Heart Failure (HF):

Review of Management Guidelines and Improvement Project

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By the end of this presentation, you will be able to:

- 1. Describe the current **best practices** for management of Heart Failure
- 2. Describe the current **medication regimen** recommendations for treatment of Heart Failure
- 3. Describe additional **interventions and programs** that may be appropriate for the management of patients with Heart Failure





Complex Clinical Syndrome



Risk Factors

- 1. Hypertension
- 2. Coronary artery disease (CAD)
- 3. Obesity
- 4. Excessive alcohol use
- 5. Smoking
- 6. Illicit drug use
- 7. Poor diet



Symptoms

Decreased Perfusion

- Reduced exercise capacity
- Fatigue
- Depression
- Dyspnea
- Confusion/delirium
- Gastrointestinal discomfort
 - Early satiety
 - Nausea and vomiting
 - Pain

Fluid Retention

- Pulmonary congestion
- Splanchnic congestion
- Ascites
- Edema
- Dyspnea
- Orthopnea
- Paroxysmal nocturnal dyspnea or cough
- Wheezing or cough

Diagnosis

History and physical exam

- Volume status:
 - Wheezing
 - Rales
 - Edema
 - Ascites
- Perfusion:
 - Cool extremities
 - Prolonged capillary refill
- Rule out pulmonary disease



Diagnosis



Testing:

- Complete blood count (CBC), Comprehensive metabolic panel (CMP), Thyroid-stimulating hormone (TSH), Brain natriuretic peptide (BNP) or Nterminal-pro-BNP (NT-proBNP), Troponin
- Chest x-rays (CXR), Electrocardiogram (ECG), Trans-thoracic echocardiogram (TTE)
- Exercise/functional cardiac testing if CAD is suspected
- Coronary angiography if ischemia is contributing to Heart Failure
- May need testing for hemochromatosis, amyloidosis, rheumatological disease, pheochromocytoma or Acquired Immune Deficiency Syndrome (HIV)

Classification

New York Heart Association (NYHA) Functional Classification			
Class	Objective Assessment		
Т	No limitation of physical activity. Ordinary activity does not cause symptoms of Heart Failure		
Ш	Slight limitation of physical activity. Comfortable at rest, but ordinary physical activity causes symptoms of Heart Failure		
ш	Marked limitation of physical activity. Comfortable at rest but less than ordinary physical activity causes symptoms of Heart Failure		
IV	Unable to carry on any physical activity without symptoms of Heart Failure or symptoms of Heart Failure at rest		

Classification

Definitions		
Туре	Ejection Fraction	
I. Heart Failure with <i>reduced</i> Ejection fraction (HF <i>r</i> EF)	≤40%	
II. Heart Failure with <i>midrange</i> Ejection fraction (HF <i>mr</i> EF)	>40 but <50%	
III. Heart Failure with <i>preserved</i> Ejection fraction (HFpEF)	≥50%	

	American College of Cardiology (ACC) and American Heart Association (AHA)			
Stage Objective Assessment		Objective Assessment		
	Α	At risk of Heart Failure but without structural heart disease or symptoms		
	В	Structural heart disease but without signs or symptoms		
	C	Structural heart disease with prior or current symptoms		
	D	Refractory Heart Failure requiring specialized interventions		
		Reduced survival and increased Brain natriuretic peptide (BNP)		

Epidemiology



1. 50% mortality in 5 years, worse with reduced ejection fraction (EF)

- Stage A: 3%
 - Stage B: 4.3% **5x increase in mortality**
- Stage C: 25.4%
- Stage D: 80%

2. Prevalence increases with age

- 40-59 y/o: 1.5% of men and 0.7% of women
- ≥80 y/o: 8.6% of men and 11.7% of women
- 3. Ethnicity:
 - African American > Hispanic > White > Chinese American
 - Due to a higher prevalence of obesity and diabetes

