunction have not yet been diagnosed. It is estimated that 30% of the people who have cardiac dysfunction but are unaware of it will develop overt HF in the subsequent 3 years.¹ The one-year mortality rate for all ages for men and women is about 33% and increases to about 50% in patients with 3 or more comorbid conditions.² The one-year mortality rate can be as high as 61% in more elderly patients with comorbid conditions.²

Heart failure is most often caused by coronary artery disease³ and/or hypertension and it is a major cause of hospitalization of the elderly in Canada.⁴ About 80,500 British Columbians have been diagnosed with HF and the cost of managing HF patients in BC was about \$260 million in fiscal year 2005/06. The number of people with HF has risen from 71,600 in 2002/03, but the age-standardized mortality rate has declined by 22% due to increased use of beta-blockers (BB) and ACE Inhibitors (ACE-I) and better general care of patients with cardiovascular disease.⁵

Improvements in team-based coordination and case management with early intervention, improved pharmaceutical management, close follow-up, and caregiver and patient education about self-management have resulted in reduced hospital admissions.⁶⁻⁹ In one study, patients in the intervention group had fewer admissions for HF (37% vs 53%) and spent fewer days in hospital for HF (3.43 vs 7.46 days) than the control group.⁹ These studies have largely been based upon the model of nurse clinical care coordination from a HF clinic and need to be extended into primary care settings as outlined in this guideline.

Recent research provides guidance related to worsening renal function and decompensated HF.^{10,11} New guidelines from the Canadian Cardiovascular Society emphasize prevention, use of biomarkers such as brain natriuretic peptide (BNP) and management of intercurrent illness, acute decompensation, and HF in the elderly and those with comorbidity.¹² Natriuretic peptides such as BNP have been shown to be useful in the diagnosis of HF in patients with unexplained dyspnea in the acute and ambulatory care settings. Other clinical uses such as screening or guiding therapy, have not been sufficiently validated for widespread use.¹³

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This guideline is based on scientific evidence current as of the Effective Date.

This guideline was developed by the Guidelines and Protocols Advisory Committee, approved by the British Columbia Medical Association and adopted by the Medical Services Commission.

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The principles of the Guidelines and Protocols Advisory Committee are:

- to encourage appropriate responses to common medical situations
- to recommend actions that are sufficient and efficient, neither excessive nor deficient
- to permit exceptions when justified by clinical circumstances.

Appendices

Appendix A: Diuretics

Appendix B: Beta blockers

Appendix C: ACE inhibitors

Appendix D: Angiotensin receptor blockers

Appendix E: Direct acting vasodilators

Appendix F: Spironolactone

Appendix G: Digoxin

Associated Documents

The following documents accompany this guideline:

- Flow Sheet
- Patient Guide

Applicable Diagnostic Code: 428

Appendix A Diuretics

Rationale

- Used to control symptomatic volume overload

Beneficial Subsets

- NYHA class II-IV with fluid overload (edema, ascites, weight gain)

Goal/Dose

- Start with furosemide 20 mg/day and increase/decrease as needed
 - Divide the doses BID if > 80 mg/day are required
 - Aim for minimum effective dose to control symptoms of fluid overload
- If volume overload persists despite optimal medical therapy and progressive increases in furosemide dose (i.e. >120 mg BID) consider:
 - Changing furosemide to bumetanide as oral absorption may be improved
 - Cautious addition of metolazone 2.5-5 mg 30 min prior to furosemide dose
 - Start with a test dose 3 times/week, closely monitoring daily weight, as well as serum K⁺ and Cr/eGFR
- Note: Diuretics can be stopped once fluid overload resolves

Monitoring

- Check serum Cr, Na⁺ and K⁺ before initiating therapy and one to two weeks after each dose adjustment
- Watch K⁺ carefully: maintain K⁺ between 4.0-5.5 mmol/L
 - K⁺ may increase when using K⁺ sparing diuretics (spironolactone, triamterene, amiloride), especially when combined with an ACE-I or ARB
 - K⁺ may increase when K⁺ depleting diuretics decreased / discontinued while patient on K⁺ sparing diuretic, ACE-I and / or ARB
 - K⁺ may decrease when using K⁺ depleting diuretics (furosemide, metolazone, hydrochlorothiazide)

