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Guidelines & Protocols Advisory Committee

Heart Failure – Diagnosis and Management

Effective Date: July 26, 2023

Scope

This guideline provides recommendations for the diagnosis and management of people aged ≥ 19 years with suspected or confirmed heart failure in the ambulatory primary care setting. Given that heart failure is associated with reduced life expectancy, advanced care planning and palliative care are also addressed.

For specific guidance on heart failure in ***acute care settings*** refer to the Canadian Cardiovascular Society Heart Failure guidelines.

Key Recommendations

- Echocardiogram (ECHO) is the gold standard for assessing structural and/or functional cardiac abnormalities and determining ejection fraction to guide treatment planning.
- BNP and NT-proBNP tests have a high sensitivity for the detection of heart failure (HF) and can help with diagnosis while waiting for echocardiogram.
- There are cornerstone therapies that improve clinical outcomes (e.g., reduced hospitalizations, and mortality, improved quality of life) in patients with HF with reduced ejection fraction (HFrEF) and HF with preserved ejection fraction (HFpEF) necessitating their rapid implementation in eligible patients.
- **NEW:** It is recommended that in the absence of contraindications, **patients with HFrEF** be treated with combination therapy including one medication from each of the following categories: Angiotensin receptor-neprilysin inhibitors (ARNI) [or Angiotensin-converting enzyme inhibitors (ACEI)/Angiotensin receptor blockers (ARB)]; beta-blockers (β-blockers); Mineralocorticoid receptor antagonists (MRA); and Sodium-glucose cotransporter-2 inhibitors (SGLT2i). These four medications should be initiated and titrated in parallel as quickly as possible.
- Patient and caregiver education about the importance of self-monitoring and early identification of disease decompensation is crucial to avoid hospitalization and to inform acute treatment.
- Consider referral to a heart function clinic or a multi-disciplinary chronic disease management clinic, where available.
- Initiate advance care planning discussions early in the disease course.
- Incorporate a palliative approach as the disease progresses and/or as per patient preference.

Definition

The new universal definition of heart failure (HF):

- Signs and/or symptoms caused by a structural and/or functional cardiac abnormality based on ECHO findings AND
- Elevated natriuretic peptide levels (BNP or NT-proBNP*) OR objective evidence of cardiogenic, pulmonary or systemic congestion.[1]

* B -Type natriuretic peptide or N-terminal pro B-type natriuretic peptide prohormone of BNP

Epidemiology

According to 2020/2021 data,[†] 2% of the population in BC is affected by HF (prevalence of 137,082), with 18,512 new cases (incidence) in 2020/21.

Diagnosis

Diagnosis begins with a suspicion of HF based on clinical history (risk factors, symptoms) and physical examination, and is then confirmed with natriuretic peptide testing and ECHO.[2,3] See Figure 1: Diagnosis of Heart Failure.

Edema, fatigue, and dyspnea are typical but not specific symptoms of HF; atypical presentations may need to be considered, particularly for women, elderly and obese patients.[4,5]

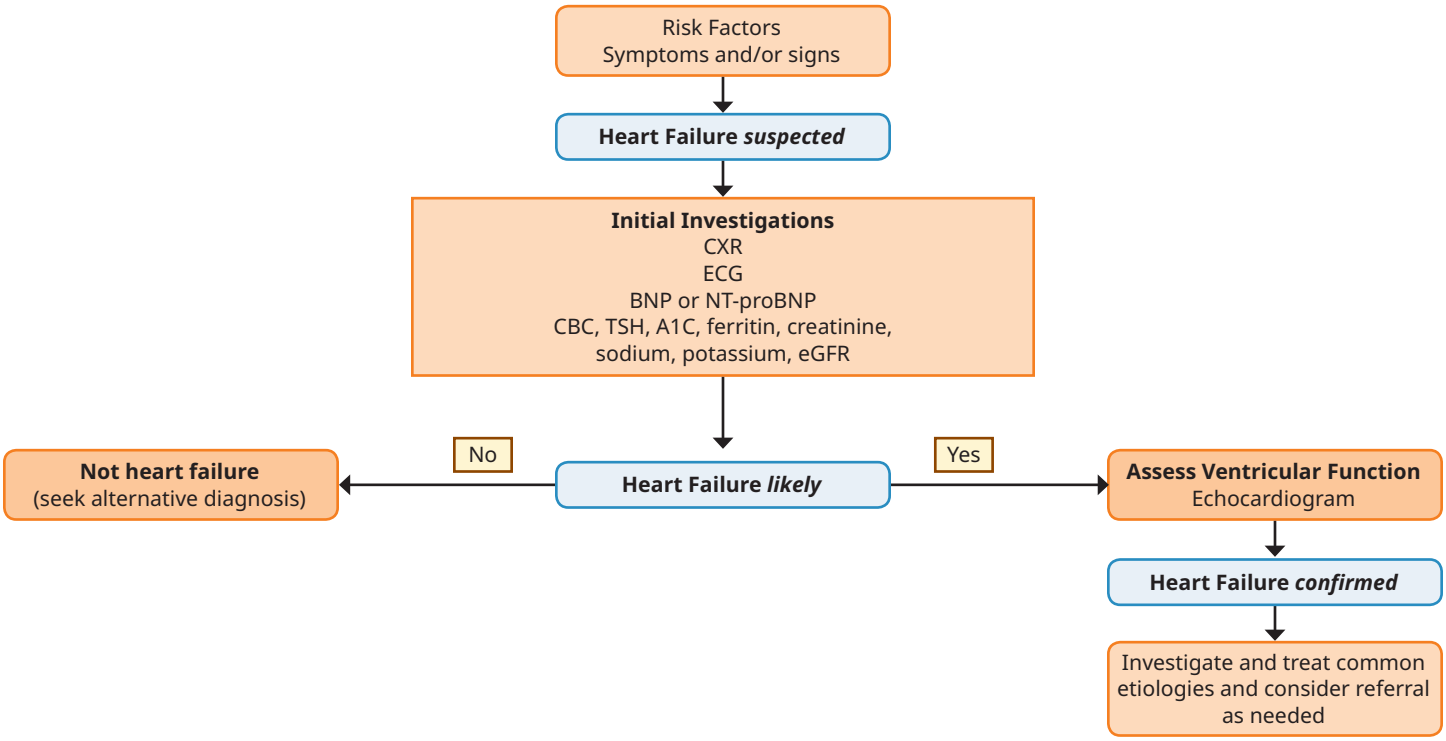
Initial investigations should be targeted to confirm or exclude HF, and to identify systemic disorders that might affect its development or progression (e.g., thyroid dysfunction).

