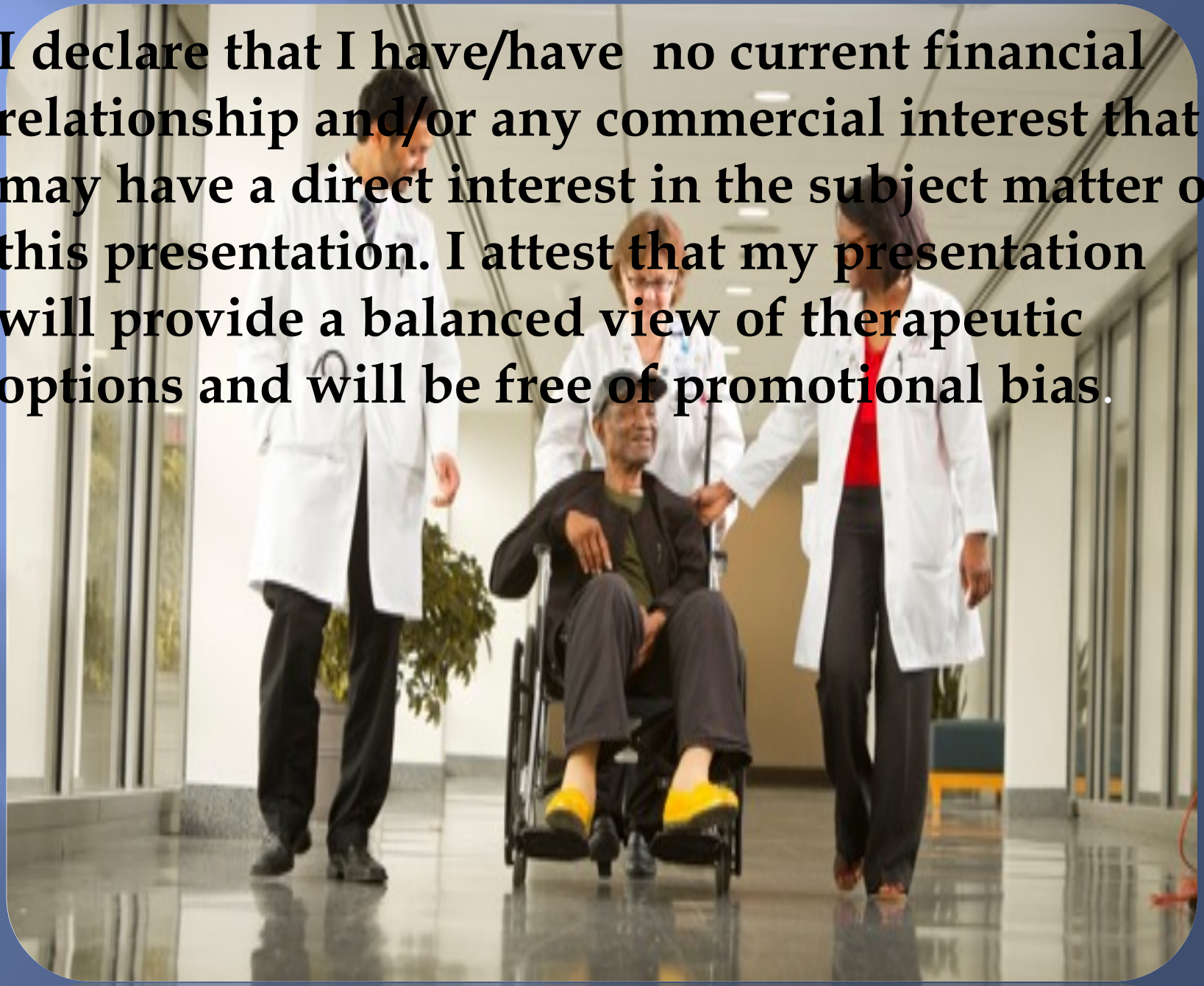
HEART FAILURE IN 2017

Karol Harshaw-Ellis, MSN, DNP
Nurse Practitioner – Director of Outreach
Duke Heart Failure – Same Day Access Clinic

I declare that I have/have no current financial relationship and/or any commercial interest that may have a direct interest in the subject matter of this presentation. I attest that my presentation will provide a balanced view of therapeutic options and will be free of promotional bias.



Objectives

- The attendees will be able to:
  - 1) Analyze how cardiometabolic disease contributes to the development of heart failure.
  - 2) Review the initiation and integration of guideline directed medical therapy in the management of chronic heart failure.
  - 3) Demonstrate utilization of the New Pharmacological therapies in the 2016 ACC/AHA/HFSA Focused Update in Heart Failure.
  - 4) Differentiate between heart failure with reduced ejection fraction versus heart failure with preserved ejection fraction.
  - 5) Evaluate successful strategies and care models being utilized to reduce heart failure readmissions.
  - 6) Identify the current and potential role of telemedicine interventions in the management of heart failure.

Heart Failure in America

- 5.7 million people affected
- 870,000 new cases annually
- 284,000 individuals die annually

- Anticipate prevalence increase to over 8 million by 2030

Mozaffarian D, et al, *Circulation*. 2015;131:e29-e322.

Heart Failure Burden in America

- 16 million estimated physician visits annually
- 50% at 5 years Mortality after diagnosis

- More hospitalizations than all cancer combined
- Most common discharge diagnosis for Medicare patients

