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THE OMNICARE
HealthLine

Focus on Heart Failure, Part 1: Classifications and Causes

- by Allen Lefkovitz

The American Heart Association defines heart failure (HF) as "a chronic, progressive condition in which the heart muscle is unable to pump enough blood through to meet the body's needs for blood and oxygen." In trying to compensate, the heart may enlarge and may pump faster. HF is a leading cause of cardiovascular death and accounts for 1 in 9 deaths in the United States. HF is considered a leading cause of hospitalizations and hospital readmissions among older adults. Since the initiation of the Hospital Readmission Reduction Program in October 2012, HF has been targeted as one of the leading causes of excess 30 day-readmissions. Estimates from a few years ago stated the prevalence of HF among skilled nursing facility (SNF) residents to be between 20% and 37.4%. Additionally, 4.3% of SNF residents had HF as a primary diagnosis during the admission process.

Two systems are commonly utilized for classifying the severity of HF symptoms:

- The American College of Cardiology Foundation (ACCF)/American Heart Association (AHA) Stages
- The New York Heart Association (NYHA) Functional Classifications

A comparison of these two systems is located in the table below.

ACCF/AHA Stages		NYHA Functional Classifications	
A	At high risk for HF, but without structural heart disease or symptoms of HF	None	
B	Structural heart disease but without signs or symptoms of HF	I	No limitation of physical activity. Ordinary physical activity does not cause symptoms of HF.
C	Structural heart disease with prior or current symptoms of HF	II	Slight limitation of physical activity. Comfortable at rest, but ordinary physical activity results in symptoms of HF.
		III	Marked limitation of physical activity. Comfortable at rest, but less than ordinary activity causes symptoms of HF.
D	Refractory HF requiring specialized interventions	IV	Unable to carry on any physical activity without symptoms of HF, or symptoms of HF at rest.

Adapted from Yancy CW, et al. 2013 ACCF/AHA guideline for the management of heart failure: Executive summary: A report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. Circulation. 2013;128:1810–1852.

Continued on next page

Inside This Issue

In addition to these classification systems, HF is now divided into two general categories:

HF with reduced ejection fraction (HFrEF) (previously systolic HF)	• Ejection fraction ≤ 40% • Impaired myocardial contractility
HF with preserved ejection fraction (HFpEF) (previously diastolic HF)	• Ejection fraction ≥ 50% • Impaired myocardial relaxation

Ejection fraction 41 to 49% may be considered either HFpEF borderline or HFpEF improved

The prevention of HF and/or its progression necessitates an awareness and a response to risk factors of HF. Risk factors for HF include:

- Coronary artery disease (e.g., history of a myocardial infarction)
- Uncontrolled high blood pressure
- Diabetes
- Valvular heart disease (e.g., mitral regurgitation)
- Smoking tobacco
- Alcohol or illicit drug abuse
- Sedentary lifestyle
- Obesity

Efforts to address or minimize these risk factors (e.g., smoking cessation, adequate blood pressure control) should be prioritized as they can have a dramatic impact on the development and/or progression of HF. High blood pressure is considered "the most common cause of HF in older women, particularly in those with preserved ejection fraction." For men, coronary artery disease is considered the most common cause.

Additionally, several medications have been associated with causing or exacerbating HF symptoms. Some of these medications are outlined in the following table. Mechanisms by which these medications may contribute to HF symptoms include direct myocardial toxicity, negative inotropic effects (i.e., weakening the force of the heartbeat), worsening blood pressure control, or increasing sodium load. Key strategies in managing HF include being aware of medications that can negatively impact patients with HF and avoiding their use whenever possible.

Potential Mechanism	**Example Medications** (not all-inclusive)
Cardiotoxicity	clozapine, cyclophosphamide, doxorubicin
Retention of sodium and water	alendronate effervescent, nonsteroidal anti-inflammatory drugs (e.g., ibuprofen)
Negative inotrope	diltiazem, disopyramide, dronedarone, flecainide, itraconazole, topical beta-blockers (e.g., timolol), verapamil
Other causes	amphotericin B, doxazosin, pioglitazone, prazosin, rosiglitazone, saxagliptin, sitagliptin, terazosin

While pharmacological treatment is beyond the scope of this month's article, it must be realized that early recognition of HF symptoms allows for earlier intervention and can hopefully avoid hospitalizations. The most common symptoms of HF include shortness of breath (especially during activity or when lying down), swelling, weakness, and fatigue. However, nursing facility staff should be vigilant for any of the following signs and symptoms suggestive of worsening HF:

- peripheral edema and/or unexpected weight gain
- shortness of breath (SOB)/dyspnea
- rales ("crackles")
- tachycardia
- elevated jugular venous pressure
- cool extremities
- cognitive changes/confusion

If noted, any of these signs and symptoms should be promptly reported to the prescriber to determine the appropriate next steps.

The prevalence of HF among skilled nursing facility residents has been estimated between 20% and 37.4%.

Sodium Polystyrene Sulfonate Interferes with Absorption of Other Drugs

- by Allen Lefkovitz

Sodium polystyrene sulfonate (SPS), also called Kayexalate, Kalexate, Kionex, and SPS, is a binding agent given orally or rectally to treat hyperkalemia. Over the past two years, the US Food and Drug Administration (FDA) has increasingly warned about the risk of SPS interfering with the absorption of other drugs, thereby increasing the risk of ineffectiveness of these drugs.