Table 1: Risk factors, Symptoms and Signs of Heart Failure

Risk Factors	Symptoms	Signs
• Hypertension • Atrial fibrillation • Coronary artery disease • Diabetes • Obesity • Valvular heart disease • Preeclampsia • Dyslipidemia • Family history of cardiomyopathy • Poor health behaviors (e.g., smoking, heavy alcohol or substance use, inactivity)	• Dyspnea, including shortness of breath • Fatigue • Leg swelling • Confusion (especially in the elderly) • Orthopnea • Paroxysmal nocturnal dyspnea	• Weight gain (over 2 kg/week) • Low blood pressure (BP) • Heart rate > 100 BPM • Lung crackles • Elevated jugular venous pressure • Heart murmur • 3rd heart sound, 4th heart sound (S3, S4) • Displaced apex • Positive abdominal jugular reflux • Peripheral edema

[†] British Columbia Ministry of Health [data provider]. BC Observatory for Population and Public Health [publisher]. Chronic Disease Dashboard. Available at: http://www.bccdc.ca/health-info/disease-system-statistics/chronic-disease-dashboard

Figure 1: Diagnosis of Heart Failure



Abbreviations: **BNP** – B -Type Natriuretic Peptide, **CBC** – Complete Blood Count, **CXR** – Chest X-Ray, **ECG** – Electrocardiogram, **NT-proBNP** – N-terminal pro B-type natriuretic peptide

Common etiologies for heart failure include tachyarrhythmia, valvular disease, coronary artery disease, and left ventricular hypertrophy. There are several less common etiologies.

N-terminal pro B-type natriuretic peptide Testing

- Both BNP and NT-proBNP tests have a high sensitivity and clinical utility for the detection of HF and similar clinical utility. In BC, the laboratory determines which test is performed. In most instances in this guideline, the terms BNP and NT-proBNP are used interchangeably.
- An abnormally high BNP test result does not eliminate the need for cardiac imaging, but in many cases it may allow treatment to begin while waiting for ECHO.
- Interpretation of BNP values differ significantly depending on acute versus ambulatory settings.
- In the ambulatory setting, even a mildly elevated BNP (BNP > 50, NTproBNP > 125 ng/L) indicates need for further investigation and treatment.
- BNP is **NOT** recommended to screen asymptomatic patients without risk factors, or for interval monitoring of disease severity or therapeutic response.

Table 2: Natriuretic Peptide cut points for the diagnosis of HF
(adapted from Table 9. Natriuretic peptide cut points for the diagnosis of HF of the 2017 CCS Heart Failure Guidelines)

	Age (years)	HF is unlikely	HF is possible but other diagnoses need to be considered	HF is very likely
Acute setting				
BNP	All	< 100 ng/L	100-400 ng/L	> 400 ng/L
NT-proBNP	< 50	< 300 ng/L	300-450 ng/L	> 450 ng/L
	50-75	< 300 ng/L	450-900 ng/L	> 900 ng/L
	> 75	< 300 ng/L	900-1800 ng/L	> 1800 ng/L
Ambulatory care setting				
BNP	All	< 50 ng/L		
NT-proBNP	All	< 125 ng/L		

BNP – N-terminal pro B-type natriuretic peptide; **HF** – heart failure; **NT-proBNP** – N-terminal propeptide BNP.

Echocardiography

ECHO should be performed in all patients with suspected HF to assess cardiac structure, quantify systolic and diastolic function, and to facilitate treatment planning and prognostication. There is regional variation in timely access to ECHO in BC. Delays in obtaining ECHO should not delay initiation of treatment in cases where HF is likely.

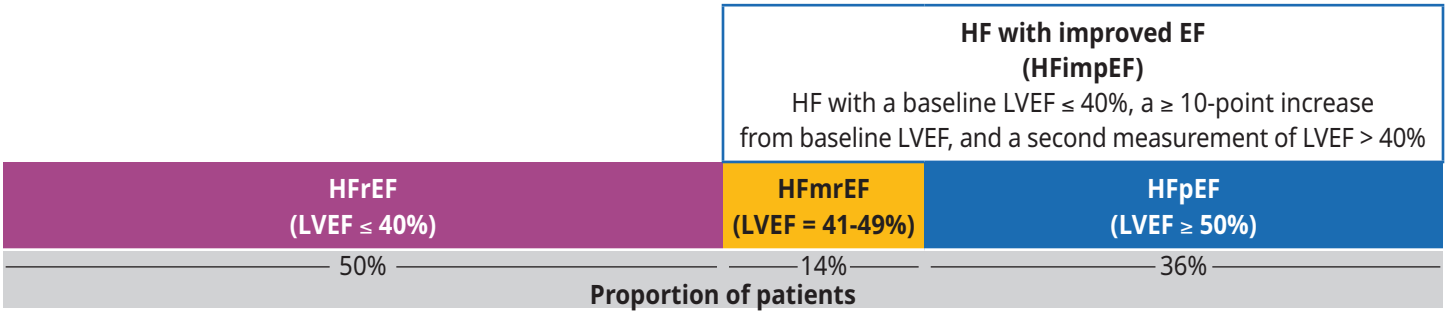
Though not a replacement for ECHO, an estimate of left ventricular function may be obtained through alternate imaging modalities:

- Thallium and Sestamibi (MIBI) scan – especially in those patients where ischemia may be the underlying etiology.
- Multi Gated Acquisition Scan (MUGA) or radionuclide angiography – especially for patients with chronic obstructive pulmonary disease or obesity, which may affect ECHO image quality.

Ejection Fraction

Left ventricular ejection fraction (LVEF) is the primary measure of left ventricular systolic function. Normal LVEF is approximately 60%. Management of HF is based upon LVEF.

Figure 2: Classifications of Ejection Fraction*



Abbreviations: **EF** – Ejection Fraction; **HF** – Heart Failure; **LVEF** – Left Ventricular Ejection Fraction. **HFrEF** – Heart Failure with reduced Ejection Fraction, **HFmrEF** – Heart Failure with mild reduced Ejection Fraction, **HFpEF** – Heart Failure with preserved Ejection Fraction

*Adapted from Bozkurt B et al. Eur J Heart Fail. 2021;23:352

New York Heart Association (NYHA) Functional Classifications

Determine NYHA functional classification in order to guide therapy and determine prognosis.