Dealing with Side-Effects

- If Cr increases > 30% from baseline
 - Reduce/hold diuretic until volume status normalizes
- If muscle cramping occurs check magnesium and calcium and replace as necessary
- If nocturia is a concern, avoid diuretic therapy after 2 pm

	USUAL STARTING DOSE	MAXIMUM TOTAL DAILY DOSE	DURATION
K⁺-depleting diuretics			
• Furosemide ²	20-40 mg daily or BID	600 mg	6-8 hours
• Bumetanide ²	0.5-1 mg daily or BID	10 mg	4-6 hours
• Ethacrynic acid ²	25-50 mg daily or BID	400 mg	6-8 hours
• Metolazone ³	2.5 mg daily	20 mg	12-24 hours
• Hydrochlorothiazide ³	25 mg daily or BID	200 mg	6-12 hours
K⁺-sparing diuretics			
• Triamterene ¹	50-75 mg BID	200 mg	7-9 hours
• Amiloride ¹	5 mg daily	5 mg	24 hours

¹potassium sparing, ² loop diuretic, ³ thiazide diuretic

Appendix B Beta-Blockers (BB)

Rationale

- BB are the most recent dramatic advance in HF medical treatment
- They slow disease progression, decrease hospitalization, decrease mortality and improve quality of life but have little effect on exercise duration

Beneficial Subsets

- All patients with chronic, stable HF (volume controlled NYHA Class I-IV)
 - Start when there is no physical evidence of fluid retention (i.e. euvolemic), with a heart rate > 60 bpm and a systolic BP > 85 mmHg
 - Not to be initiated in volume overloaded, acute or highly symptomatic HF

Considerations

- Contraindicated in patients with reactive airway disease (asthma) but can be used for patients with COPD, peripheral vascular disease or diabetes

Monitoring

- Monitor blood pressure, pulse rate and HF symptoms with dose adjustments

Dealing with Side-Effects

- Patients may clinically deteriorate over the first 6-12 weeks but persistence is necessary
- Adjustments may be required in the doses of other medication, including diuretics, vasodilators and ACE-I, at least in the titration phase, to increase the tolerance for BB
- Hypotensive effects:
 - Consider general measures as above (**See Recommendation 3**)
 - Reconsider need for nitrates, CCB, vasodilators and diuretics
 - Reassure: symptoms of dizziness often resolve within 2-4 weeks of titration
- Worsening fluid overload:
 - Intensify sodium and fluid restriction and/or increase diuretic dose
 - May have to temporarily reduce BB dose until volume control achieved then retry titration (halve dose if serious deterioration (**See Recommendation 9**))
- Significant bradycardia:
 - Obtain an ECG to exclude heart block
 - Reduce or eliminate other drugs that also slow heart rate (digoxin, diltiazem, verapamil, amiodarone)
 - Reduce dose of BB
 - Consider pacemaker support if severe bradycardia or high grade AV block

	STARTING DOSE	TITRATION	TARGET DOSE
Carvedilol (preferred)	3.125 mg PO BID	Increase by 50-100% q2-4 weeks	25 mg PO BID if <75 kg 50 mg PO BID if >75 kg
Bisoprolol	1.25 mg PO daily		10 mg PO daily
Metoprolol Tartrate or LCA	12.5 mg PO BID		100 mg PO BID*

LCA - low cost alternative

- * for Metoprolol Tartrate it is recommended to change to once daily sustained release formulation when target dose has been reached

Beta-Blocker Equivalent Doses

- The effect of BB in HF is not a class effect. It is recommended that patients already on a beta blocker be changed to one of the recommended agents as above. The following is presented as a rough guide based only on recommended “usual” and “starting” doses. Therefore, it is recommended that patients are followed closely during and after conversion.

The following doses are equivalent to carvedilol 12.5mg BID

acebutolol 100mg BID	metoprolol 50mg BID	propranolol 40mg BID
atenolol 50mg daily	metoprolol SR 100mg daily	propranolol LA 80mg daily
bisoprolol 5mg daily	nadolol 80mg daily	sotalol 80mg BID
labetolol 100mg BID	pindolol 5mg BID	timolol 5mg BID

Appendix C ACE-Inhibitors (ACE-I)

Rationale

- ACE-Is slow disease progression, improve exercise capacity and decrease hospitalization and mortality.