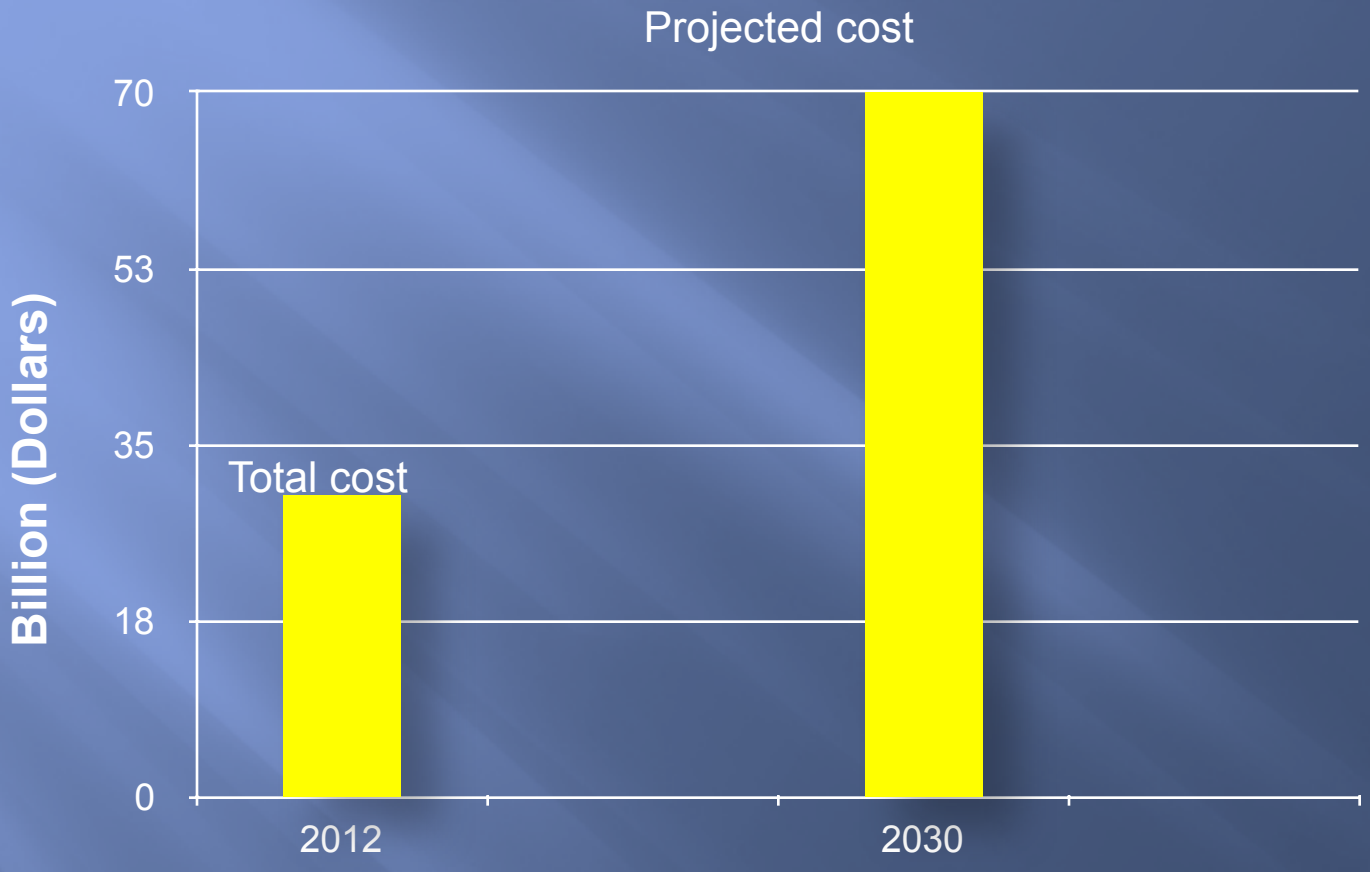
Mosalpuria K, et al. *Tex Heart Inst J.* 2014;41(3):253-261; Stewarts S, et al. *Eur J Heart Fail.* 2001;3(3): 315-322; Mozaffarian D, et al. *Circulation.* 2015;131(4):e29-e322.

Leading Potentially Avoidable Conditions

Condition	Potentially Avoidable Hospitalizations	Percentage Distribution
All	699,818	100%
Heart Failure	160,397	22.9%
COPD, Asthma	118,936	17%
Dehydration	103,024	14.7%
Pneumonia	101,357	14.5%
Urinary tract infection	87,296	12.5%
Sum of subgroup	571,010	81.6%

Segal M. *Centers for Medicare and Medicaid Services.* 2011.

Cost of Heart Failure



- Projected to cost every US adult $244

Mozaffarian D, et al. *Circulation*. 2015;131:e29-e322.

What is Heart Failure?

- Complex syndrome
- Caused by a structural or functional cardiac disorder that affects:
  - Ventricular filling (*diastolic heart failure or preserved ejection fraction*)
  - Ejection of blood (*systolic heart failure or reduced ejection fraction)*
- "Heart failure" (HF) term preferred to "congestive heart failure" because may present with or without symptoms.

Hunt SA, et al. *Circulation.* 2009;119:e154-e235.

Classification of Heart Failure

Classification	Ejection Fraction	Explanation
HF*r*EF (Reduced EF)	≤40%	-Systolic heart failure -Clinical trials have demonstrated efficacy morbidity and mortality
HF*p*EF (Preserved EF)	≥ 50%	-Diastolic heart failure -Different criteria used for defining -Diagnosis challenging as often diagnosis of excluding non-cardiac conditions causing HF symptoms -Accounts for 50% of all HF cases -Efficacy for therapies not yet identified in reducing morbidity and mortality

*There are other types of HF, but this presentation will be limited to HF*r*EF and HF*p*EF

Yancy CW, et al. *J Am Coll Cardiolol.* 2013;62:e147-e239.

Classification of Heart Failure

Classification	Ejection Fraction	Explanation
HF*p*EF (Preserved EF), borderline/middle or HF*b*EF/HF*m*EF	41-49%	Treatment plans and outcomes similar to HF*p*EF
HF*p*EF (Preserved EF), improved or HF*i*EF	>40%	Patients with HF*p*EF who previously had HF*r*EF. Their EF has recovered.

Yancy CW, et al. *J Am Coll Cardiolol.* 2013;62:e147-e239.

Heart Failure Risk Factors

- Hypertension *(single most modifiable)*
- Coronary artery disease *(myocardial infarction)*
- Valvular heart disease
- Congenital defects
- Cardiomyopathy
- Family history of cardiomyopathy
- Diabetes *(2-fold increase in women/5-fold increase in men)*
- Arrhythmias *(ie, atrial fibrillation)*

What causes heart failure? National Heart, Lung and Blood Institute. NIH website. www.nhlbi.nih.gov/health/health-topics/topics/hf/causes. Updated June 22, 2015. Accessed December 1, 2016; Lloyd-Jones DM, et al. *Circulation*. 2002;106(24):3068-72.

Demographic Risk Factors

- Sex (male)
- Older age
- Ethnicity (African-american and hypertension)
- Low socioeconomic income

Yancy CW, et al. *J Am Coll Cardiol.* 2013:62:e147-e239.