Table 3: New York Heart Association (NYHA) Functional Classifications[3]

Class	Degree of Symptoms with Physical Activity and at Rest
I – mild	Asymptomatic with ordinary physical activity, no limitations on physical activity, comfortable at rest
II – mild	Symptoms with ordinary activity, slight limitations on physical activity, comfortable at rest
III – moderate	Symptoms with less than ordinary activity, noticeable limitations on physical activity, and comfortable at rest
IV – severe	Symptoms at rest, unable to perform any activity without symptoms

Management

Patients with HF benefit from frequent assessments and continuity of care, ideally with multi-disciplinary support.

Self-Monitoring and Health Behavior Changes[6]

HF care may benefit from the patient and their caregiver's understanding of, and participation in, optimal care in a culturally safe context. Educate the patient and their caregiver(s) on health behavior changes (see Appendix A: Health Behavior Modifications and Self-monitoring Recommendations), HF Zones (see Appendix B: Heart Failure Zones Reference Guide), and medications (see HealthLinkBC: *Heart Failure Medications*, RxFiles: SADMANS medications in heart failure). See Patient, Family and Caregiver Resources section for a list of patient resources.

Pharmacologic Management

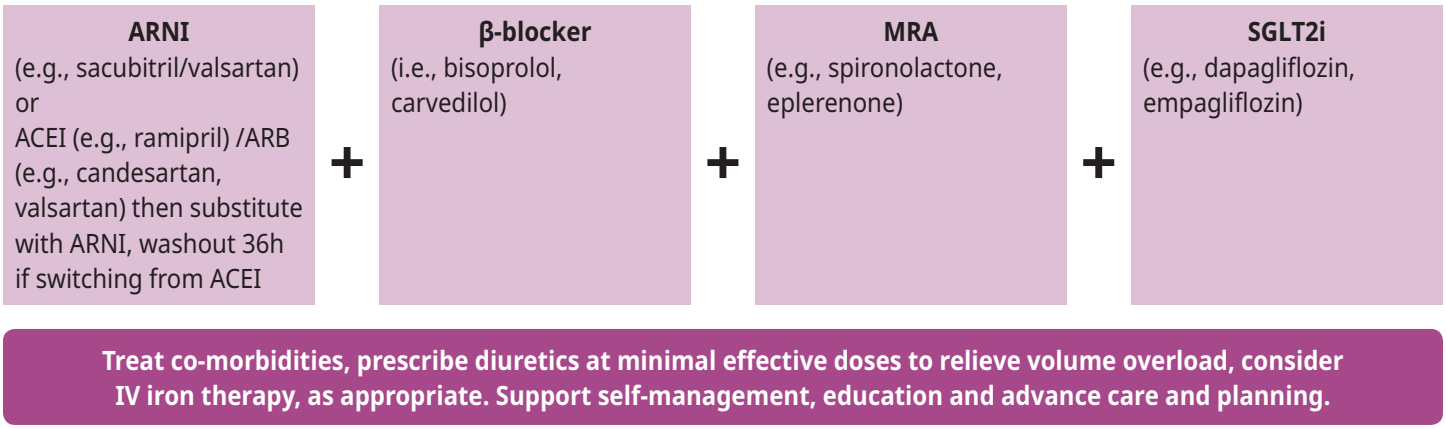
For all patients with HF ***regardless*** of LVEF:

- Initiate appropriate treatment for HF (even while awaiting ECHO).
- Once an ECHO is completed, treatment is guided by LVEF.
- Consider diuretic therapy to relieve volume overload and for symptom management.
- Consider initiation of a sodium-glucose cotransporter-2 inhibitor (SGLT2i) and mineralocorticoid receptor antagonist (MRA) to improve cardiovascular outcomes.
- If recently discharged from hospital or experiencing worsening HF symptoms, rapid initiation and up-titration of guideline directed medical therapy (GDMT) reduces cardiovascular mortality and future HF hospitalization.
- GDMT refers to the combination pharmacotherapy used for the treatment of patients with HFrEF and HFpEF.
- Those who fall under the HFimpEF category have a 56% decrease in mortality risk and reduction in hospitalizations.[5,7] However, there is evidence of relapse when GDMT is reduced or eliminated, so continuing with GDMT is recommended.[8]
- Treat co-morbidities like atrial fibrillation, hypertension, diabetes mellitus, renal disease, and sleep apnea based on established BCGuidelines.ca.
- Review medications for intended and unintended effects (e.g., polypharmacy, drug-drug interactions, and aggravation of co-morbid conditions).
- Although studies demonstrating the benefits of HF therapy did not include frail elderly patients, age alone should not preclude attempts to optimize GDMT.[9]

Heart Failure with Reduced Ejection Fraction (LVEF ≤ 40%)

- Patients with HFrEF should be treated early with a combination of four medications, one from each of the following classes: angiotensin receptor-neprilysin inhibitor (ARNI), beta-blocker (β-blocker), MRA, and SGLT2 inhibitor (SLGTi). This GDMT/quadruple therapy has been shown to have substantial and sustained reductions in mortality, HF hospitalizations, and symptom burden, even at low doses.[5,10–17]
- It is preferable to titrate medication doses simultaneously and as quickly as possible ("in-parallel" approach), rather than titrating one medication before initiating an additional agent ("strict sequential" approach).[18]
- The principles behind treatment are to: treat early, use combination of all four medications, up titrate rapidly, and aim for target dose of each medication.
- Consider IV iron therapy for patients with HFrEF who meet all of the following criteria: ejection fraction ≤ 40%, serum ferritin < 100 µg/L or between 100-299 µg/L, and TSAT < 20%.[18]
- See Appendix C: Commonly Used Drugs for in Heart Failure Care for dosages, Pharmacare coverage and therapeutic considerations for drug classes used in the management of patients with HF. The appendix also includes titration and renal function considerations. Consider consultation with your local specialist or a RACE line clinician when further guidance is needed.