Patient Profiles

Stage	NYHA	Clinical Presentation
A	N/A	 HTN, Diabetes Mellitus (DM), obesity Atherosclerotic disease Metabolic syndrome Using cardiotoxins: Illicit drugs, excessive alcohol, tobacco, chemotherapy Familial hypercholesterolemia or cardiomyopathy
В	I	 Previous myocardial infarction (MI) Left ventricle remodeling including left ventricular hypertrophy (LVH) and low ejection fraction (EF) Asymptomatic valvular disease
С	I-IV	Known structural heart diseaseHeart failure signs and symptoms
D	IV	 Marked heart failure symptoms at rest Recurrent hospitalizations despite compliance with guideline-directed medication therapy (GDMT)

Goals of Therapy

Stage	Therapy Goals	
Α	 Heart healthy lifestyle Prevent vascular, coronary disease Prevent left ventricle structural abnormalities 	
В	Prevent heart failure symptomsPrevent further cardiac remodeling	
С	 HFpEF Control symptoms Improve Health-related quality of life (HRQOL) Prevent hospitalization Prevent mortality Identify comorbidities HFrEF Control symptoms Patient education Prevent hospitalization Prevent mortality 	
D	 Control symptoms Improve HRQOL Prevent hospital readmissions Establish patient's end-of-life goals 	

Non-Medication Treatment

- 1. Education on disease and self care
- 2. Social support
- 3. Sodium restriction 1.5 to 3 g/day in symptomatic patients
- 4. Diet appropriate for underlying conditions
- 5. Treat underlying conditions:
 - HTN (goal: systolic blood pressure (SBP) <130), Atrial fibrillation (AF), CAD, DM, etc.
 - Screen and treat sleep disorders
- 6. Weight loss
- **7. Exercise training** or regular physical activity for patients able to participate, cardiac rehabilitation to improve function
- 8. Fluid restriction in advanced or decompensated heart failure



Guideline Directed Medication Therapy (GDMT)

Stage	Treatment Recommendations		
	 Control HTN, optimal blood pressure (BP) should be <130/80 		
_	Control lipid disorders, use statins as appropriate		
A	 Control or avoid obesity, diabetes mellitus, tobacco use, and cardiotoxic agents: illicit drugs, excessive alcohol, tobacco, chemotherapy 		
	 Angiotensin-converting enzyme inhibitors (ACEI) or Angiotensin receptor blocker (ARB), Beta blockers, and statins as appropriate if history of MI or Acute coronary syndrome (ACS) 		
_	 ACEI or ARB and Beta blockers if rEF even without MI history 		
В	In selected patients:		
	 Implantable Cardioverter Defibrillator (ICD): Ischemic Cardiomyopathy 		
	 Revascularization or valvular surgery 		

Guideline Directed Medication Therapy (GDMT)

Stage	Treatment Recommendations
	HF <i>p</i> EF
	 Diuretics to relieve symptoms of volume overload
	 Follow guideline driven indications for comorbidities:
	 HTN: goal is SBP <130, use ACEI/ARB/Beta Blockers AF, CAD, DM
С	Screen for and treat sleep disorders
	Consider ARBs
	Consider aldosterone receptor antagonists in appropriate patients
	HF <i>r</i> EF Step 1:
	ACEI or ARB and Beta Blockers
	 Diuretics as needed for fluid overload

Guideline Directed Medication Therapy (GDMT): DM Update

Sodium-glucose cotransporter 2 inhibitors (SGLT2i) initially FDA approved for treatment of DM now have additional cardiovascular (CV) indications

Empagliflozin

 Reduction of CV mortality due to major cardiovascular events (MACE) and reduction of HF hospitalizations* in patients with DM2 and CV disease

Canagliflozin

- Reduction of CV mortality and MACE in patients with DM2 and CV disease
- Reduction of HF hospitalizations and CV death in adults with DM2 and diabetic nephropathy with albuminuria more than 300 mg/day