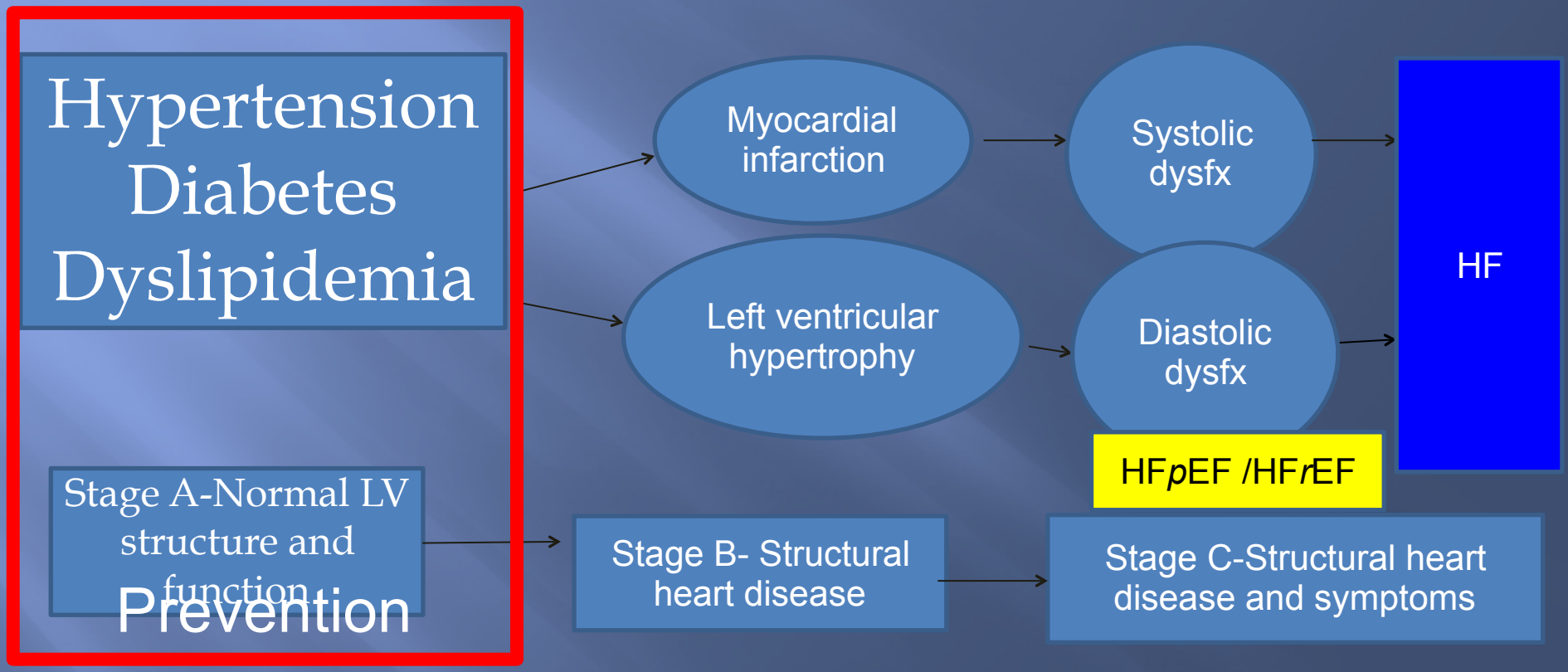
Metabolic Syndrome And Risk of Heart Failure

Includes any 3 of the following:

- Abdominal adiposity
- Hypertriglyceridemia
- Low high-density lipoprotein
- Hypertension
- Fasting hyperglycemia

Yancy CW, et al. *J Am Coll Cardiol.* 2013:62:e147-e239.

Significantly Reduce the Risk of HF



Adapted from Yancy CW, et al. *J Am Coll Cardiol.* 2013:62:e147-e239.

Preventing Metabolic Syndrome

Early Recognition and Identification	Risk Assessment and Proper Screening (based on Diagnosis and Management of the Metabolic Syndrome An American Heart Association/National Heart, Lung, and Blood Institute Scientific Statement)
Management strategies	
Treat dyslipidemia to goal	Report of the National Cholesterol Education Program Expert Panel (NCEP) on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults
Maintain normal glucose	American Diabetes Association (ADA)
Maintain blood pressure at goal	JNC Guidelines for the Management of Hypertension in Adults

Berra K. *J Am Acad Nurse Pract.* 2003:15(8); 361-370.

Preventing Metabolic Syndrome

Healthy lifestyle changes/self-care

- Smoking cessation
- Weight management (ideal BMI)
- Physical activity (Moderate intense exercise 30 min daily)
- Dietary modifications
- Reduce sodium, sugars, saturated fats
- Increase fruits and vegetables
- Alcohol moderation (≤ 2 drinks men/≤ 1 drink women)
- Avoid toxic substances

Berra K. *J Am Acad Nurse Pract.* 2003:15(8); 361-370.

Heart Failure Evaluation

- Complete history
  - Family history in patients with idiopathic dilated cardiomyopathy (3 generations)
- Complete physical examination
  - Weight and volume status
  - Symptoms of heart failure

Yancy CW, et al. *J Am Coll Cardiol.* 2013:62:e147-e239.

Heart Failure Signs

- Volume status
  - Hepatic jugular reflux
  - S3 gallop
  - Peripheral edema
  - Abdominal edema
  - Rales

Yancy CW, et al. *J Am Coll Cardiol.* 2013:62:e147-e239.

Heart Failure Symptoms

- Dyspnea on exertion/ nocturnal
- Decreased exercise tolerance
- Feelings of fatigue
- Orthopnea (number of pillows)
- Cough at night
- Wheezing
- Anorexia/early satiety
- Confusion/delirium in elderly

Mosterd A, & Hoes, AW. *Heart*.2007;93:1137-1147.

Evaluation of Symptomatic HF

(Class Ic Recommendation 2013 ACCF/AHA Guidelines)

- Echocardiogram (2-dimensional)
- Chest X-ray
- Electrocardiogram
- Consider noninvasive imaging for myocardial ischemia *(II a level C recommendation)**

Yancy CW, et al. *J Am Coll Cardiol.* 2013:62:e147-e239.

Evaluation of Symptomatic HF

(*Class Ic* Recommendation 2013 ACCF/AHA Guidelines)*

- Complete blood count
- Urinalysis
- Complete metabolic panel (electrolytes, liver panel)
- Lipids (fasting)
- Thyroid-stimulating hormone (TSH)
- Fasting glucose
- B-type natriuretic peptide (BNP)/N-terminal-BNP (IA recommendation)

*Strong recommendation, low– or very–low–quality evidence (1C)

Yancy CW, et al. *J Am Coll Cardiol.* 2013:62:e147-e239.