Figure 3: GDMT for Heart Failure Reduced Ejection Fraction (HFrEF) LVEF ≤ 40%

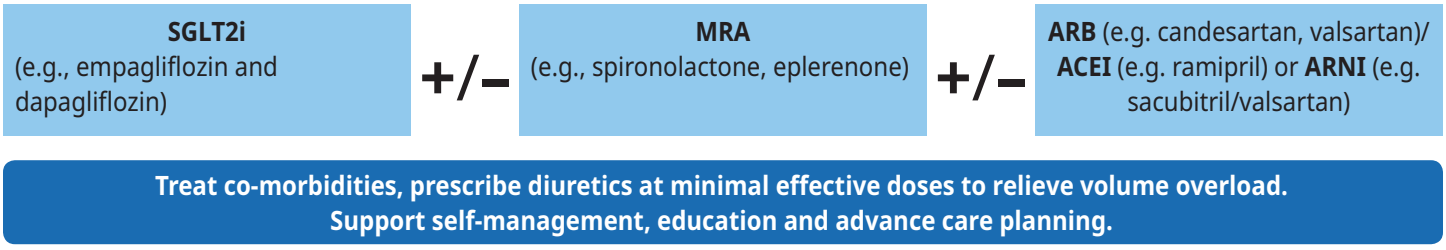


Abbreviations: **ACEI** – Angiotensin Converting Enzyme Inhibitors, **ARB** – Angiotensin Receptor Blocker, **ARNI** – Angiotensin Receptor-Neprilysin Inhibitor (ARNI), **GDMT** – Guideline Directed Medical Therapy, **MRA** – Mineralocorticoid Receptor Antagonist, **SGLT2i** – Sodium-Glucose Cotransporter-2 Inhibitor

Heart Failure with Mildly Reduced Ejection Fraction (EF 41-49%) and Heart Failure with Preserved Ejection Fraction (EF ≥ 50%)

- To improve symptoms:
  - Use ***minimal effective*** diuretic dose to achieve and maintain euvolemia.
- To improve outcomes:
  - Initiate an SGLT2i (e.g., empagliflozin and dapagliflozin). SGLT2i therapy reduces hospitalizations as well as all-cause and cardiovascular mortality across age, sex, race, HF and EF classification.[5,19,20]
  - Consider MRA (in all eligible patients) to reduce HF hospitalization.[21]
  - In select patients, consider initiating an angiotensin receptor-neprilysin inhibitor (ARNI). In large randomized clinical trials, patients with HFmrEF had fewer hospitalizations when treated with an ARNI compared to an Angiotensin Converting Enzyme Inhibitors (ACEI).

Figure 4: GDMT for Heart Failure with Mildly Reduced Ejection Fraction (LVEF 41-49%) and Heart Failure with Preserved Ejection Fraction (LVEF ≥ 50%)



Abbreviations: **ACEI** – Angiotensin Converting Enzyme Inhibitors, **ARB** – Angiotensin Receptor Blocker, **ARNI** – Angiotensin Receptor-Neprilysin Inhibitor (ARNI), **GDMT** – Guideline Directed Medical Therapy, **MRA** – Mineralocorticoid Receptor Antagonist, **SGLT2i** – Sodium-Glucose Cotransporter-2 Inhibitor

Reassessment and Follow-up

- **For all patients, regardless of their EF status, periodic assessment of renal function and potassium is recommended. Renal function and electrolytes should be checked with each adjustment of diuretic, MRA, and/or ACEI/ARB/ARNI dose.**
- For patients with HFrEF, EF should be reassessed after maximally tolerated GDMT has been achieved, and before deciding on further treatment options.
- Once clinically optimized, *routine surveillance* with ECHO is *not indicated* unless the patient's clinical status changes. A follow-up ECHO may be warranted in 3-5 years.

Clinical follow-up frequency recommendations:

1-4 weeks or as clinically indicated:

- Those classified with NYHA III or IV symptoms, recent HF hospitalization, during titration of HF medications, new onset heart failure, complications of HF therapy (e.g., rising creatinine, hypotension), needing to down-titrate or discontinue ß-blockers or ACEI/ARB, severe concomitant and active illness (e.g., COPD, frailty), frequent implantable cardioverter defibrillator (ICD) firings.

1-6 Months:

- Those with no clear features of high or low risk.

6-12 months:

- NYHA I or II.
- No hospitalizations in past year.
- No recent changes in medications, receiving optimal medical/device HF therapies.

Worsening HF:

- By the time a person reports worsening symptoms of fluid overload or has overt signs of fluid overload on clinical exam, they may have been progressing over days or even weeks. They should be addressed as soon as possible to avoid further decline, hospitalization or even death.
- Identify triggers and treat appropriately. Treat volume overload, optimize therapies and reinforce education.
- If a patient fails to improve, consider referral to a heart failure clinic and/or specialist, including RACE.

Indications for Referral

Refer to a Cardiologist/Internist:

- Persistent symptoms or signs of HF despite attempts TO OPTIMIZE medical therapy.
- To aid in diagnosis and management of HF where valvular disease or coronary disease is a significant contributing factor.
- If a rare underlying etiology is suspected.
- For assistance with diagnosis or management, refer the patient to a heart function clinic or a multi-disciplinary chronic disease management clinic, if available.

Refer to a Heart Function Clinic, if available, for:

- Management after a recent admission or repeated admissions to hospital.
- Assessment of asymptomatic left ventricular dysfunction.
- Assistance with multidisciplinary HF care including education on lifestyle management skills.
- Consideration for procedural interventions including PCI, surgery, and implantable devices.
- See Cardiac Services BC for Heart Function Clinics in BC

Device Management:

- Decisions about device management (e.g., implantable cardioverter defibrillator [ICD], cardiac resynchronization therapy [CRT]) are complex and involve a cardiologist/internist/cardiac electrophysiologist/Heart Function Clinic.
- Appropriate ICD utilization is associated with improved mortality, but does not improve quality of life. By contrast, CRT is associated with improved mortality and quality of life (i.e., improved symptom status and functional capacity) in properly selected individuals.[18]

ICD may be considered in patients with one of the following:

- History of hemodynamically significant sustained ventricular arrhythmia;
- Ischemic cardiomyopathy and LVEF ≤ 35% (measured at least 1 month after acute myocardial infarction, or 3 months post coronary artery revascularization); or
- Non-ischemic cardiomyopathy and LVEF ≤ 35% (measured at least 9 months after optimal medical therapy).

ICD ***should not be*** considered in patients with active NYHA Class IV symptoms.