Guideline Directed Medication Therapy (GDMT): DM Update

Dapagliflozin

- Reduction of HF hospitalizations in patients with DM2 and CV disease or multiple CV risk factors
- Reduction of risk of cardiovascular death and hospitalizations for HF heart failure in patients with HF with reduced ejection fraction (NYHA class II to IV)
 - This new HF indication is independent of DM2 diagnosis

Guideline Directed Medication Therapy (GDMT): Sleep Apnea

- 61% of patients with HF have either central or obstructive sleep apnea
 - Sleep apnea is associated with poor health-related quality of life (HRQOL)
 - Sleep apnea increases levels of Natriuretic Peptides
- Treatment may improve cardiac function and decrease pulmonary hypertension
- Use screening questionnaires in patients with risk factors and symptoms
- A diagnostic polysomnogram is the gold standard for diagnosis of obstructive sleep apnea
- Most patients are treated with continuous positive airway pressure (CPAP)

Guideline Directed Medication Therapy (GDMT): Sleep Apnea

Comorbidities associated with sleep apnea

- AF, HF, obesity, stroke
- Type 2 Diabetes Mellitus
- High-risk occupation / commercial driving
- Nocturnal arrhythmias
- Pre-operative clearance for bariatric surgery
- Pulmonary hypertension
- Refractory hypertension

History and exam for patients with suspected sleep apnea

- Apneas
- Daytime sleepiness
- Morning headaches
- Hypertension
- Obesity
- Retrognathia
- Snoring



Continue Guideline Directed Management and Therapy with serial reassessment and optimized dosing/adherence

Anemia



Anemia Treatment:

- 1. IV iron replacement to improve functional status and quality of life
- 2. NYHA class II and III
- 3. Iron deficiency
 - ferritin <100 ng/mL or
 - 100 to 300 ng/mL if transferrin saturation is <20%

ACEI: Angiotensin Converting Enzyme Inhibitors

Mechanism of action: Relax blood vessels to lower blood pressure and reduce strain on the heart and improve blood flow

Drug	Initial Daily Dose	Maximum Dose
Captopril	6.25 mg 3 times	50 mg 3 times
Enalapril	2.5 mg twice	10-20 mg twice
Fosinopril	5-10 mg once	40 mg once
Lisinopril	2.5-5 mg once	20-40 mg once
Perindopril	2 mg once	8-16 mg once
Quinapril	5 mg twice	20 mg twice
Ramipril	1.25-2.5 mg once	10 mg once
Trandolapril	1 mg once	4 mg once

ARB: Angiotensin Receptor Blockers

Mechanism of action: Relax blood vessels to lower blood pressure and reduce strain on the heart and improve blood flow

Drug	Initial Daily Dose	Maximum Dose
Candesartan	4-8 mg once	32 mg once
Losartan	25-50 mg once	50-150 mg once
Valsartan	20-40 mg twice	160 mg twice

ARNI: Angiotensin Receptor-Neprilysin Inhibitors

Mechanism of action: A combination of an ARB and a medicine that inhibits the production of neprilysin, an enzyme that breaks down natural substances in the body that widen blood vessels and reduce sodium retention. The effect is to lower blood pressure and decrease strain on the heart.

Drug	Initial Daily Dose	Maximum Dose
Sacubitril/Valsartan	49/51 mg twice a day (BID) may start at 24/26 mg BID	97/103 mg BID

Aldosterone Antagonists

Mechanism of action: Help the body to get rid of salt and water through urine. Lowers the volume of blood that the heart must pump

Drug	Initial Daily Dose	Maximum Dose		
Spironolactone	12.5-25 mg once	25 mg once or twice		
Eplerenone	25 mg once	50 mg once		
	Beta Blockers			
Mechanism of action: Can slow a rapid heart rate and lower blood pressure				
Drug	Initial Daily Dose	Maximum Dose		
Bisoprolol	1.25 mg once	10 mg once		
Carvedilol	3.125 mg BID	50 mg BID		
Carvedilol CR	10 mg once a day (QD)	80 mg QD		
Metoprolol succinate extended release Metoprolol (CR/XL)	12.5–25 mg QD	200 md QD		

Hydralazine (HYD) and Isosorbide Dinitrate (ISDN)

Mechanism of action: Relax blood vessels to lower blood pressure. A combination that has shown to improve outcomes in African Americans and is often used if someone is allergic to or can't take angiotensin converting enzyme (ACE) inhibitors or ARBs.