Biomarker- Natriuretic Peptide

(Class Ia Recommendation 2013 ACCF/AHA Guidelines)*

- BNP or N-terminal BNP in ambulatory setting
  - Utilized to support clinical decision making regarding diagnosis when uncertain
  - Utilized to establish prognosis or severity of disease severity in chronic HF

*Strong recommendation, high−quality evidence (1A)

Yancy CW, et al. *J Am Coll Cardiol.* 2013:62:e147-e239.

HF*p*EF Recommendations

ontrol systolic and diastolic blood pressure
iuretics for HF symptoms due to volume overload

Class I *(Strong)*

reat atrial fibrillation
tilize beta-blockers, angiotensin-converting-enzyme-inhibitors (ACE-Is), and angiotensin II
ceptor blockers (ARBs) for hypertension
oronary revascularization in CAD patients or angina with myocardial ischemia

Class IIa *(Moderate)*

o decrease hospitalizations, consider ARBs

Class IIb *(Weak)*

Adapted from Yancy CW, et al. *J Am Coll Cardiol.* 2013;62:e147-e239.

Medical Therapy for Stage B HF*r*EF

Remote history of MI or ACS + HF*r*EF

↓

-ACE-I
-ARB if ACE- intolerant
*Evidenced-based beta-blocker
-Statins

HF*r*EF without history of MI

↓

-ACE-I
-ARB if ACE-intolerant
*Evidenced-based beta-blocker

-Nondihydropyridine calcium channel blockers may be harmful due to negative inotrope effects
-Calcium channel blockers not recommended in routine treatment

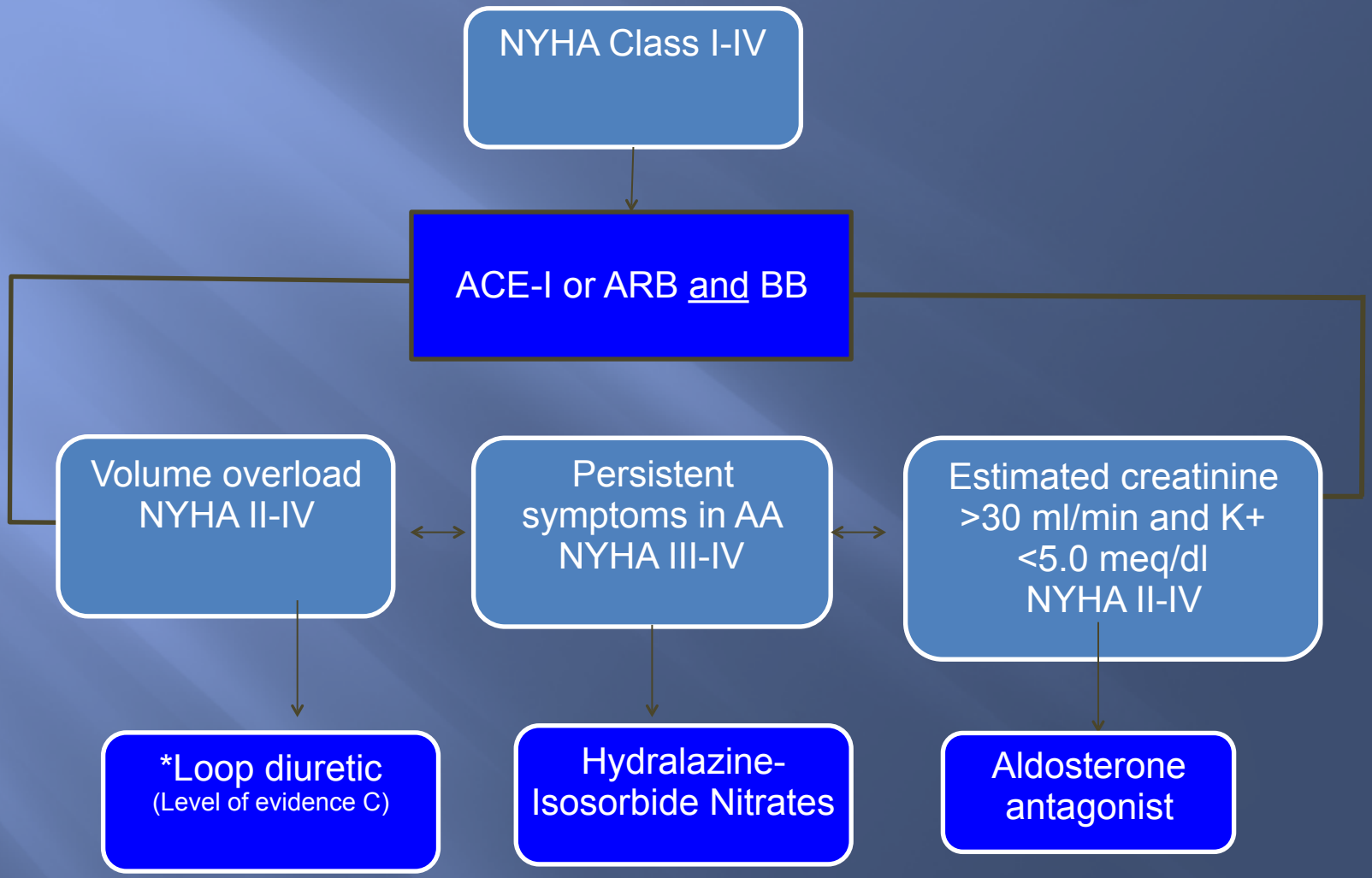
Adapted from Yancy CW, et al. *J Am Coll Cardiol.* 2013:62:e147-e239.

Guideline Directed Medical Therapy (GDMT) for Stage C HF*r*EF

Guideline directed therapy	Mechanism of action	RRR in mortality	RRR in HF hospitalizations
ACE-I or ARB	Block excess of RAAS	17%	31%
Beta-blocker	Block excess norepinephrine	34%	41%
Aldosterone antagonist	Block excess aldosterone	30%	35%
Hydralazine and isosorbide dinitrate	Increases release of nitric oxide to aide in vasodilation	43%	33%

Adapted from Yancy CW, et al. *J Am Coll Cardiol.* 2013:62:e147-e239.