CRT may be considered in patients with NYHA class II – IV symptoms despite maximally tolerated HF therapies, with a QRS duration ≥ 130 ms, and LVEF ≤ 35%.

Palliative Care and End of Life Care

Palliative care offers the potential to improve quality of life for cardiac patients with advanced disease. Unfortunately, many patients perceive palliative care in a negative context, equating it with hospice care. As a result, very few cardiac patients receive appropriate palliative care. For those who do, it typically occurs quite late in the disease trajectory, limiting the benefit. Do not delay advance care planning conversations or palliative care for a patient with serious illness who has physical, psychological, social, or spiritual distress because they are pursuing disease-directed treatment.

A palliative care approach addresses management of pain, dyspnea, other symptoms, and prioritizes quality of life. This may include support for the patient's family and caregivers.

Some resources include:

- Supportive Cardiology Tool – a clinician tool which focuses on delivery of care from the primary care perspective.
- What Really Matters Now, a comprehensive resource for patients with advanced heart failure.
- BCGuidelines.ca: *Palliative Care for the Patient with Incurable Cancer or Advanced Disease*.
- HealthLinKBC: Palliative Care and MOST forms

Table 4: Reasons to Consider Palliative Care Consultation in Heart Failure*

***Any one* of the following:** • Two or more hospital admissions for HF in the prior 6 months • Two or more emergency department visits for HF in the prior 6 months • Progressing disease or substantial worsening of prognosis or quality of life • NYHA class III or IV symptoms • Ventricular arrhythmias refractory/not amenable to medication • Substantial worsening or difficulty in controlling other physical or psychological symptoms from heart failure • Patient or family request
AND
***At least one* of the following:** • Ineligible or not interested in advanced heart failure therapies (outpatient inotropic infusion, left ventricular assist device, cardiac transplantation) • Consideration for high-risk procedures (cardiac surgery, thoracic surgery) • Consideration for ICD • Consideration for feeding tube placement, tracheostomy, or initiation of renal replacement therapy • Comorbidity (chronic renal failure, diabetes, cancer, stroke, cancer, human immunodeficiency virus, pulmonary fibrosis, oxygen-dependent chronic obstructive pulmonary disease) • Previous/current intensive care/cardiac intensive care unit admission or CPR within past year • Negative response to the 'surprise' question: "Would you be surprised if the patient died within 1 year?" (although the 'surprise' question does not have great predictive value in non-cancer populations) • Significant worsening of comorbidity (e.g., oxygen requirement) • Disagreements, uncertainty, or ethical concerns concerning treatment decisions or resuscitation preferences • Perceived emotional, spiritual, or relational distress to patient, family, or surrogate • Functional or cognitive decline, loss of independence, complex care requirements • Withdrawal or significant reduction of evidence-based medication

*Adapted from Slawnych, New Dimensions in Palliative Care Cardiology, CJC, 2018[22]

Resources

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Abbreviations:

ACEI	Angiotensin-converting enzyme inhibitors
ARNI	Angiotensin Receptor-neprilysin Inhibitor
BNP	B -Type Natriuretic Peptide
CRT	Cardiac Resynchronization Therapy
CVD	Cardiovascular Disease
ECG	Electrocardiogram
ECHO	Echocardiogram
GDMT	Guideline Directed Medical Therapy
HF	Heart Failure
HFmrEF	HF Mild Reduced Ejection Fraction
HFpEF	HF Preserved Ejection Fraction
HFrEF	HF Reduced Ejection Fraction
ICD	Implantable Cardioverter Defibrillator
LVEF	Left Ventricular Ejection Fraction
MIBI	Thallium and Sestamibi scan
MRA	Mineralocorticoid Receptor Antagonist
MUGA	Multi Gated Acquisition Scan
NT-proBNP	N-terminal pro B-type natriuretic peptide Prohormone of BNP
NYHA	New York Heart Association
SGLT2i	Sodium-Glucose Cotransporter-2 Inhibitor
TSH	Thyroid Stimulating Hormone

Practitioner Resources

- **Cardiac Services BC, www.cardiacbc.ca** generates and shares accurate, current, and relevant HF information for health care professionals and patients in BC.
- **RACE: Rapid Access to Consultative Expertise Program** – RACE means timely telephone advice from specialist for Physicians, Medical Residents, Nurse Practitioners, Midwives, all in one phone call.
  - Monday to Friday 0800 – 1700
  - Online at www.raceapp.ca or though Apple or Android mobile device. For more information on how to download RACE mobile applications, please visit www.raceconnect.ca/race-app/
  - Local Calls: 604–696–2131 | Toll Free: 1–877–696–2131
  - For a complete list of current specialty services visit the Specialty Areas page.
- **BC Ministry of Health – Advance Care Planning**, HealthLinkBC Planning for Advance Care. Each health authority also has an Advance Care Planning website.

Patient, Family and Caregiver Resources

- CardiacServicesBC (www.cardiacbc.ca): Multiple patient handouts available.
- HealthLinkBC: Heart Failure Overview
- HealthLinkBC: Heart Failure: Taking Medicines Properly
- HealthLinBC: Monitoring and Medicines for Heart Failure
- Island Health Community Virtual Care: Community Virtual Care provides support to people with a range of medical conditions. Registered nurses help you to manage your condition from the comfort of your home. All the tools needed are loaned to you at no cost.
- Canadian Heart Failure Society: Living Well with Heart Failure
- Canadian Heart Failure Society: How to manage your heart failure medication ON SICK DAYS?
- RxFiles: SADMANS medications in heart failure
- Heartlife Foundation: Patients
- Heart Failure Medications: A Patient and Caregiver Guide
- Heart and Stroke Foundation: Heart Failure

Diagnostic Fee Code

428 Heart Failure

Appendices

- Appendix A: Health Behavior Modifications and Self-monitoring Recommendations
- Appendix B: Heart Failure Zones Reference Guide
- Appendix C: Commonly used Drugs in Heart Failure Care

Associated Documents

The following documents accompany this guideline:

- Heart Function Clinic Referral Form
- What to Do with Heart Failure Medications When I am Sick
- List of Contributors

This guideline is based on scientific evidence current as of the effective date.

This guideline was developed by the Guidelines and Protocols Advisory Committee in collaboration with the Provincial Laboratory Medicine Services and adopted under the *Medical Services Act* and the *Laboratory Services Act*.

