

## CLINICAL COLUMN

# Test Your Knowledge of Heart Failure!

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Heart failure presents an increasing clinical burden to both patients and health care professionals, along with a decreased quality of life for patients and families. Overall the Canadian prevalence of heart failure is 1%. Heart failure has a poor prognosis with an average one-year mortality of 33% and a high hospital readmission rate of 23.6% in one year. Fifty per cent of Canadian heart failure patients are treated by their family physicians (Canadian Heart Failure Network, n.d.). Challenges with management strategies are often related to lack of knowledge of current clinical practice guidelines, shortened length of stay and complexity of the disease. As cardiovascular nurses,

we have a huge role to play in educating patients in risk factor management, heart failure management and prevention.

The questions posed here will test and enhance your knowledge and understanding of heart failure management strategies. At the end of the test, participants will be able to: 1) recognize decompensated heart failure and investigations required, 2) identify non-pharmacological strategies, and 3) become familiar with treatment options including drug therapy and medical interventions.

*(Editor's Note: References are included at the end for ease of reading.)*

## QUESTIONS

### Risk Factors

1. Name at least four causes of dilated cardiomyopathy.
2. What prophylactic intervention should health care professionals offer to patients with heart failure to avoid infections?
3. List five lifestyle factors that require modification in patients with heart failure.
4. Women with obstructive sleep apnea are often thin, elderly and present with unexplained pulmonary hypertension and tricuspid regurgitation. Is this statement True or False?
5. What over-the-counter medication should be avoided in patients with heart failure?
  - a) Naprosyn
  - b) Ibuprofen
  - c) Pseudoephedrine
  - d) All of the above

### Signs and Symptoms

1. What New York Heart Association (NYHA) Functional Class (FC) consists of heart failure symptoms with less than normal activity?
  - a) FC I
  - b) FC II
  - c) FC III
  - d) FC IV
2. What clinical feature is NOT a sign of right sided heart failure?
  - a) hypotension
  - b) clear lung fields
  - c) abdominal bloating
  - d) low JVP
3. Name five laboratory tests that should be performed in patients presenting with new onset heart failure symptoms?
4. Ejection Fraction (EF) can be obtained from various cardiac tests including cardiac catheterization, nuclear stress

test, wall motion study (WMS), transthoracic echocardiogram, pharmacological echocardiogram and cardiac MRI. Which two tests give the most reliable measurement of the left ventricular (LV) ejection fraction?

- a) WMS and MRI
  - b) Cardiac catheterization and echocardiogram
  - c) Nuclear stress test and pharmacological echocardiogram
5. Common presentations of heart failure are: dyspnea, orthopnea, PND, fatigue, weakness, exercise intolerance, dependent edema, cough, weight gain, abdominal distension, nocturia and cool extremities. Name three less-common presentations of heart failure.

### Systolic Versus Diastolic Heart Failure

1. Characteristics of heart failure with preserved systolic function (diastolic heart failure) are:
  - a) reduced contractility
  - b) reduced filling time or limited filling
  - c) loss of myocardium
  - d) impaired relaxation
  - e) b and d
2. Diastolic heart failure is especially common in patients of which descent:
  - a) Chinese
  - b) Black
  - c) Aboriginal
  - d) All of the above
3. Name two classes of drugs that all patients with heart failure and LVEF of less than 40% should be prescribed:
4. What combination therapy should be considered in a black patient with systolic heart failure in addition to standard therapy (beta blocker and ace inhibitor)?

5. What percentage of patients with heart failure has a preserved systolic function?
- 10 to 20%
  - 40 to 50%
  - 60 to 70%

### Drugs

1. In a patient with severe symptomatic heart failure on high dose Lasix, which medication is the best add-on therapy for improved diuresis?

- Ethacrynic acid
- Spironolactone
- Metolazone
- Bumetanide

2. What drug will not be started initially in a patient with acute heart failure?

- Spironolactone
- Lasix
- Ramipril
- Carvedilol

3. Routine statin therapy should be considered for patients with heart failure, in the absence of ischemic disease or high-risk vascular events. Is this statement True or False?

4. The 2011 Canadian Cardiovascular Society Heart Failure Management Guidelines Update recommends what drug not only for patients with NYHA FC III and FC IV heart failure, but also for patients with mild heart failure at FC II?

- Digoxin
- Eplerenone
- Hydralazine
- Imdur

5. Kayexelate has how many mg of sodium per 30 grams?

- 1,500 mg
- 500 mg
- 750 mg
- 200 mg

### Non-Pharmacological Treatment

1. Ideally, at what stage of the continuum of heart failure should end of life be discussed?

- early in the diagnosis
- end stage disease
- decompensated heart failure presentation
- after the second admission within one year

2. What is the treatment for a patient four months post myocardial infarction, with an EF 28% on maximum medical therapy and asymptomatic ventricular tachycardia?