Guideline Directed Therapy in Stage C HF*r*EF (*Class Ia Recommendation*)



Adapted from Yancy CW, et al. *J Am Coll Cardiol.* 2013:62:e147-e239

Guideline Directed Therapy HF*r*EF (Stage C HF): Most Commonly Used Medications

Beta-blockers and Vasodilators

Drug	Initial daily dose	Max dose	Side effects
Beta-blockers			*Fatigue, weakness, lightheadedness, bradycardia*
Bisoprolol	2.5 mg daily	10 mg daily	
Carvedilol	3.125 mg BID	50 mg BID	
Carvedilol CR	10 mg daily	80 mg daily	
Metoprolol Succinate (Metoprolol CR/XL)	12.5 mg to 25 mg daily	200 mg daily	

Vasodilators: Hydralazine and Isosorbide Dinitrate			*Headache and lightheadedness*
Fixed-dose combination	37.5 mg HYD/20 mg ISDN TID	75 mg HYD/40mg ISDN TID	
Hydralazine (HYD) Isosorbide dinitrate (ISDN)	HYD 25-50 mg TID or QID ISDN 20-30 mg TID or QID	HYD 300 mg daily in divided doses ISDN 120 mg daily in divided doses	

Adapted from Yancy CW, et al. *J Am Coll Cardiol.* 2013:62:e147-e239.
Adapted from Pazos-López P, et al. *Vasc Health Risk Manag.* 2011:7:237-254.

ACE-Inhibitors

Drug	Initial dose	Max dose	Side effects
ACE-Inhibitors			*Cough, dizziness, rise in creatinine, angioedema (<1%) but higher in blacks, hyperkalemia*
Captopril	6.25 mg TID	50 mg TID	
Enalapril	2.5 mg BID	10 - 20 mg BID	
Fosinopril	5 -10 mg daily	40 mg daily	
Lisinopril	2.5 - 5 mg daily	20 - 40 mg daily	
Quinapril	5 mg BID	20 mg BID	
Trandolapril	0.5 mg daily	4 mg daily	
Ramipril	1.25 -2.5 mg daily	10 mg daily	
Perindopril	2mg daily	8-16 mg daily	

Adapted from Yancy CW, et al. *J Am Coll Cardiol.* 2013:62:e147-e239; adapted from Pazos-López P, et al. *Vasc Health Risk Manag.* 2011:7:237-254.

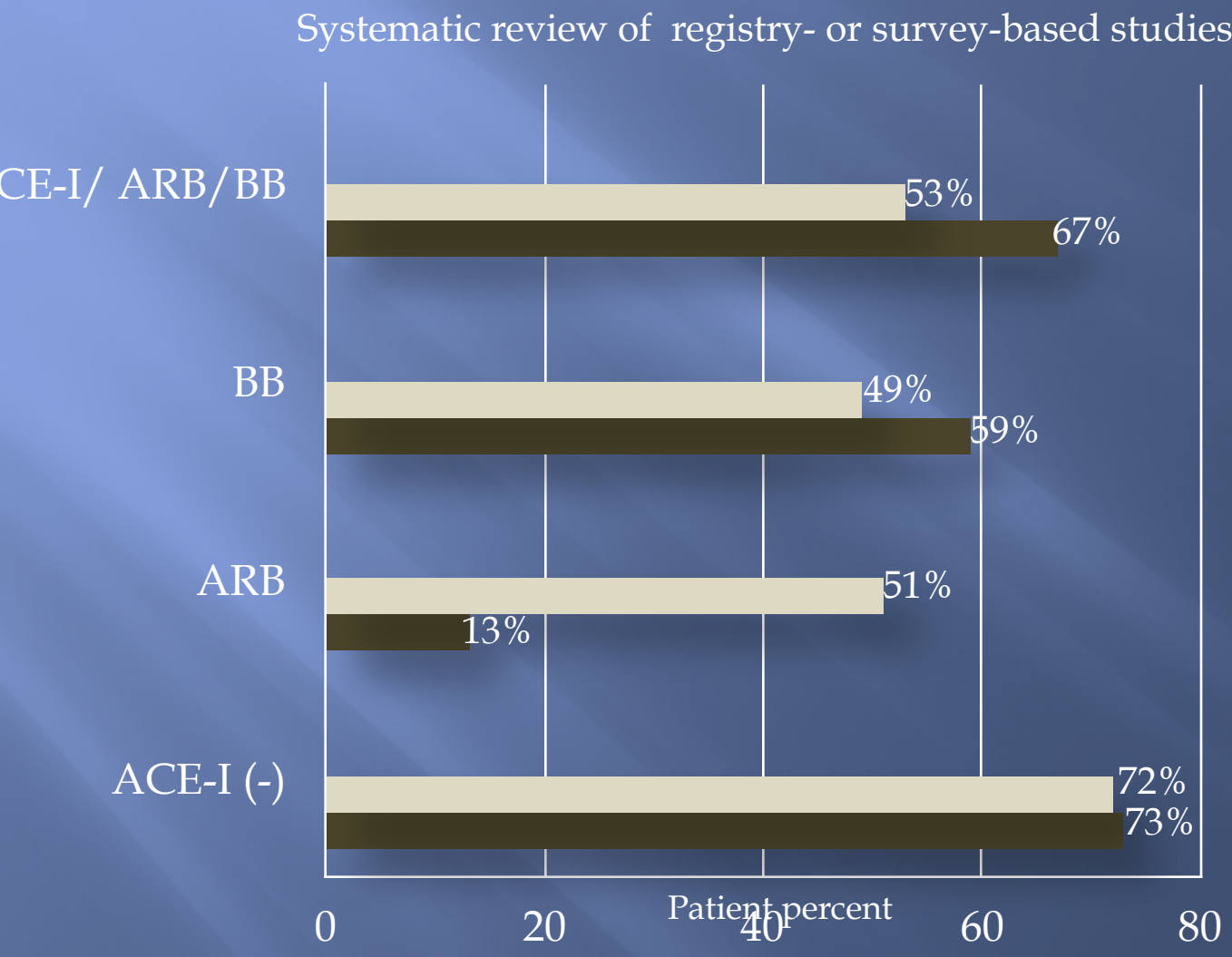
Angiotensin Receptor Blockers and Aldosterone Antagonists

DukeMedicine

Drug	Initial daily dose	Max dose	Side effects
Angiotensin Receptor Blockers			*Lightheadedness, elevated creatinine, hyperkalemia*
Candesartan	4-8 mg daily	32 mg daily	
Losartan	25-50 mg daily	50-150 mg daily	
Valsartan	20-40 mg BID	160 mg BID	
Aldosterone Antagonists -NYHA II-IV + EF ≤35%; NYHA II + hospital; Acute MI and EF ≤ 40%			*Hyperkalemia, gynecomastia*
Spironolactone	12.5-25 mg daily	25 mg daily or BID	
Eplerenone	25 mg daily	50 mg daily	*Gynecomastia rare*

Adapted from Yancy CW, et al. *J Am Coll Cardiol.* 2013:62:e147-e239; Adapted from Pazos-López P, et al. *Vasc Health Risk Manag.* 2011:7:237-254.