Beneficial Subsets

- All patients with HF (NYHA I-IV)

Contraindications

- If baseline kidney function impaired (eGFR <30 ml/min) do not start ACE-I
 - start hydralazine/nitrate combination and consult a nephrologist

Considerations

- ACE-I may cause a deterioration in kidney function and hyperkalemia, so careful monitoring is required during titration phase
- In most situations these drugs can be used successfully with dosage adjustments of concomitant medications

Monitoring

- Check Cr and K⁺ before initiating therapy and 1-2 weeks after each dose adjustment (sooner for the elderly)
- On stable therapy check Cr and K⁺ every 3-6 months

Dealing with Side-Effects

- In most situations these drugs can be used successfully with dosage adjustments of concomitant medications (i.e. diuretics, ARBs)
- If Cr increases > 30% from baseline:
 - First reduce/hold diuretic for 1-2 days; if no response then reduce/stop ACE-I and consider hydrolyzing/nitrate combination
 - When there is uncertainty about the underlying cause of kidney impairment or management thereof, referral to a nephrologist is encouraged.
- Intractable cough or drug-associated rash:
 - First ensure that cough is not due to poorly controlled HF
 - Stop ACE-I, consider ARB or hydrolyzing/nitrate combination if ARB not tolerated
- Angioedema may occur with ACE-I (may recur with ARB therapy)

	STARTING DOSE	TRIAL DOSE*	MAXIMUM DOSE
Ramipril (Altace®) or LCA	1.25 mg BID	5 mg BID	10 mg BID
Enalapril (Vasotec®)	2.5 mg BID	10 mg BID	20 mg BID
Captopril (Capoten®) or LCA	6.25 mg TID	50 mg TID	150 mg TID
Lisinopril (Prinivil®, Zestril®)	2.5 mg daily	35 mg daily	80 mg daily
Trandolapril (Mavik®),	1 mg daily	4 mg daily	4 mg daily
Perindopril (Coversyl®)	2 mg daily	8 mg daily	8 mg daily

* Target dose used in large CHF trials with clinical endpoints

Quinapril (or LCA), cilazapril (or LCA), fosinopril, and benazepril are available but have not been used in clinical trials, and thus their use cannot be endorsed.

Appendix D Angiotensin Receptor Blockers (ARBs)

Beneficial Subsets

- NYHA Class II-IV
- ARBs are not first-line agents and are reserved for patients intolerant of ACE-I or BB or for patients in NYHA class II and IV HF despite treatment with both ACE-I and BB

Contraindications, considerations, monitoring and dealing with side-effects

- See above – Same as ACE-I
- Note: Angioedema may recur with ARBs

	STARTING DOSE	TARGET DOSE
Candesartan (Atacand®)	4 mg daily	32 mg daily
Valsartan (Diovan®)	40 mg BID	160 mg BID
Losartan (Cozaar®)	25 mg daily	100 mg daily
Telmisartan (Micardis®)	40 mg daily	80 mg daily
Irbesartan (Avapro®)	75 mg daily	300 mg daily

Appendix E Direct-Acting Vasodilators

Rationale

- Hydralazine and nitrates in combination are effective at reducing afterload and preload with a mortality benefit that is inferior to ACE-I. For this reason ACE-I are generally preferred
 - May have greater benefit in patients of African-Canadian descent
 - Not associated with renal failure or hyperkalemia

Beneficial Subsets

- ACE-I intolerant patients
- Of note: nitrates can also be useful to relieve orthopnea, paroxysmal nocturnal dyspnea, exercise-induced dyspnea or angina (tablet, spray or transdermal patch)

Considerations

- Hydralazine results in a tachyphylaxis and may worsen myocardial oxygen demand
- Nitrates require a “drug free” interval, usually 12 hours, to decrease resistance

Goal/Dose

- Hydralazine and nitrates should be used concurrently

	STARTING DOSE	GOAL DOSE
Hydralazine	37.5 mg TID	75 mg TID
Isosorbide Dinitrate	20 mg TID	40 mg TID
or Nitropatch	0.2-0.4 mg/h x 12h/day	0.6-0.8 mg/h x 12h/day