THE GUIDELINES AND PROTOCOLS ADVISORY COMMITTEE

The principles of the Guidelines and Protocols Advisory Committee are to:

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

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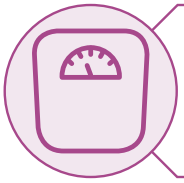
Disclaimer

The Clinical Practice Guidelines (the guidelines) have been developed by the guidelines and Protocols Advisory Committee on behalf of the Medical Services Commission. The guidelines are intended to give an understanding of a clinical problem, and outline one or more preferred approaches to the investigation and management of the problem. The guidelines are not intended as a substitute for the advice or professional judgment of a health care professional, nor are they intended to be the only approach to the management of clinical problem. **We cannot respond to patients or patient advocates requesting advice on issues related to medical conditions. If you need medical advice, please contact a health care professional.**

Appendix A: Health Behavior Modifications and Self-monitoring Recommendations



Weight Monitoring: Have the patient record their daily weight. A weight gain of 2 kg over two days or 2.5 kg in one week should be reported to a healthcare provider

Salt Intake: Recommend the patient limit sodium intake to the goal of < 2000 mg per day (no added salt, limit canned food)

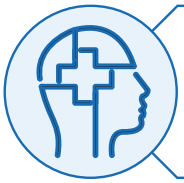
Fluid Intake: Recommend the patient limit fluid intake if they report symptoms of congestion, if there are signs of fluid overload, or if patient is on diuretics. The recommended total amount of fluid intake per day is 1.5 – 2 litres.

Alcohol: Recommend patient limit alcohol consumption to 2 standard drinks per week. If the patient's HF is felt to be secondary to alcohol, alcohol must be strictly avoided. If alcohol abuse is suspected, refer to BCGuidelines.ca – *Problem Drinking* for screening and assessment information

Physical activity: If the patient has stable symptoms and volume status recommend 30 minutes of continuous moderate exercise (e.g., you have enough breath to carry on a conversation), and weight-bearing/resistance and flexibility activities at least twice a week. Consider referral to a cardiac rehabilitation program where available. To find a program in BC, contact HealthLink BC at 8-1-1, website, www.healthlinkbc.ca (search 'cardiac rehabilitation' on the 'Find Services' box).

Smoking: Ask the patient of their smoking history. Strongly recommend smoking cessation. For assistance, refer to Quitnow, website: www.quitnow.ca

Immunization: Encourage an annual influenza vaccine. It is recommended that all patients receive a one-time only pneumococcal vaccine . For other relevant immunization for adults, visit: https://immunizebc.ca/adults



Mental Wellness: Ongoing discussion with the patient about their mental and emotional well being.

Appendix B: Heart Failure Zones Reference Guide

Check Weight Daily

- Weigh yourself in the morning before breakfast. Write it down. Compare your weight today to your weight yesterday.
- Keep the total amount of fluids you drink to only 6 to 8 glasses each day. (6-8 glasses equals 1500-2000 mL or 48-64 oz)
- Take your medicine exactly how your doctor said.
- Check for swelling in your feet, ankles, legs, and stomach.
- Eat foods that are low in salt or salt-free.
- Balance activity and rest periods.

Which Heart Failure Zone Are You Today? Green, Yellow, or Red

Safe Zone

ALL CLEAR – This zone is your goal!

Your symptoms are under control. You have:

- No shortness of breath.
- No chest discomfort, pressure, or pain.
- No swelling or increase in swelling of your feet, ankles, legs, or stomach.
- No weight gain of more than 4 lbs (2 kg) over 2 days in a row or 5 lbs (2.5 kg) in 1 week.

Caution Zone

CAUTION – This zone is a warning

Call your Health Care Provider (e.g., doctor, nurse) if you have **any** of the following:

- You gain more than 4 lbs (2 kg) over 2 days in a row or 5 lbs (2.5 kg) in 1 week.
- You have vomiting and/or diarrhea that lasts more than two days.
- You feel more short of breath than usual.
- You have increased swelling in your feet, ankles, legs, or stomach.
- You have a dry hacking cough.
- You feel more tired and don't have the energy to do daily activities.
- You feel lightheaded or dizzy, and this is new for you.
- You feel uneasy, like something does not feel right.
- You find it harder for you to breath when you are lying down.
- You find it easier to sleep by adding pillows or sitting up in a chair.

Health Care Provider _____ Office Phone Number _____

Danger Zone

EMERGENCY – This zone means act fast

Go to emergency room or call 9-1-1 if you have **any** of the following:

- You are struggling to breathe.
- Your shortness of breath does not go away while sitting still.
- You have a fast heartbeat that does not slow down when you rest.
- You have chest pain that does not go away with rest or with medicine.
- You are having trouble thinking clearly or are feeling confused.
- You have fainted.