Treatment Gap in Chronic Systolic Heart Failure



83,605 HF patients
8210 prescribed doses

Chin K, et al. *Heart Fail Rev. 2016;21(6):675-697.*

Loop Diuretics

Drug	Initial Dose	Max Dose	Side effects
Loop Diuretics			
Furosemide	20-40 mg daily or BID	600 mg	*Hypovolemia, hypokalemia*
Bumetanide	0.5-1.0 mg daily or BID	10 mg	
Torsemide	10-20 mg daily	200 mg	
Ethacrynic acid	25-50 mg daily or BID	200 mg	

Adapted from Yancy CW, et al. *J Am Coll Cardiol.* 2013:62:e147-e239.

Potassium Sparing Diuretics

Drug	Initial Dose	Max Dose	Side effects
Potassium Sparing Diuretics			
Amiloride	5 mg daily	20 mg	*Hypovolemia, Hypokalemia*
Chlorothiazide	250 to 500 mg once or BID	1,000 mg	
Chlorthalidone	12.5 to 25.0 mg daily	100 mg	
Hydrochlorothiazide	25 mg once or BID	200 mg	
Indapamide	2.5 mg daily	5 mg	
Metolazone	2.5-10 mg prn	20 mg	

Adapted from Yancy CW, et al. *J Am Coll Cardiol.* 2013:62:e147-e239.

Digoxin in HF*r*EF to Reduce Hospitalizations *(Class IIa Level B Evidence)*

Drug	Initial Dose	Dosing considerations	Side effects
Digoxin Increase vagal tone, inotropy, and natriuresis Decrease RAAS and plasma norepinephrine HF*r*EF unless contraindicated	0.125-0.25 mg daily 0.125 mg every other day if >70 years old, low lean body mass, reduced renal function	No loading dose Avoid in significant bradycardia or AV block unless have pacemaker	*Cardiac arrhythmias (ectopy, heart block), GI symptoms (anorexia, nausea, vomiting), neurological complaints (visual changes, confusion)*

-Consider adding in patients on GDMT with persistent symptoms
-Digoxin may be added to the initial regimen in patients with severe symptoms who have not responded symptomatically during GDMT

Adapted from Yancy CW, et al. *J Am Coll Cardiol.* 2013:62:e147-e239; The Digitalis Investigational Group. *NEJM. 1997;336:525-533.*

Updated Guidelines

2016 ACC/AHA/HFSA Focused Update on New Pharmacological Therapy for Heart Failure: An Update of the 2013 ACCF/AHA Guideline for the Management of Heart Failure

Yancy CW, et al. *Circulation.* 2016;134:e282-93.

Ivabradine (SH/*f*T) Trial Stage C HFrEF *(Level of evidence IIa B-R)**

- Beneficial to reduce hospitalizations (RRR 26%; p<0.0001)

- Studied in 6558 subjects
  - Symptomatic stable HF (EF ≤ 35%), NYHA II-III
  - NSR with resting heart rate ≥ 70 bpm
  - Taking maximal tolerated beta-blocker dose and on GDMT

*IIa: Moderate evidence; B-R moderate-quality evidence from 1 or more randomized control trials (RCTs); Meta-analyses of moderate-quality RCTs

Swedberg K, et al. *Lancet.* 2010;376:875-885; Yancy CW, et al. *Circulation.* 2016;134:e282-93.

Ivabradine in HF*r*EF

Drug	Mechanism of action	Dose	Side effects
Ivabradine	Inhibits “funny” channel of SA node causing spontaneous diastolic depolarization by reducing the slope which lowers the heart rate. *If* channel is activated by cAMP and carried by the hypolarization-activated cyclic nucleotide-gated family of ion channels.	5 mg BID Max dose: 7.5 mg BID	Bradycardia, HTN, AF, Visual disturbance (flashes of light)

Yancy CW, et al. *Circulation.* 2016;134:e282-93; DiFrancesco D. *Curr Med Res Opin*. 2005;21:1115-1122.

Sacubitril/Valsartan (PARADIGM-HF Trial) in Stage C HFrEF *(Level of evidence I B-R)*

- Sacubitril/valsartan was superior to enalapril in reducing the risks of death and of hospitalization for heart failure. (RRR 20%, p= 0.00008)
- Studied in over 8000 subjects
- Patients with chronic symptomatic HFrEF NYHA class II or III who tolerate an ACE-I or ARB should be replaced with an ARNI
  - On guideline directed medical therapy

I: Strong evidence; B-R moderate-quality evidence from 1 or more RCT; Meta-analyses of moderate-quality RCTs

McMurray JJV, et al. *NEJM.* 2014;371:994-1004; Yancy CW, et al. *Circulation.* 2016;134;e282-93.

Sacubitril/Valsartan in HF*r*EF

Drug	Mechanism of action	Dose	Side effects
Sacubitril/valsartan (ARB and neprilysin inhibitor)	-Inhibition of neprilysin which increases natriuretic and other vasoactive peptides which lowers the BP and promotes sodium excretion -Valsartan, an ARB, promotes vasodilation and reduces BP by blocking the angiotensin (AT1) receptor	24mg/26 mg BID 49mg/51 mg BID 97mg/103 mg BID	Hypotension Hyperkalemia Renal impairment Angioedema (low incident)

McMurray JJV, et al. *NEJM.* 2014;371:994-1004; Yancy CW, et al. *Circulation.* 2016;134;e282-93.