Drug	Initial Daily Dose	Maximum Dose
Fixed-dose combination	37.5mg HYD/20mg ISDN 3 times daily	75mg HYD/40mg ISDN 3 times daily
Hydralazine (HYD) and isosorbide dinitrate (ISDN)	HYD 25-50mg 3 or 4 times daily and ISDN 20-30mg 3 or 4 times daily	HYD 300mg daily in divided doses and ISDN 120mg daily in divided doses

I_fChannel Inhibitor

Mechanism of action: Sinoatrial node modulator. This new drug is used with beta blockers when they cannot lower the heart rate sufficiently. It helps reduce the amount of oxygen the heart needs and the amount of work the heart has to do to pump blood through the body.

Drug	Initial Daily Dose	Maximum Dose
Ivabradine	5 mg BID	7.5 mg BID

Device Therapy

Implantable Cardioverter Defibrillator (normalICD)

(Resets rhythm)

Cardiac resynchronization therapy-pacemaker (CRT-P) or Cardiac resynchronization therapy-defibrillator (CRT-D)

(Biventricular pacing ± ICD)



Device Therapy



Implantable cardioverter-defibrillator (ICD)

- Recommended: primary prevention of sudden cardiac death (SCD)
 - HF*r*EF, ≥40d post-MI
 - Left ventricular ejection fraction (LVEF) ≤35%
 - NYHA II-III on GDMT
 - Life expectancy >1 year

Cardiac resynchronization therapy-pacemaker (CRT-P) or Cardiac resynchronization therapy-defibrillator (CRT-D)

- Indicated: LVEF ≤35%
 - Sinus, Left bundle branch block (LBBB) with QRS ≥150ms, useful if QRS 120-149ms
 - NYHA II, III, or ambulatory IV symptoms on GDMT

Device Therapy



Cardiac resynchronization therapy-pacemaker (CRT-P) or Cardiac resynchronization therapy-defibrillator (CRT-D)

- Useful: LVEF ≤35%
 - sinus, non-LBBB pattern, QRS ≥150ms
 - NYHA III or ambulatory class IV symptoms
- Useful: AF and LVEF≤35% on GDMT if
 - a) requires ventricular pacing or meets CRT criteria and
 - b) AV nodal ablation or rate control allows near 100% ventricular pacing with CRT on GDMT
- Useful: on GDMT, LVEF ≤35%, undergoing new or replacement device implantation with anticipated ventricular pacing (>40%)

Acute Heart Failure

Acute Decompensated Heart Failure

- Dyspnea, weight gain, low BP, tachypnea
- Labs: AKI, myocardial ischemia
- Etiologies: 56% CAD, need functional testing
- In-hospital mortality: 3.9% HFrEF, 2.9% HFpEF

Mortality Risk

- SBP ≤125, BUN >37, Cr >2
- 60-90 day mortality: 9.5%
- Readmission Risk
 - No family support, low BP, high HR
 - 60-90 day readmission: 29.2%; 6 months: 50%



Hospital Management

Multidisciplinary including cardiology consultation

- Oxygen to correct hypoxemia, Nasal intermittent positive pressure ventilation (NIPPV) for dyspnea
- Systemic and pulmonary decongestion: **IV diuretics**
- Sodium restriction <2g/d, fluid restriction <2L/d
- Monitor electrolytes and renal function
- AF rate/rhythm control: beta blocker, digoxin, amiodarone
- Inotropes (dobutamine, milrinone) for low BP/perfusion
- Pulmonary wedge pressure monitoring as needed
- Interventional and Surgical Therapy
 - CAD: higher in-hospital and 60-90 day post-discharge mortality 3.7% vs 2.9% and 9.2% vs 6.9%
 - Stress testing, coronary angiography, revascularization
 - Valve replacement