Appendix C: Commonly Used Drugs for in Heart Failure Care

Generic Name *Trade name* Dosage form and strengths	Recommended Adult Dose[A]	Approx. Cost per month[B]	PharmaCare Coverage[C]	Adverse Effects[D]	Therapeutic Considerations
Angiotensin Converting Enzyme Inhibitors (ACE-I)					• Contraindication: avoid in pregnancy, bilateral renal artery stenosis • Monitor symptoms of postural hypotension, SCr and potassium at initiation of therapy and periodically. • Reduce initial dose by 50% if on concomitant diuretics (risk of hypotension with hypovolemia). • Cough associated with ACE-I is dry, hacking, and non-productive and typically occurs within months of initiation of therapy. • Risk factors for hyperkalemia include renal dysfunction, diabetes and concomitant use of potassium supplements, potassium-sparing diuretics, or potassium-containing salts. • For patients who experience reduced antihypertensive effect near the end of the 24-hour dosing interval, divide total daily dose into two equal doses given every 12 hours or increase once daily dose. • Longer-acting ACEIs such as perindopril or ramipril might be associated with less hypotension in patients with chronic HF, particularly in older patients[5] • An increase in serum creatinine or decrease in estimated glomerular filtration rate (eGFR) of up to 30% in the absence of oliguria is not unexpected when an ACEI or ARB is introduced; if the increase stabilizes at 30%, there is no immediate need to decrease the drug dose, but closer long-term monitoring might be required[5]
Ramipril *Altace, G* Caps: 1.25, 2.5, 5, 10, 15 mg	Canadian HF guideline[5]: **Initial:** 1.25 – 2.5 mg BID **Target:** 5 mg BID Once daily dosing3: **Initial:** 1.25 mg daily **Target:** 10 mg daily	$4	Regular benefit RDP (Reference drug) 15 mg: non-benefit	Common • Dry cough (8-12%) • Hyperkalemia Less Common • Angioedema • Precipitation of renal failure in patients with renovascular disease, volume depletion or concomitant NSAID use	
Enalapril *Vasotec, G* Tabs: 2.5, 5, 10, 20 mg	**Initial:** 1.25 – 2.5 mg BID **Target:** 10 mg BID (20 mg BID in NYHA IV)	$15	Partial benefit RDP		
Lisinopril *Prinivil, Zestril, G* Tabs: 5, 10, 20 mg	**Initial:** 2.5 – 5 mg daily **Target:** 20 – 35 mg daily	$6	Partial benefit RDP		
Perindopril *Coversyl, G* Tabs: 2, 4, 8 mg	**Initial:** 2 – 4 mg daily **Target:** 4 – 8 mg daily	$7	Partial benefit RDP		
Trandolapril *Mavik, G* Caps: 0.5, 1, 2, 4 mg	**Initial:** 1 – 2 mg daily **Target:** 4 mg daily	$8	Partial benefit RDP		
Angiotensin receptor blocker (ARB)					
Candesartan *Atacand, G* Tabs: 4, 8, 16, 32 mg	**Initial:** 4 – 8 mg daily **Target:** 32 mg daily	$8	Limited Coverage RDP (Reference Drug) 4 mg: non-benefit	Hypotension, renal impairment, hyperkalemia, angioedema (rare)	
Valsartan *Diovan, G* Tabs: 40, 80, 160, 320 mg	**Initial:** 40 mg BID **Target:** 160 mg BID	$7	Limited Coverage RDP (Reference Drug)		

Generic Name *Trade name* Dosage form and strengths	Recommended Adult Dose[A]	Approx. Cost per month[B]	PharmaCare Coverage[C]	Adverse Effects[D]	Therapeutic Considerations
Angiotensin receptor neprilysin inhibitor (ARNI)					
Sacubitril-valsartan *Entresto* Tabs: 24/26, 49/51, 97/103 mg	**Initial:** 24/26 mg - 49/51 mg BID **Target:** 97/103 mg BID	$250	Limited Coverage (Currently limited to Internal Medicine and Cardiology special authority, consider RACE consultation to obtain approval)	• Hypotension (18%) • Hyperkalemia • Increased SCr • AKI • Dizziness • Angioedema • Cough (9%)	• Stop ACEI 36h prior to starting ARNI to minimize potential for life-threatening angioedema • Wash out period not necessary when switching from ARB • Valsartan in this combination tablet is more bioavailable than valsartan in other marketed formulations; Valsartan 26, 51 and 103 mg is equivalent to 40, 80 and 160 mg in other marketed tablet formations respectively. • Monitoring: renal function and electrolytes • Contraindications: Pregnancy and lactation • Circulating levels of BNP may increase after initiation of sacubitril-valsartan. Interpret BNP with caution[7,8]
Beta-blockers					
Bisoprolol[E] *Monocor, G* Tabs: 5, 10 mg	**Initial:** 1.25 mg daily **Target:** 10 mg daily	$4	Regular benefit	Orthostatic hypotension, worsening heart failure, worsening fluid retention, bronchospasm, dyspnea, bradycardia, malaise, fatigue, asthenia, erectile dysfunction, masking of symptoms of hypoglycemia.	• Beta blockers should be started at low doses and increased slowly. Transient fluid retention might occur with initiation or up titration of beta blockers and might require assessment of diuretic dosage. • If concomitant reactive airways disease is present, consider using more selective B-1 blockade (e.g. bisoprolol) • If indicated as per practice guidelines, consider ICD/CRT implantation to mitigate risk of bradycardia
Metoprolol[E] *Lopressor, Betaloc, G* IR Tabs: 25, 50, 100 mg SR tabs: 100, 200 mg	IR tabs: **Initial:** 12.5 – 25 mg BID **Target:** 100 mg BID SR tabs: **Initial:** use IR tab **Target:** 200 mg daily	IR: $8 SR: $12	Regular benefit		
Carvedilol *Coreg, G* Tabs: 3.125, 6.25, 12.5, 25 mg	**Initial:** 3.125 mg BID **Target:** 25-50 mg BID	$15	Limited Coverage		

Generic Name *Trade name* Dosage form and strengths	Recommended Adult Dose[A]	Approx. Cost per month[B]	PharmaCare Coverage[C]	Adverse Effects[D]	Therapeutic Considerations
Mineralocorticoid receptor antagonist (MRA)					
Spironolactone *Aldactone, G* Tabs: 25, 100 mg	**Initial:** 12.5 mg daily **Target:** 25 – 50 mg daily	$3	Regular benefit	Hyperkalemia, dehydration, nausea, gynecomastia (usually reversible upon discontinuation).	• Monitor serum creatinine and potassium 3 and 7 days after initiation or titrating the dose. Repeat every 1-3 months once stable. • Concomitant use with ACEI, ARB and potassium supplements can lead to hyperkalemia • Concomitant use with NSAIDs: reduce diuretic effect, worsening renal function, hyperkalemia • Advantage of eplerenone over spironolactone is lack of binding to progesterone and androgen receptors which is associated with drug induced gynecomastia, breast pain and impotence.[6] • Contraindications: Pregnancy • Contraindications specific to eplerenone: Use with strong inhibitors of CYP3A4 (e.g., ketoconazole, itraconazole, ritonavir, nelfinavir, clarithromycin, telithromycin, nefazodone) can significantly increase eplerenone levels.
Eplerenone *Inspra, G* Tabs: 25, 50 mg	**Initial:** 25 mg daily **Target:** 50 mg daily	$75	Non-benefit	Hyperkalemia, dehydration, dizziness, diarrhea, nausea.	
Sodium Glucose Transport 2 (SGLT2) inhibitors					
Dapagliflozin *Forxiga, G* Tabs: 5, 10 mg	**Initial:** 10 mg daily **Target:** 10 mg daily	$22	Regular benefit	Genital mycotic infections (highest risk for women, hx of genital mycotic infections, uncircumcised men); typically can be managed with antifungals and do not require discontinuation of therapy Temporary reduction of eGFR, which generally resolves within 1-3 months AKI Hypoglycemia (rare in absence of other hypoglycemics) Diabetic ketoacidosis (0.1%)	• Contraindications: pregnancy, renal impairment (refer to product monograph for details), dialysis. • SGLT2 inhibitors should not be used in individuals with type 1 diabetes or in individuals with type 2 diabetes who have factors predisposing to diabetic ketoacidosis
Empagliflozin *Jardiance* Tabs: 10, 25 mg	**Initial:** 10 mg daily **Target:** 10 mg daily	$90	Non-benefit for HF indication Limited Coverage for treatment of type 2 diabetes mellitis		
Canagliflozin[E] *Invokana* Tabs: 100, 300 mg	**Initial:** 100 mg daily **Target:** 100 – 300 mg daily	$95	Non-benefit		