3. What non-pharmacological agent is recommended for patients with heart failure?

- co-enzyme Q10
- vitamin E
- omega 3 fatty acids
- chelation therapy

4. What food contains the highest milligrams of sodium per serving?

- A&W hot dog
- regular-sized bowl of chili from Tim Horton's
- KFC chicken breast breaded
- Subway six-inch sweet onion teriyaki

5. Cardiac resynchronization therapy should be considered for patients with symptomatic heart failure NYHA II or III, QRS duration greater than 130 mms and which of the following?

- normal sinus rhythm
- EF less than 35%
- left bundle branch block
- all of the above

### ANSWERS

#### Risk Factors

1. Genetic, viral, alcohol, chemotherapy, thyroid disease, pregnancy, untreated sleep apnea, hemochromatosis, drugs, atrial fib/flutter (tachycardia induced)

2. Influenza and pneumococcal vaccinations

The CCS guidelines recommend that all heart failure patients receive the influenza vaccine annually and the pneumococcal vaccine if not received in the last six years. Research shows that this will reduce the risk of respiratory infections that may seriously aggravate heart failure.

3. Smoking: smoking cessation among smokers with heart failure is as effective or more effective at reducing mortality as treatment with beta blockers or ACE inhibitors.

Alcohol: alcoholic cardiomyopathy requires total abstinence. Otherwise it is recommended to limit alcohol intake to less than two standard drinks a day for men and one standard drink a day for women.

Sodium intake/fluid restriction: the recommended sodium intake is less than 2 grams a day. Patients with more advanced heart failure and fluid retention should restrict their salt intake to a further 1.5 gram a day. Daily fluid intake should be between 1.5 to 2 L a day.

Aerobic exercise: three to five times a week for 30 to 45 minutes.

Obesity: all patients should maintain a healthy weight (BMI 20 to 27).

4. True

This is where men and women are different. In contrast, in men with heart failure, clues to the presence of obstructive sleep apnea are obesity and drug resistant hypertension but not necessarily for women.

5. d) All of the above

Use of nonsteroidal anti-inflammatories (aside from low dose ASA) is associated with more than a 10 fold increase in heart failure. The kidney is exquisitely dependent upon vasodilating prostaglandins to maintain renal perfusion and salt and water balance. NSAIDS decrease prostaglandins synthesis and this may precipitate fluid retention in patients with heart failure.

Pseudoephedrine (also known as Ma Hung) is a vasoconstrictor, working mainly on blood vessels located in the nasal passages. However, side effects include hypertension, tachycardia and palpitations, which can be dangerous in patients with heart failure.

### Signs and Symptoms

#### 1. c) FC III

The NYHA description of FC includes:

FC I – no symptoms

FC II – symptoms with ordinary activities

FC III – symptoms with less than ordinary activities

FC IV – symptoms would include dyspnea, fatigue, weakness, orthopnea or PND

#### 2. d) Low JVP

The JVP is closely related to the right side of the heart and is elevated with increased right heart failure. The lungs can be clear in right heart failure as the fluid backs up from the right side of the heart to the venous system, not the left side, which is more closely related to the lung pressures.

#### 3. TSH, BNP, ferritin, CBC, electrolytes, creatinine, liver enzymes, HIV

It is important to rule out causes of heart failure such as: thyroid disease, hemochromatosis, anemia, electrolyte imbalances, kidney failure, liver disease and HIV. BNP helps to confirm the diagnosis of heart failure, and can help measure progress or prognosis.

#### 4. a) WMS and MRI

WMS has a high accuracy and reproducibility. However, the patient must be in sinus rhythm.

Cardiac MRI is the most reliable, but is not easily available.

#### 5. Cognitive impairment, delirium, nausea, abdominal discomfort, oliguria, anorexia, and cyanosis. These are more difficult clues that lead to a diagnosis of heart failure.

### Systolic Versus Diastolic Heart Failure

1. e) b and d. Reduced filling time and impaired relaxation. Diastolic dysfunction is a result of impaired relaxation, which can be caused by hypertension, LV hypertrophy and ischemia. Causes of limited filling time include constrictive pericarditis and mitral valve stenosis. Atrial fibrillation can lead to reduced filling time.

In contrast, examples of causes of systolic heart failure include myocardial infarction, valvular regurgitation, myocarditis and dilated cardiomyopathy.

#### 2. d) All of the above

Hypertension is an important cause of heart failure in the Asian, African, African American population.

Heart failure with a normal LVEF is more common than systolic heart failure in Chinese patients and that may be related to an older age at presentation and the high prevalence of hypertension.