Appendix F Spironolactone

Rationale

- Although a K⁺ sparing diuretic, this drug exerts its beneficial effects in HF through aldosterone antagonism
- Spironolactone decreases mortality and hospitalization and improves symptoms

Beneficial Subsets

- NYHA Class III-IV moderate to severe systolic heart failure

Considerations

- Extreme caution should be used when adding spironolactone to ACE-I and ARBs due to a propensity for hyperkalemia
- Avoid use in patients with renal dysfunction
- Hyperkalemia may develop if K⁺ depleting diuretic dose is decreased

Goal/Dose

- Start at 12.5 mg daily and titrate to 25 mg daily as tolerated (>25 mg rarely indicated)

Monitoring

- Check K⁺, Cr and eGFR at 3-7 days and 1-2 weeks after each dose adjustment

Side-effects

- Gynecomastia is known to occur in up to 5-10% of males

Appendix G Digoxin

Rationale

- Digitalis may improve symptoms, exercise tolerance and quality of life, but it has not been shown to improve survival

Beneficial Subsets

- NYHA Class II-III Systolic HF (digoxin has no role in HF with PSF with normal sinus rhythm)

Considerations

- Digoxin should be used with caution, especially in women and those with impaired renal function

Goal/Dose

- Usual dose is 0.125-0.25 mg/day through level 0.65-1 nmol/L 8-12 hours post-dose
 - As digoxin levels are typically drawn in the morning, digoxin should be dosed in the evening
- Digoxin: dose will need to be adjusted in the elderly, those with low body mass, those with impaired renal function and those taking amiodarone

Monitoring

- Electrolytes, Cr and digoxin serum concentrations should be obtained 5-7 days after dose adjustments (approximate time to steady-state).
 - Note: it may take 15-20 days to reach steady-state in patients with renal dysfunction
- Obtain a digoxin level whenever toxicity is suspected.
 - The most important toxic effects are life-threatening arrhythmias (e.g. ventricular tachycardia/fibrillation, complete atrioventricular block).
 - Other symptoms include nausea, vomiting, anorexia, diarrhea, confusion, amblyopia, and, rarely, xerophthalmia may occur.
 - Note: If hypokalemia or hypomagnesemia (often due to diuretic use) is present, even lower doses and lower serum levels can cause toxicity.