Sacubitril/Valsartan

- Things to remember
  - Elevates pro-bnp (Sacubitril/Valsartan decreases BNP clearance)
  - ACE-I stopped 36 hours before starting ARNI
  - Close surveillance of potassium and creatinine
  - ARNI therapy should not be administered in patients with a history of angioedema
  - If intolerant of ACE-I and/or ARNI, still can substitute ARB
  - ACE and neprilysin break down bradykinin
  - Contraindicated in aliskiren

Yancy CW, et al. *Circulation.* 2016;134:e282-93.

Titration of GDMT

- Uptitrate medications slowly and small increments to recommended target or highest tolerated dose
- Vulnerable populations (such as elderly and those with chronic kidney disease) may require more frequent visits and laboratory monitoring
- Monitor blood pressure and heart rate during uptitration of medications specifically orthostatic changes, bradycardia, and low blood pressures
- Alternate between classes of medications
- Monitor renal function for elevation in serum creatinine and hyperkalemia (does not mean discontinue)

Adapted from Yancy CW, et al. *J Am Coll Cardiol.* 2013:62:e147-e239.

Titration of GDMT

- Complaints of fatigue and weakness with dosage increases; in the absence of instability in vital signs, reassure symptoms often transient and resolve in a few days
- Discourage sudden spontaneous discontinuation of GDMT medications by the patient and/or other clinicians without discussion with managing provider
- Review doses of other medications for HF symptom control (e.g., diuretics, nitrates)
- Consider temporary adjustments in dosages of GDMT during acute non-cardiac illnesses
- Educate patients, family members, and other clinicians about the expected benefits of achieving GDMT

Adapted from Yancy CW, et al. *J Am Coll Cardiol.* 2013:62:e147-e239.

ICD Primary Prevention in HFrEF *(Level of evidence Class I)*

- Primary prevention of sudden death (SCD) to reduce total mortality in selected patients
- Non-ischemic DCM or ischemic heart disease at least 40 days post-MI with LVEF ≤35% /NYHA class II or III on chronic GDMT, who are expected live ≥ 1 year *(Level of Evidence: A)**
- Patients at least 40 days post-MI with LVEF of ≤30% /NYHA class I on GDMT, who who are expected live ≥ 1 year *(Level of Evidence: B)**

Adapted from Yancy CW, et al. *J Am Coll Cardiol.* 2013:62:e147-e239.

CRT-D in HFrEF

(Level of evidence A NYHA III/IV;B NYHA II)

- LVEF of ≤35%
- Normal sinus rhythm
- Left bundle-branch block (LBBB) QRS duration of 150 ms or more
- NYHA Class II-IV symptoms on GDMT

Yancy CW, et al. *J Am Coll Cardiol.* 2013:62:e147-e239.

Consider Referral for Advanced HF

- Frequent heart failure hospitalizations (2 in 6 months)
- Worsening renal function
- HF*r*EF with persistent NYHA Class III or IV HF on GDMT and devices
- Requiring high/higher doses of diuretics and/or frequent adjustments (>120 mg furosemide daily, >60 mg torsemide daily, or > 3mg bumetanide daily)
- Intolerance to beta-blocker and ACE-I due to hypotension

Society of Hospital Medicine. http://www.hospital http://www.hospitalmedicine.org/Web/Quality___Innovation/Impementation_Toolkit/CHF/hf_specialistaspx. Updated 2016. Accessed December 26, 2016.

Non-Pharmacological Interventions in Heart Failure

- Continuous positive airway pressure
  - Improves cardiac output
  - Decreases myocardial oxygen consumption
  - Improves LV function*

**Small study*

- Cardiac rehabilitation
  - Modest significant reductions
    - All-cause mortality or hospitalization cardiovascular mortality
    - HF hospitalization

Kaneko Y, et al. *NEJM .* 2003;348:1233-41; Yancy CW, et al. *J Am Coll Cardiol.* 2013:62:e147-e239; O'Connor CM, et al. *JAMA.* 2007:301(14):1439-1450.

Drugs to Avoid in Heart Failure

- NSAIDS (*ie,* ibuprofen, indomethacin, ketorolac, naproxen, nimesulide, and piroxicam)*
- COX-2 Selective (*ie,* etoricoxib and rofecoxib)*
- Thiazolidinediones (NYHA III-IV)
- Nondihydropyridine calcium channel blockers
- Certain antibiotics (*ie,* quionolones)
- Certain anti-arrhythmic agents (*ie,* dronedarone)
- Tumour necrosis factor antagonists (*ie,* infliximab, etanercept)

Morrissey RP, Czer L, & Shah PK. *Am J Cardiovasc Drugs.* 2011;11(3):153-171; *Andrea A, et al. *BMJ*. 2016 doi: https://doi.org/10.1136/bmj.i4857; Potentially harmful drugs to avoid in heart failure. Heart online. Heart Foundation. www.heartonline.org.au/resources. Updated 11/2014. Accessed March, 27, 2017.

Strategies to Reduce Readmissions

- Self-care education
- Early follow-up
- Disease management
- Team-based care

Self-Management Tools

- Behavioral modification – Teach Back method
- Variety of delivery platforms - booklets, videos, web based, smart phone, pictures
- Literacy and health literacy appropriate

Self-Care Adherence in Heart Failure

- 308 subjects in outpatient academic HF clinic
- Assess adherence of self care education behaviors with Medical Outcomes Study Specific Adherence Scale (MOS-SAS)
- Self–care behaviors education in person, video and written instructions:
  - Smoking
  - ETOH consumption
  - Medication management
  - Weight monitoring
  - Low sodium diet
  - Symptom management

Marti CN, et al. *Congest Heart Fail.* 2013;19(1): 16-24.

Self-Care Adherence in Heart Failure

- Improves health status demonstrated by KCCQ (Kansas City Cardiomyopathy Questionnaire) ($p=0.011$)
- Reduces all-cause ED visits ($p<0.001$)
- HF-related ED visits ($p=0.005$)
- Total all-cause hospitalized days ($p=0.015$)
- Total HF related hospitalized days ($p<0.001$)

Marti CN, et al. *Congest Heart Fail.* 2013;19(1): 16-24

Self-Care Education

- Knowing how to self manage and what to report
  - Limiting salt intake (<2000 mg daily)
    - Avoid canned foods, processed foods, salting foods and fast foods
  - Weight monitoring
    - Weight gain of 2-3 lbs in 1 day or 5 lbs in 1 week
  - Heart failure symptoms
    - Swelling in legs or stomach, cough, tiredness, SOB lying flat and/or with activity

White MF, Kirschner J, & Hamilton MA. *Circulation*. 2014;129:e293-e294.

