Sharing or Use of this Presentation

We encourage you to share this presentation.

If you use this presentation in its entirety, parts of it, or any of the information in it, please credit the Ohio Cardiovascular and Diabetes Health Collaborative (Cardi-OH) AND include a link to Cardi-OH.org.

Please also send Cardi-OH (info@Cardi-OH.org) information about where the content will be used.

Heart Failure Risk Management:
What to Know, What to Do

Statewide Webinar

October 25, 2023

Welcome

Michael W. Konstan, MD
Principal Investigator, Cardi-OH

Shari Bolen, MD, MPH
Co-Principal Investigator, Cardi-OH

Case Western Reserve University School of Medicine

About Cardi-OH

Founded in 2017, the mission of Cardi-OH is to improve cardiovascular and diabetes health outcomes and eliminate disparities in Ohio's Medicaid population.

WHO WE ARE: An initiative of health care professionals across Ohio's seven medical schools.

WHAT WE DO: Identify, produce, and disseminate evidence-based cardiovascular and diabetes best practices to primary care teams.

HOW WE DO IT: Best practices resources are available via an online library at Cardi-OH.org, including monthly newsletters, podcasts, webinars, and virtual clinics using the Project ECHO® virtual training model.

Learn more at Cardi-OH.org

CARDI•OH
Ohio Cardiovascular and Diabetes Health Collaborative

CASE WESTERN RESERVE UNIVERSITY
School of Medicine

In partnership with

THE OHIO STATE UNIVERSITY
COLLEGE OF MEDICINE

U.T. COLLEGE of MEDICINE AND LIFE SCIENCES
THE UNIVERSITY OF TOLEDO

OHIO UNIVERSITY
Heritage College of Osteopathic Medicine

Northeast Ohio
MEDICAL UNIVERSITY

University of CINCINNATI
COLLEGE OF MEDICINE

Boonshoft School of Medicine
WRIGHT STATE UNIVERSITY

GOVERNMENT RESOURCE CENTER

Ohio
Department of Medicaid

medtapp

Special Thanks

Zoom Webinar Logistics

CARDI·OH
Ohio Cardiovascular and Diabetes Health Collaborative

- **Your Zoom display name should contain your first and last name** for attendance purposes.

- **Joining as a group?** Please use the Chat feature to record names and emails of all attendees.

- **Submit questions for discussion.**
  - Use the Q&A feature to submit questions at any point.
  - Questions will be answered during the Q&A portion of the webinar.

- **Post webinar evaluation survey.**
  - The survey link will be shared at the end of today's webinar and also sent by email.
  - Please complete by COB **Wednesday, November 1.**
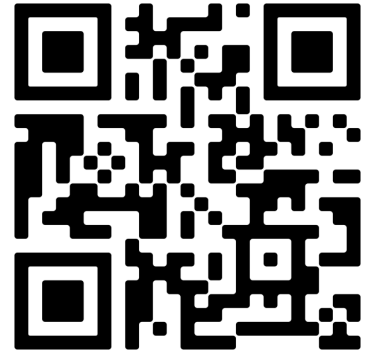
Disclosure Statements

- The following speakers have no relevant financial interest or affiliation with any organizations that could be perceived as a real or apparent conflict of interest in the context of the subject of their presentation:
  - Shari Bolen, MD, MPH; Mark E. Dunlap, MD, MPH; Michael W. Konstan, MD; Amy Zack, MD

- The following members of the planning committee do not have any disclosures or financial relationships from any ineligible companies:
  - Richard Cornachione; Carolyn Henceroth; Gillian Irwin; Elizabeth Littman; Ann Nevar; Devin O'Neill; Steven Ostrolencki; Claire Rollins; Catherine Sullivan

Continuing Medical Education (CME)

- 1.0 *AMA PRA Category 1 Credit*™ is available for this webinar.

- Attendees who indicated on the registration form that they were interested in claiming CME credit for this webinar will receive an email from myevaluations.com next week with more information.