A GUIDE FOR PATIENTS

Effective Date: February 15, 2008

<p>Heart and Stroke Foundation of BC and Yukon</p> <p>The Heart and Stroke Foundation of BC and Yukon provides information regarding heart disease education and advocacy. HSF branches do not offer direct health care, but rather they offer information and various care management strategies.</p> <p>B.C./Yukon Division Office 1212 West Broadway Vancouver, B.C. V6H 3V2 Telephone: 604 736-4404 Toll-Free: 1 888 473-4636 Fax: 604 736-8732 Web site: http://www.heartandstroke.ca/</p>	<p>Heart Function Clinics</p> <ul style="list-style-type: none"> • Pentiction 250 492-4000 • Fraser Health (Burnaby Hospital) 604 412-6109 • Fraser Health (Surrey Memorial Hospital) 604 588-3003 • Vancouver (St Pauls Hospital) 604 806-8733 • Vancouver Island Health Authority (Royal Jubilee Hospital) 250 519-1601 <p>The Canadian network of Heart Failure Clinics maintains an excellent Web site that includes a video explaining heart failure. Log on to: http://www.cchfcn.org/nonmembers</p>	<p>Common Medications for Heart Failure</p> <p>ACE Inhibitors These are drugs such as ramipril, enalapril, captopril, and lisinopril. They help improve your heart's pumping action and prevent your disease from getting worse. Angiotensin receptor blockers (ARBs) have a similar function.</p> <p>Beta Blockers These are drugs such as carvedilol, bisoprolol and metoprolol. They reduce how hard your heart has to work and prevent your disease from getting worse. They also help to prevent and treat irregular heartbeat.</p> <p>Diuretics These are drugs such as furosemide. They work to improve symptoms by relieving fluid overload.</p> <p>Aldosterone Antagonists Drugs such as spironolactone block some of the negative complications and keep potassium levels steady when you are on a diuretic.</p>
<p>Local Community Health Services/Rehabilitation Support</p> <p>There are a number of other health professionals who may assist you. Whenever possible, develop a consistent relationship with each:</p> <ul style="list-style-type: none"> • Community Health Nurses • Nutritionists • Pharmacists • Cardiologist/Geriatrician /Other internist • Healthy heart programs • Support groups • Cardiac rehabilitation centres • Cardiac Nurse Specialists • Palliative Care Teams 	<p>The Healthy Heart Society</p> <p>The Society is involved in building the capacity of communities to develop and maintain healthy heart programs. It maintains a Web site with a list of cardiac rehabilitation programs throughout the province.</p> <p>Suite 401 1212 West Broadway Vancouver, B.C. V6H 3V2 Telephone: 604 742-1772 Fax: 604 742-1773 Toll free: 1 888 742-1772 Web site: http://www.heartbc.ca</p>	<p>Diuretics These are drugs such as furosemide. They work to improve symptoms by relieving fluid overload.</p> <p>Aldosterone Antagonists Drugs such as spironolactone block some of the negative complications and keep potassium levels steady when you are on a diuretic.</p> <p>Digoxin Usually called digoxin or lanoxin. This drug works to help relieve symptoms or control irregular heartbeat.</p> <p>Anti-coagulants Drugs such as aspirin and warfarin are used to prevent heart attack and/or stroke.</p>
<p>Ministry of Health Primary Health Care</p> <p>Web site: http://www.health.gov.bc.ca/cdm/patients/chf/</p>	<p>BC HealthGuide Web site: http://www.bchealthguide.org</p> <p>BC HealthGuide NurseLine: The 24-Hour BC HealthGuide NurseLine puts you in touch with a registered nurse any time, day or night, just by calling one of the following numbers:</p> <ul style="list-style-type: none"> • Province-wide toll free: 1 866 215-4700 • Local calling within Lower Mainland: 604 215-4700 • Deaf and hearing-impaired toll-free, province wide: 1 889 TTY-4700 	<p>Anti-coagulants Drugs such as aspirin and warfarin are used to prevent heart attack and/or stroke.</p>

PATIENT REMINDERS

Heart Failure

Heart Failure (HF) is a condition which usually happens over a period of time.

With HF, the heart muscle is weakened and does not pump well.

This can result in poor blood circulation to tissues and organs of the body. Also, blood can “back up” causing symptoms such as:

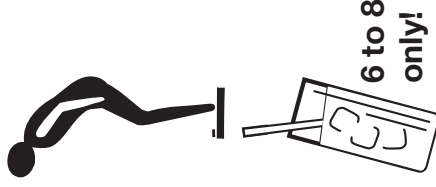
- Shortness of breath
- Swelling of hands and lower legs
- Sensation of bloating
- Irregular heart beat
- Waking at night with sudden shortness of breath
- Trouble breathing when lying flat

Steps to Help Reduce Symptoms

1. Weigh yourself daily before breakfast.

Your goal weight is:

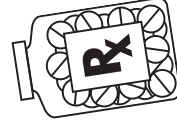
2. Limit fluid intake to 6 to 8 cups per day



3. Avoid high salt foods



4. Don't add extra salt to your food



5. Take your medications as prescribed

6. Try to get a little exercise each day



7. Avoid alcohol and smoking

When to Call or Visit Your Doctor

If you gain 5 lbs (2.5 kg) in a week or 4 lbs (2kg) in 2 days



If you are thinking of changing any of your medications (including non-prescription)

If you notice any of the following:

- Chest pain
- Sudden dizziness or heart palpitations
- Increased fatigue
- Trouble breathing when lying flat
- Increased shortness of breath
- Difficulty breathing at night
- Increased signs of swelling such as swollen ankles, bloating, or clothing feels tight





CONGESTIVE HEART FAILURE FLOW SHEET

This Flow Sheet is based on the Guideline, *Heart Failure Care*
Web site: <http://www.BCGuidelines.ca>