Transitions of Care



- 1. Elements to address Inpatient (IP), at discharge, and Outpatient (OP)
 - Initiation of **GDMT** if not done or contraindicated
 - Causes of heart failure, barriers to care, and limitations in support
 - Assessment of volume status and blood pressure with adjustment of heart failure therapy
 - Optimization of chronic oral heart failure therapy
 - Renal function and electrolytes
 - Management of comorbid conditions
 - Heart failure education, self-care, emergency plans, and adherence
 - Palliative or hospice care

Transitions of Care



- 2. Multidisciplinary heart failure DM programs for patients at high risk for hospital readmission:
 - to facilitate the implementation of GDMT
 - to address different barriers to behavioral change
 - to reduce the risk of subsequent rehospitalization for heart failure
- Schedule an early follow-up visit (within 7 to 14 days) and early follow-up telephone call (within 3 days) after hospital discharge
- 4. Use clinical risk-prediction tools and/or biomarkers to identify patients at higher risk for postdischarge clinical events

Advanced Heart Failure

- Refractory, stage D heart failure
- NYHA class IV with terminal diagnosis or considering cardiac transplant
- Estimate Prognosis: <u>www.SeattleHeartFailureModel.org</u>
- Severe cardiac dysfunction and poor functional capacity
- Quaternary hospital referral:
 - Palliative care
 - Left Ventricular Assist Device
 - Cardiac transplantation
 - Investigational therapies



Advanced Heart Failure

- Repeated heart failure (≥2) hospitalizations or emergency department visits in last year
- Deterioration in renal function
- Weight loss
- Intolerance to:
 - ACEI due to hypotension and/or worsening renal function
 - Beta blockers due to worsening heart failure or hypotension
- Frequent SBP <90 mmHg
- Persistent dyspnea with dressing or bathing requiring rest
- Inability to walk one block on the level ground
- Recent need to escalate diuretics to maintain volume status
 - Reaching daily furosemide equivalent dose >160 mg/d and/or
 - Use of supplemental metolazone therapy
- Progressive decline in serum sodium, usually to <133 mEq/L
- Frequent ICD shocks



Heath Plan Heart Failure Care Improvement Project

Advance Care Planning, Palliative Care

Disease Management, Remote Patient Monitoring (RPM)

Care Management (CM): Transitions of Care (TOC), Care Coordination (CC), Complex Case Management (CCM)

Pharmacy Interventions

Heart Healthy Lifestyle

Comprehensive Medication Management (CMM) by Clinical Pharmacy Services Team

Member outreach and provider outreach to promote GDMT

• Indication:

- Unnecessary medications
- Needs additional medications

• Effectiveness:

- Ineffective medication
- Dosage too low
- Needs additional monitoring

• Safety:

- Adverse medication event
- Dosage too high
- Needs additional monitoring

Adherence:

- Due to members' attitudes and perspectives
- Cost



Disease Management Remote Patient Monitoring of Weight



- Eligible members and control group in initial phase
 - Inclusion Criteria:
 - NYHA Class I-III heart failure
 - Hospital admissions or emergency room (ER) visits within the last year
 - Weight up to 395 lbs
 - May have additional co-morbidities including Diabetes Mellitus Type 2 (DM2), CAD, Chronic kidney disease (CKD) ≤ stage 3
 - Has a Bluetooth-enabled smart phone and can download apps
 - Has internet access (via Wi-Fi or cellular data) at primary residence
 - Exclusion Criteria:
 - Not meeting all inclusion criteria
 - Unsteady on feet/poor balance