- Complete CME Evaluation and claim credits by **Friday, November 10.**

- Contact Cathy Sullivan (csullivan1@metrohealth.org) if you do not receive an email to complete your CME evaluation or need other assistance.

Agenda

CARDI·OH
Ohio Cardiovascular and Diabetes Health Collaborative

Topics	Presenter(s)	Timing
Welcome and Overview	Michael W. Konstan, MD Shari Bolen, MD, MPH	5 mins.
Heart Failure Risk Management: What to Know, What to Do	Mark E. Dunlap, MD, MPH	40 mins.
Audience Question and Answer	Amy Zack, MD (Moderator) Mark E. Dunlap, MD, MPH	10 mins.
Next Steps and Wrap Up	Shari Bolen, MD, MPH	5 mins.

Mark E. Dunlap, MD, MPH
Case Western Reserve University
School of Medicine
The MetroHealth System

Amy Zack, MD (Moderator)
Case Western Reserve University
School of Medicine
Cleveland Clinic

Heart Failure Risk Management: What to Know, What to Do

Mark E. Dunlap, MD, MPH

Professor, Case Western Reserve University

Division of Cardiology

The MetroHealth System

CARDI•OH

Ohio Cardiovascular and Diabetes Health Collaborative

- No conflicts of interest

Objectives

1. Screen and identify those at risk for heart failure.

2. Describe current disparities in care in heart failure risk, assessment and management.

3. Evaluate patients with suspected heart failure.

4. Utilize key therapies in the management of heart failure.

What Do These People Have in Common?

- Wilt Chamberlin
- Federico Fellini
- Jerry Garcia
- Chaim Herzog
- Charles Kuralt
- Harold Robbins

- Roy Rogers
- Mike Royko
- Jonas Salk
- Isaac Stern
- Jimmy "the Greek" Snyder
- Hank Williams

They all:
a) were born in Ohio
b) are dead
c) had wives named "Betsy"
d) had heart failure (HF)
e) both b and d

13

Heart Failure: Overview

- 6.5 million men and women in the U.S. have HF.

    - 1,000,000 new HF cases annually.

- Prevalence of HF **will increase 46% by 2030**, resulting in >8 million people.

- Biggest risk factor is uncontrolled hypertension.

- Annual impact on healthcare resources.

    - 1.1 million hospitalizations (# 1 cause in older adults).

    - $30.7 billion per year, projected to increase to $70 billion.

Virani SS, Alonso A, Benjamin EJ, et al. Circulation. 2020;141(9):e139-e596.

Epidemiology of Heart Failure in the United States

Increase in HF related deaths from 2009 to 2014.

Increase in HF hospitalizations from 2013 to 2017.

Decline in overall HF incidence from 2011 to 2014 with declining incidence of HFrEF but increasing incidence of HFpEF.

Increasing *prevalence* of HF.

Racial and ethnic disparities in death resulting from HF persist.

Disparities in racial and ethnic HF outcomes warrant studies and health policy changes to address health inequity.

Heidenreich PA, Bozkurt B, Aguilar D, et al. Circulation. 2022;145(18):e895-e1032.

20% Lifetime Risk for Heart Failure After Age 40

Framingham Heart Study

Cumulative risk (%)