NAME OF PATIENT	SEX <input type="checkbox"/> M <input type="checkbox"/> F	TYPE OF HEART FAILURE <input type="checkbox"/> Systolic (EF ≤40%) <input type="checkbox"/> Diastolic (EF >40%)	DATE OF BIRTH	AGE AT DIAGNOSIS
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CARE OBJECTIVES	SELF MANAGEMENT (Discuss with patient)
<p>RISK FACTORS AND CO-MORBID CONDITIONS</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <input type="checkbox"/> Obesity <input type="checkbox"/> Smoker <input type="checkbox"/> Alcohol <input type="checkbox"/> Diabetes <input type="checkbox"/> HTN <input type="checkbox"/> CAD <input type="checkbox"/> Cardiomyopathy <input type="checkbox"/> Atrial fib <input type="checkbox"/> Asthma <input type="checkbox"/> COPD <input type="checkbox"/> Renal disease <input type="checkbox"/> Other: _____ </div> <div style="width: 60%;"> <p>Baseline Investigations (✓ when done; normal or add values prn)</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <input type="checkbox"/> FBG: _____ <input type="checkbox"/> TSH: _____ <input type="checkbox"/> eGFR: _____ <input type="checkbox"/> AST: _____ <input type="checkbox"/> Albumin: _____ <input type="checkbox"/> CBC: _____ <input type="checkbox"/> U/A: _____ </div> <div style="width: 45%;"> <input type="checkbox"/> ECG _____ <input type="checkbox"/> CXR _____ <input type="checkbox"/> Echo (date): <div style="border: 1px solid black; width: 60px; height: 20px; display: inline-block;"></div> EF _____ % <div style="border: 1px solid black; width: 60px; height: 20px; display: inline-block;"></div> EF _____ % </div> </div> </div> </div>	<input type="checkbox"/> Define management goals (Lifestyle; Risk factor reduction; Treat co-morbid conditions) <input type="checkbox"/> Monitor & reduce symptoms <ul style="list-style-type: none"> • Daily weights • Goal weight: _____ • Fluid intake (4-8 cups per day) • Sodium (2-3 gram per day) • Avoid alcohol • Exercise (20-30 mins 3-4 X/week) <input type="checkbox"/> Heart Failure Patient Guide <input type="checkbox"/> End-of-life directives

VISITS (3 - 6 MONTHS)

DATE	BP	WEIGHT Lbs Kg	LABS (most recent)			SYMPTOMS REVIEW; EXAM NOTES; MEDICATIONS	*NYHA CLASS
			Na	K	eGFR		
BASELINE REVIEW OF CLINICAL STATUS AND MEDICATIONS (SET TARGET DOSES)							

REMINDEES: Review Na/fluid intake and activity levels
TREATMENT RECOMMENDATIONS (SEE REVERSE)

VACCINATIONS

Annual Flu: DATE

Pneumovax: DATE

*NYHA CLASS	SEVERITY
I	No symptoms
II	Symptoms with ordinary activity
III	Symptoms with less than ordinary activity
IV	Symptoms at rest

Care of Heart Failure in Adults: Summary

Diagnosis

- Distinguish systolic (more fully researched treatment; poorer prognosis) and diastolic heart failure.
- For systolic, ejection fraction (EF) $\leq 40\%$; for diastolic, EF $> 40\%$.
- Both types display heart failure signs and symptoms (fatigue, fluid retention, dyspnea).

Evaluation (beyond thorough history and physical examination)

- Assess volume status.
- Assess vascular risk factors and comorbid conditions.
- Lab: CBC, urinalysis; serum albumin, AST, BUN, creatinine/GFR, electrolytes, FBS, TSH; 12 lead ECG.
- Imaging: CXR; 2D Doppler echocardiography (less desirable is radionuclide ventriculography).
- Brain natriuretic protein (BNP) if available.

Therapy for underlying/contributing causes

- Hypertension
- Ischemic heart disease
- Atrial fibrillation
- Hypertrophic cardiomyopathy (consider referral)

Follow-Up

- Patient self-management is important (e.g. goal setting, salt restriction, weight monitoring, rehab).
- Immunize for influenza and Pneumococcus.
- Monitor electrolytes and Cr/eGFR if condition or medications change and at least q6 months.
- Monitor digoxin levels only if there are concerns about toxicity or compliance.

DRUG THERAPY FOR SYSTOLIC HF (EF < 40%)