Self-Care Education

- Consider a method to manage medications
  - Utilizing a pillbox
  - List (updated)
- Avoid cardiotoxic agents
  - Recreational drugs
  - Moderate alcohol consumption
  - Smoking cessation

Marti CN, et al. *Congest Heart Fail.* 2013;19(1): 16-24.

Team Management of Patients With Heart Failure

A Statement for Healthcare Professionals From the Cardiovascular Nursing Council of the American Heart Association

Kathleen L. Grady, PhD, RN; Kathleen Dracup, DNSc, RN; Gemma Kennedy, PhD, RN; Debra K. Moser, DNSc, RN; Mariann Piano, PhD, RN; Lynne Warner Stevenson, MD; James B. Young, MD

Circulation. 2000;102:2443-2456

doi: 10.1161/01.CIR.102.19.2443

Team-Based Care

- Comprehensive health serves to individuals, families and/or their communities
  - By at least two health professionals working collaboratively with patients, family caregivers, and community service providers on shared goals
  - Within and across settings to achieve care that is safe, effective, patient centered, timely, efficient and equitable

Naylor MD, et al. Team-Based Primary Care for Chronically Ill Adults: State of the Science. Advancing Team-Based Care. Philadelphia, PA: *American Board of Internal Medicine Foundation*; 2010.

Models Reduce Readmissions

- Multidisciplinary teams
  - In-person communication
- Multidisciplinary interventions
  - Include medical and at least 1 or more disciplines

Holland R, et al. *Heart* 2005;**91**:899-906; Sochalski J, et al. *Health Affairs* . 2008;28(1):179-189.

Multidisciplinary interventions with physician oversight in heart failure

- Meta-analysis 30 RCTs (Sample 71-1518)
- Multidisciplinary interventions : Europe, US, Australia, New Zealand and Argentina
- Physician and at least 1 type of professional: nurse, pharmacist, dietician, or social worker
- Almost all interventions shared 2 key elements:
  - 1 to 1 pt. education on heart failure, medication, and diet and exercise advice
  - Symptom monitoring and self-management advice

- 4 types of High intensity interventions:
  - Home visits
  - Tele-monitoring
  - Phone f/u or edu mailings
  - Hospital or Clinic interventions
- Effective when at least partly delivered in a patient's own home through visits, telephone calls, or more advanced tele-video techniques
- Reduced all cause hospitalization (13%), HF related admissions (30%), and mortality (20%)

Holland, et al. Heart . (2005). 91: 1899-906.

HF Transitional Care

Intervention	All-Cause Readmissions	
	30 d	3-6 mo
High-intensity home visits	0.34 (0.19-0.62)	0.75 (0.68-0.86)
Telephone support	0.80 (0.38-1.65)	0.92 (0.77-1.10)
Telemonitoring	1.02 (0.64-1.63)	1.11 (0.87-1.42)
Multidisciplinary clinic	-	0.70 (0.55-0.89)
Education	-	1.14 (0.84-1.54)

Adapted from Feltner C, et al. *Ann Intern Med*. 2014;160:774-784.

HF Disease Management Outcomes

- Studies for outcomes of disease management interventions in European countries were compared to that of other countries (United States, Canada, Australia, New Zealand)

- More studies in other countries demonstrated significant improvements in outcomes in comparison to the European countries
  - Outcomes included combined event of readmission or death, total rehospitalizations, number of days hospitalized, and quality of life

Bernard S, et al. RTI International. 2007. The Health Foundation

HF Disease Management

- Established in 1998
- Physician oversight and Nurse Practitioner – Led Model
- 117 NYHA Functional Class III-IV
- Program involved:
  - Treatment protocols
  - Follow-up visits
  - Education (manual)
  - Telephone calls

- Results
  - ↑ Beta-blocker 52% to 76%
  - ↓Hospitalizations from 1.5 per patient-year to none
  - ↑Outpatient visits from 4.3 to 9.8 per year
  - ↑Outpatient cost by $659 per patient-year
  - ↓Inpatient cost by $6963 per patient-year

Whellan DJ & Gattis W A. *Archives of Intern Med.* 2001;161: 2223-2228.

Early Follow-Up Reduces Readmissions

- Most patients should see a physician (provider) within a week of discharge
- Patients who are discharged from hospitals that have higher early follow-up rates have a lower risk of 30-day readmission
- Patients need a timely evaluation of medication changes and clinical status

Hernandez A et al. *JAMA*. 2010;303(17):1716-1722.

Outpatient Infusions and heart failure

Case Report

J Clin Med Res • 2012;4(6):434-438

The Role of Outpatient Intravenous Diuretic Therapy in a Transitional Care Program for Patients With Heart Failure: A Case Series

Mohamad Lazkani[a], Ken S. Ota[a, b]

MINI-FOCUS ISSUE: PREVENTING HEART FAILURE ADMISSIONS

Intravenous Diuretic Therapy for the Management of Heart Failure and Volume Overload in a Multidisciplinary Outpatient Unit

Leo F. Buckley, PharmD,[a] Danielle M. Carter, PharmD,[a] Lina Matta, PharmD, MPH,[a] Judy W. Cheng, PharmD, MPH,[a] ..., NP,[a] ... S. Desai, MD, MPH[b]

J Card Fail. 2015 Aug;21(8):667-73. doi: 10.1016/j.cardfail.2015.05.009. Epub 2015 May 22.

Thinking Outside the Box: Treating Acute Heart Failure Outside the Hospital to Improve Care and Reduce Admissions.

DeVore AD[1], Allen LA[2], Eapen ZJ[3].

Congestive Heart Failure

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ORIGINAL PAPER

Open Access to an Outpatient Intravenous Diuresis Program in a Systolic Heart Failure Disease Management Program

Kathy Hebert MD, MMM, MPH, Andre Dias MD, Emiliana Franco MD, Leonardo Tamariz MD, MPH, Dylan Steen MD, Lee M. Arcement MD, MPH

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Conclusion

- Advanced Practice Providers have an important role in preventing and reducing the burden of HF by managing risk factors
- Multidisciplinary teams that include advanced practice providers improve HF outcomes
- Knowledge of past and current HF guidelines is imperative for optimal HF management
- Innovation that involves creativity as well as technology is required to reduce readmissions in high risk HF patients