Attained age (years)
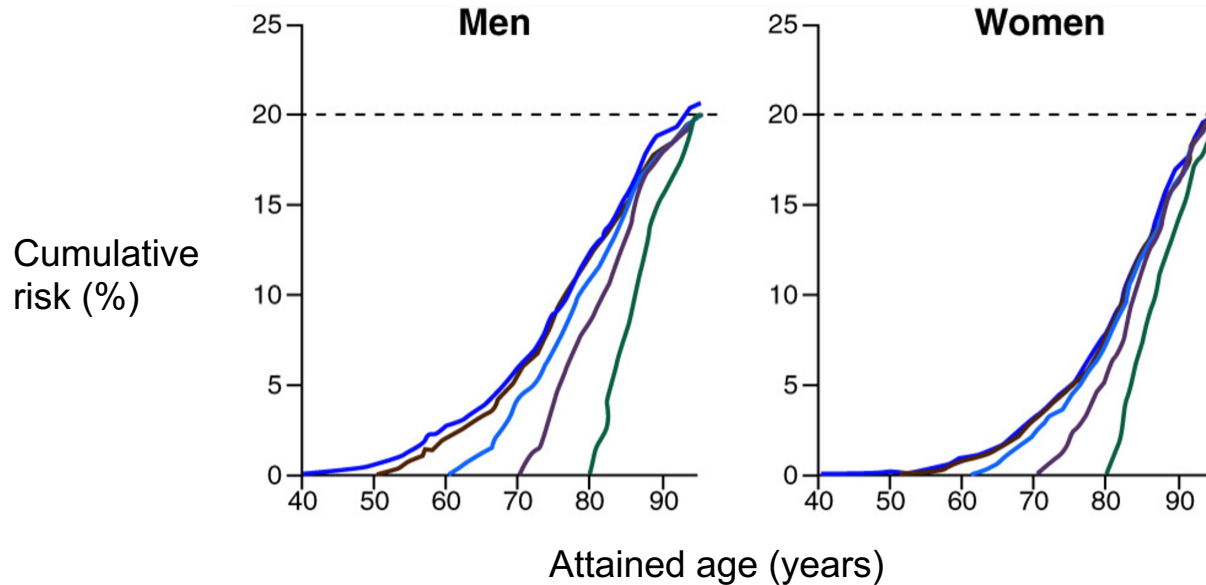
Lifetime risk for congestive HF for given index age is cumulative risk through age 94 years

Lloyd-Jones DM, Larson MG, Leip EP, et al. Circulation. 2002;106(24):3068-3072.

Prevalence of Heart Failure by Age

Tsao CW, Aday AW, Almarzooq ZI, et al. Circulation. 2022;145(8):e153-e639.
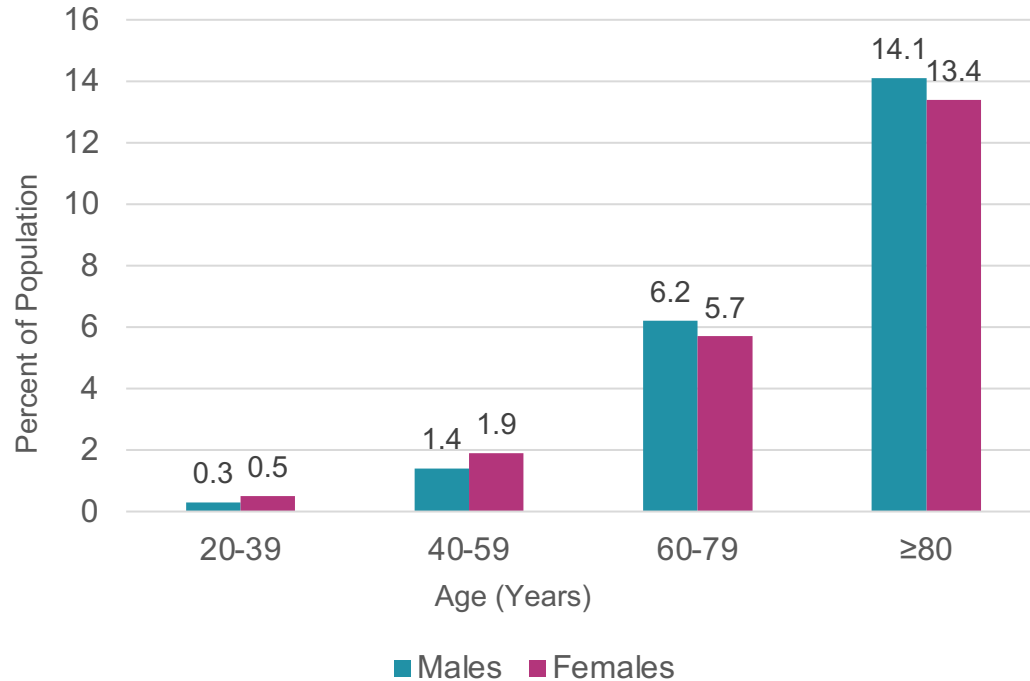
First Acute Heart Failure Episode by Sex and Race