Disease Management Remote Patient Monitoring of Weight



- Numberless scale with Apple iOS or Google Android smartphone app
- Tailored messaging on heart healthy lifestyle driven by Machine Learning (ML) and Artificial Intelligence (AI)
- Weight feedback and alerts of excessive weight gain
 - A sudden weight gain that may signal an impending Hearth Failure Exacerbation
 - Alerts advise patients to contact their doctor or care team for advice and followup care as needed
- Patients will be approached by CM and Clinical Pharmacy Teams
- Providers will be informed if one of their patients agrees to participate in the program
- Providers may refer to Case Management potential candidates

Disease Management Remote Patient Monitoring of Weight





By creating your Shapa account and agreeing to participate in this pilot, you agree to allow Shapa to share your weight measurements weekly with Real Appeal Assuvil no teed to enter your weight on your Real Appeal dishiboard weekly before class.





Be ahead of the game and mplete the Shapa assessment





Try to add as much color to one meal today. For example, add bright reds (tomatoes), oranges (carrots), yellows (peppers) or greens (green beans).



DAILY MISSION #2

For the Love of Lemons









Palliative Care



- Advance Care Planning (ACP) Advance Directives
 - POLST, Durable Power of Attorney for Health Care (DPA-HC) Proxy
 - Counsel patients about prognosis
 - Enable informed decisions about medications, devices, and transplantation
- Symptom alleviation even for non-terminal patients
- Addresses caregiver and patient psychosocial concerns
- Improves quality of life
- Decreases anxiety and in-hospital mortality

Contact Information

Referral Guidance for Any Intervention

• Health Net:

Tel: Check the back of the member's ID card for the correct contact number

Website: healthnet.com

- California Health & Wellness
 - Tel: <u>1-877-658-0305</u>

Website: cahealthwellness.com

CalViva Health

Tel: <u>1-888-893-1569</u>

Website: calvivahealth.org

Clinical Pharmacy Central Line

Tel: <u>1-888-893-1569</u>

Hours of operation: 7:30am - 5:30pm Pacific

(voicemail can be after hours, and calls are returned the next business day)





Citations and Resources

- Yancy CW, Jessup M, Bozkurt B, et al. 2013 ACCF/AHA guideline for the management of heart failure: a report of the American College of Cardiology Foundation/American Heart Association Task Force on practice guidelines. <u>Circulation. 2013;128(16):e240e327</u>
- Yancy CW, Jessup M, Bozkurt B, et al. 2017 ACC/AHA/HFSA Focused Update of the 2013 ACCF/AHA Guideline for the Management of Heart Failure: a report of the American College of Cardiology Foundation/American Heart Association Task Force on practice guidelines and the Heart Failure Society of America. <u>Circulation.</u> 2017;136(6):e137-e161
- Hollenberg SM, Warner Stevenson L, Ahmad T, Amin VJ, Bozkurt, B, Butler J, Davis LL, Drazner MH, Kirkpatrick JN, Peterson PN, Reed BN, Roy CL, Storrow AB. 2019 ACC expert consensus decision pathway on risk assessment, management, and clinical trajectory of patients hospitalized with heart failure: a report of the American College of Cardiology Solution Set Oversight Committee. J Am Coll Cardiol 2019;74:1966–2011
- Korabathina R, Fountain LB, Eckstein D, Wojnowich K. 2016 Heart Failure Update. FP Essent. 216;442:1-48.
- American College of Cardiology (<u>www.acc.org</u>)
- American Heart Association (professional.heart.org)
- Heart Failure Society of America (<u>www.hfsa.org</u>)

Provider Tools and Resources

Line of Business	Provider Summary	HF Guidelines Summary
California Health & Wellness	Download Document	Download Document
Health Net Community Solutions and CalViva Health	Download Document	Download Document
Health Net Commercial and Medicare	Download Document	Download Document

Patient Tools and CM Resources

- <u>American College of Cardiology CardioSmart Site</u>
- <u>American College of Cardiology Heart Failure Overview Page</u>
- <u>American College of Cardiology CardioSmart: I Have Heart Failure with</u>
 <u>reduced ejection fraction</u>
- <u>Heart Failure: How to Limit Your Fluids Documents</u>