In conducting additional research where SPS was used with amlodipine, metoprolol, amoxicillin, furosemide, phenytoin, or warfarin, it was found that the absorption of each of these medications is significantly decreased. As a result, the FDA has decided to update the drug labeling to recommend that SPS be administered at least 3 hours apart from all other prescription and over-the-counter (OTC) medications.

For individuals who have medical conditions that result in delayed stomach emptying (e.g., gastroparesis), the FDA is recommending this time apart be increased to 6 hours.

Additional information is available at: https://www.fda.gov/Drugs/DrugSafety/ucm572484.htm

The Clinical Capsule

Medications Associated with Hyperkalemia*

- by Allen Lefkovitz

Hyperkalemia is a potentially life-threatening elevation in serum potassium. Medications are considered a significant contributing factor to the development of hyperkalemia. Some common medications associated with hyperkalemia are outlined in the table below. Additionally, the risk of hyperkalemia increases when any of these medications are used concomitantly.

ACE Inhibitors (e.g., lisinopril)	Cyclosporine	Potassium supplements
Aliskiren	Digoxin	Rifaximin
Amiloride	Eplerenone	Spironolactone
ARB (e.g., losartan)	Febuxostat	Tacrolimus
Beta blockers (e.g., carvedilol)	NSAID (e.g., ibuprofen)	Triamterene
Ceftaroline	Pentamidine	Trimethoprim

ACE = angiotensin converting enzyme; ARB = angiotensin receptor blockers; NSAID = non-steroidal anti-inflammatory drugs

* This table is not all-inclusive of medications associated with hyperkalemia.

NEW Drug

Trelegy Ellipta™ for Oral Inhalation

- by Dave Pregizer

Brand Name (Generic Name)	**TRELEGY ELLIPTA [TREL-e-gee e-LIP-ta] (fluticasone furoate, umeclidinium, and vilanterol) [floo TIK a sone, ue me kli DIN ee um, and VYE lan ter ol]**
How Supplied	Inhaler containing 30 doses with 2 foil blister strips (one contains fluticasone furoate (100 mcg per blister) and the other umeclidinium and vilanterol (62.5 mcg and 25 mcg per blister)
Therapeutic Class	Combination inhaled corticosteroid/anticholinergic/long-acting beta2-adrenergic agonist
Approved Indication	Maintenance treatment of patients with COPD on a fixed-dose combination of fluticasone and vilanterol for airflow obstruction and reducing exacerbations in whom additional treatment of airflow obstruction is desired or for those already receiving umeclidinium and a fixed-dose combination of fluticasone and vilanterol.
Usual Dosing	One inhalation once daily by the orally inhaled route only.
Select Drug Interactions	Strong cytochrome P450 3A4 inhibitors (e.g., ketoconazole) may cause systemic corticosteroid and cardiovascular effects. MAOI and tricyclic antidepressants may potentiate the effect of vilanterol on the vascular system. Beta-blockers may block bronchodilatory effects of beta-agonists. Avoid use with other anticholinergic drugs.
Most Common Side Effects	Headache, back pain, dysgeusia, diarrhea, cough, oropharyngeal pain, and gastroenteritis
Miscellaneous	Boxed warning for increased risk of asthma-related death. Not indicated for relief of acute bronchospasm or the treatment of asthma.
Website	www.trelegy.com

COPD = chronic obstructive pulmonary disease; MAOI = monoamine oxidase inhibitors

NEW Generic Medications

Generic Name	Brand Name	Date Generic Available
Glatiramer acetate 20 mg/mL and 40 mg/mL Injection	Copaxone® Injection	10/6/17
Abacavir 20 mg/mL Solution	Ziagen® Oral Solution	10/6/17
Paroxetine 7.5 mg Capsule	Brisdelle® Capsule	9/25/17
Fosamprenavir 700 mg Tablet	Lexiva® Tablet	9/25/17
Sodium phenylbutyrate 500 mg Tablet	Buphenyl® Tablet	9/25/17

HealthLine Quiz

– by Steve Law

1. **Which statement about heart failure is FALSE:**
   a. It is a leading cause of hospitalizations and hospital readmissions among older adults
   b. The prevalence of heart failure among skilled nursing facility residents is between 20% and 37.4%
   c. Heart failure with an ejection fraction ≤ 40% is considered diastolic heart failure
   d. Residents classified as NYHA Stage IV heart failure are unable to carry on any physical activity without symptoms of heart failure

2. **Coronary artery disease is considered the most common cause of heart failure in women:**
   a. True b. False

3. **Which medication would LEAST likely cause or exacerbate heart failure symptoms:**
   a. Ibuprofen
   b. Rosiglitazone
   c. Lisinopril
   d. Cyclophosphamide

4. **Sodium polystyrene sulfonate (SPS) should be administered at least 3 hours apart from all other prescription and OTC medications:**
   a. True b. False

5. **Which medication is NOT associated with hyperkalemia:**
   a. Spironolactone
   b. Simvastatin
   c. Lisinopril
   d. Triamterene

6. **Which statement is TRUE about the new medication, Trelegy Ellipta™:**
   a. It is a combination inhaled corticosteroid/anticholinergic/short-acting beta2-adrenergic agonist
   b. The administration is one inhalation once daily by the orally inhaled route only
   c. It is indicated for acute treatment of asthma
   d. Tricyclic antidepressants may potentiate the effect of fluticasone

***Please note, the HealthLine Quiz is designed to help readers retain information that is relevant to their care setting. It is not an approved source of continuing education credits for healthcare professionals.**

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Answers to the HealthLine Quiz: 1) C 2) B 3) C 4) A 5) B 6) B