There is a reported higher frequency of disease among Aboriginal people and a greater burden of atherosclerosis compared with Canadians of European ancestry.

#### 3. Beta blockers and ACE inhibitors

The CCS Heart Failure Guidelines recommend that all patients with heart failure and an LVEF of less than 40% should be treated with an ace inhibitor in combination with a beta blocker unless a specific contraindication exists.

#### 4. Combination of a nitrate and hydralazine

In the African American Heart Failure Trial (Taylor et al., 2004), patients with systolic heart failure showed that adding a fixed-dose combination of isosorbide dinitrate plus hydralazine to standard medical therapy reduced mortality, as well as first hospitalization for heart failure and improved quality heart failure. This combination may be considered for other heart failure patients unable to tolerate other recommended standard therapy.

#### 5. b) 40 to 50%

Heart failure with preserved systolic function is more prevalent in the elderly, women and in patients with a history of hypertension or less often than ischemic heart disease.

### Drugs

#### 1. c) Metolazone

Loop diuretics include furosemide (lasix), bumetanide (burinex), and ethacrynic acid (edecrin).

Thiazide diuretics include hydrochlorothiazide, indapamide and metolazone (zaroxolyn).

Potassium Sparing diuretics are amiloride, spironolactone and eplerenone.

Metolazone is the most potent diuretic and works well with Lasix (taken 30 to 60 min before lasix dose).

Aim for the lowest dose of diuretic compatible with stable signs and symptoms. Metolazone requires more frequent measurements of creatinine and electrolytes.

#### 2. d) Carvedilol

Starting beta blockers can exacerbate acute heart failure symptoms. They should be started once the patients' condition is stable and fluid status is more euvolemic. In acute decompensated heart failure, the immediate goal is to establish adequate perfusion and oxygen delivery to end organs. Immediate treatments usually involve some combination of vasodilators such as nitroglycerin, diuretics, such as furosemide and possibly non-invasive positive pressure ventilation.

#### 3. False

Current data are insufficient to provide strong recommendations regarding statin therapy in non-ischemic heart failure. So the decision to treat should be on the basis of the existing prevention guidelines.

#### 4. b) Eplerenone

The EMPHASIS –HF Trial (Zannad et al., 2011) showed that eplerenone added to recommended therapy for systolic heart failure in patients with mild symptoms was associated with a reduction in the rate of death from a cardiovascular cause or hospitalization for heart failure. Prior to this study spironolactone was used in FCII and FC IV only.

## 5. a) 1,500 mg

Kayexelate has high sodium content (1,500 mg per 30 gram) versus resonium calcium, which has less than 30 mg of sodium (less than 1 mg/gram). Therefore, resonium calcium is an alternative treatment for high potassium when patients are on a sodium restriction diet (this is the total Na for the day). Resonium calcium is covered in some provinces (Manitoba and Ontario). In some provinces a special request letter has to be written for coverage.

**Non-Pharmacological Treatment**

## 1. a) Early in the diagnosis

Patients with heart failure should be approached early in the heart failure disease process regarding their prognosis, advanced medical directives and wishes for resuscitative care. The decision should be reviewed regularly and specifically after any change in the patient's condition.

## 2. Automatic Implantable Cardiac Defibrillator (AICD)

Patients with EF less than 30% are at a greater risk of sudden cardiac death. Once medical therapy has been maximized (this can take three to six months), and if the EF has not increased to over 30%, an AICD would be considered as life-saving therapy in the event of a significant ventricular arrhythmia.

## 3. d) Omega 3 fatty acids

Coenzyme Q10, vitamins and herbal supplements are not recommended as heart failure therapy. Low-dose Omega 3 polyunsaturated fatty acid therapy (1 gram day) may be considered, as it has shown reduction in morbidity and mortality in patients with mild to moderate heart failure. Patients taking warfarin

and omega 3 should closely monitor their INR. Taking greater than 3 gram a day of omega 3 may cause excessive bleeding.

4. b) regular-sized bowl of chili from Tim Horton's has 1,690 mg of sodium, which is 31% of the recommended daily intake. A&W hot dog has 740 mg of sodium.

One KFC chicken breast with skin and breasting has 1,080 mg of sodium.

A six-inch subway teriyaki has 900 mg of sodium.

Remember: 1 teaspoon of salt = 2,300 mg of sodium

The average person requires 500 mg a day of sodium, yet most consume 5 to 6 grams a day. The optimal sodium intake for heart failure patients is 2 grams or less a day.

## 5. d) All of the above

Patients have intra and interventricular conduction delays that are associated with cardiac mechanical dyssynchrony. CRT uses bi-ventricular pacing to attempt to synchronize the activation of the septum and LLV free wall, and to improve the overall LV function. ♥

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