Generic Name *Trade name* Dosage form and strengths	Recommended Adult Dose[A]	Approx. Cost per month[B]	PharmaCare Coverage[C]	Adverse Effects[D]	Therapeutic Considerations
Vasodilators					
Hydralazine[E] *G* Tabs: 10, 25, 50 mg	**Initial:** 10 – 37.5 mg TID **Target:** 75 – 100 mg TID to QID	$20	Regular benefit	Hypotension, GI complaints, SLE-like syndrome, tachyphylaxis, may worsen oxygen demand.	• Should be used in combination with isosorbide dinitrate or nitroglycerin.
Isosorbide Dinitrate[E] *G* Tabs: 10, 30 mg	**Initial:** 10 – 20 mg TID **Target:** 40 mg TID	$10	Regular benefit	Headache, flushing, hypotension.	• Should be used in combination with hydralazine. • Different from isosorbide mononitrate (long-acting formulation). • Contraindication: use with phosphodiesterase-5 inhibitors (increased risk of hypotension)
Diuretics					
Furosemide *Lasix, G* Tabs: 20, 40, 80 mg	**Initial:** 20 – 40 mg daily Max: 200 mg/d	$2	Regular benefit	Dehydration, hypokalemia, hypocalcemia, nausea, hypotension, azotemia, hypomagnesemia,	• Concomitant lithium can lead to lithium toxicity. • Concomitant digoxin can lead to digoxin toxicity if K+ depleted. • Concomitant use of oral corticosteroids may enhance hypokalemia effect of diuretic. • Concomitant NSAIDs can lead to reduced diuretic effect, increased renal toxicity
Metolazone *Zaroxolyn* Tabs: 2.5 mg	**Initial:** 2.5 mg daily Max: 20 mg/d	$7	Regular benefit		
Digoxin					
Digoxin *Toloxin, G* Tabs: 0.0625, 0.125 mg	**Initial:** 0.0625 – 0.125 mg daily Max: Titrate to lowest effective dose due to high toxicity profile. Recommend starting at lowest dose.	$11	Regular benefit	Digoxin toxicity: Apical slowing < 60bpm, AV conduction block, supraventricular tachycardia, confusion, forgetfulness, hallucinations, dizziness, psychosis, nightmares, color changes, halos, anorexia, nausea, vomiting, diarrhea, abdominal pain	• Routine digoxin levels are not required and titrating to digoxin levels has not been tested in clinical trials. • Reasons for digoxin levels: o Concern about compliance o Suspected toxicity o Inadequate therapy despite high doses o Drug interactions • If levels are required, should be drawn minimum 6 hours post dose (due to long distribution t1/2). Steady state achieved in 5-7 days for normal half-life; 1-3 weeks renal dysfunction. • Digoxin has a narrow therapeutic index and there is a large overlap between toxic and therapeutic doses • Digoxin levels < 1.2 ng/mL are associated with less treatment related morbidity. • Can cause atrial and ventricular arrhythmias particularly in the presence of hypokalemia and/or worsening renal function and levels should be monitored accordingly

Generic Name *Trade name* Dosage form and strengths	Recommended Adult Dose[A]	Approx. Cost per month[B]	PharmaCare Coverage[C]	Adverse Effects[D]	Therapeutic Considerations
Sinus node inhibitor					
Ivabradine *Lancora* Tabs: 5, 7.5 mg	**Initial:** 2.5 – 5 mg BID Max: 7.5 mg BID	$110	Limited coverage	Bradycardia, hypertension, heart block, sinoatrial arrest, atrial fibrillation	• Has no direct effect on blood pressure, myocardial contractility, or renal function and as such is well tolerated in patients who are unable to initiate or titrate beta blockers for these reasons • Typical reductions in resting sinus heart rate after treatment with beta blockers range from 10-15 bpm, with little change (< 5 bpm) between low and high doses. This consideration might assist in the decision to use further medications for sinus heart rate control • Ivabradine may be considered for patients with either stable or decompensated chronic HFrEF who are intolerant of β-blockers, symptoms despite guideline-directed medical treatments and with a resting heart rate **in sinus rhythm** of > 70 bpm • Ivabradine selectively inhibits the depolarizing Ifcurrent in the sinus node. It thus requires sinus rhythm to provide its pharmacological effect.

Abbreviations: **BID** twice a day; bpm beats per minute; **CAP** capsules; **CR** controlled release; **CRT** cardiac resynchronization therapy; **G** generics; **IR** immediate release; **ODT** oral dissolving tablet; **ICD** implantable cardioverter-defibrillator CRT **LA** long acting; **SCr** serum creatinine; **SR** sustained release; **Tab** tablets; **XR** extended release

A For normal renal and hepatic function. Consult product monograph for detailed dosing instructions and dose adjustments for unique patient populations
B Drugs costs are average retail cost of the generic, when available. Current as of Feb 2022 and does not include retail markups or pharmacy fees.
C PharmaCare coverage as of Feb 2022 (subject to revision). Regular Benefit: Eligible for full reimbursement*. Limited Coverage: Requires Special Authority to be eligible for reimbursement*. Non-benefit: Not eligible for reimbursement. *Reimbursement is subject to the rules of a patient's PharmaCare plan, including any deductibles. In all cases, coverage is subject to drug price limits set by PharmaCare. See: www.health.gov.bc.ca/pharmacare/plans/index.html and www.health.gov.bc.ca/pharmacare/policy.html for further information.
D Not an exhaustive list. Check the product monograph (https://health-products.canada.ca/dpd-bdpp/index-eng.jsp) or an interaction checker (e.g., Lexicomp(c)) before prescribing
E Medications are used off-label for heart failure.

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