Tsao CW, Aday AW, Almarzooq ZI, et al. Circulation. 2022;145(8):e153-e639.
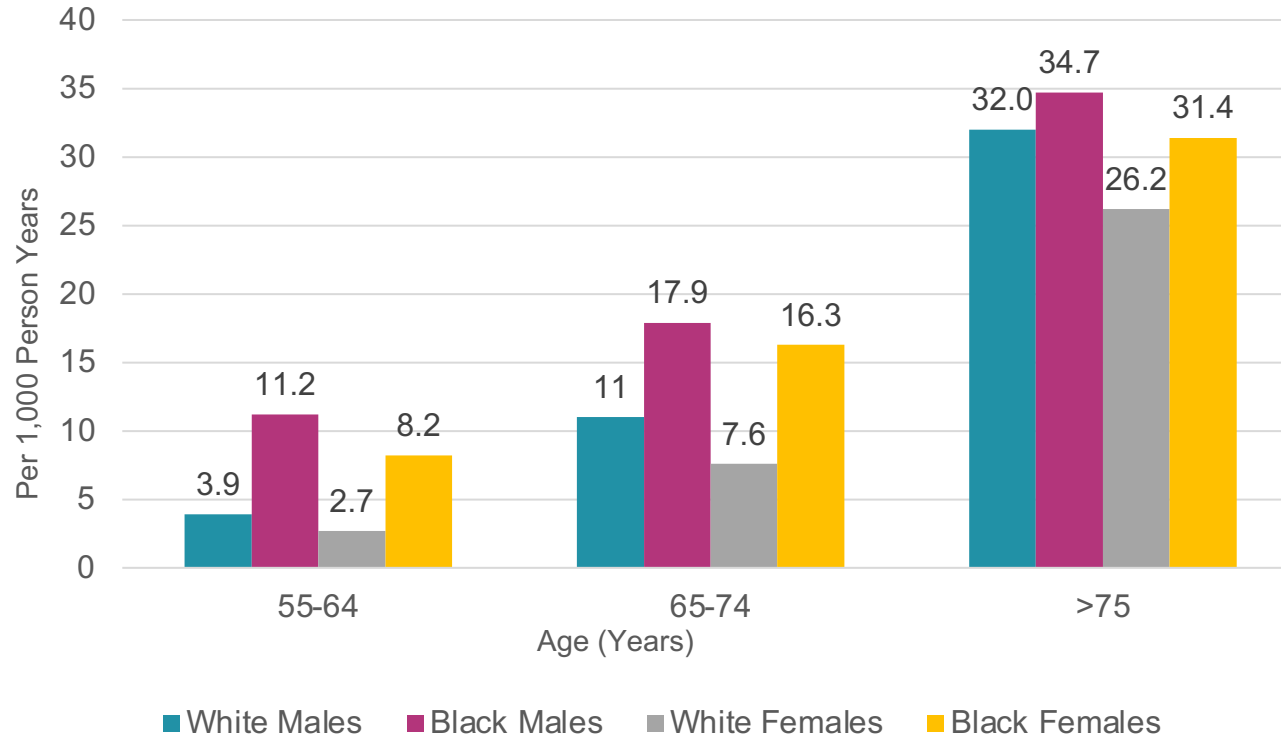
Population-Attribution Risks for Development of Heart Failure

Men

Women

- HTN 39%
- MI 34%
- VHD 7%
- LVH 4%
- DM 6%
- AP 5%

- HTN 59%
- MI 12%
- VHD 8%
- LVH 5%
- DM 12%
- AP 5%
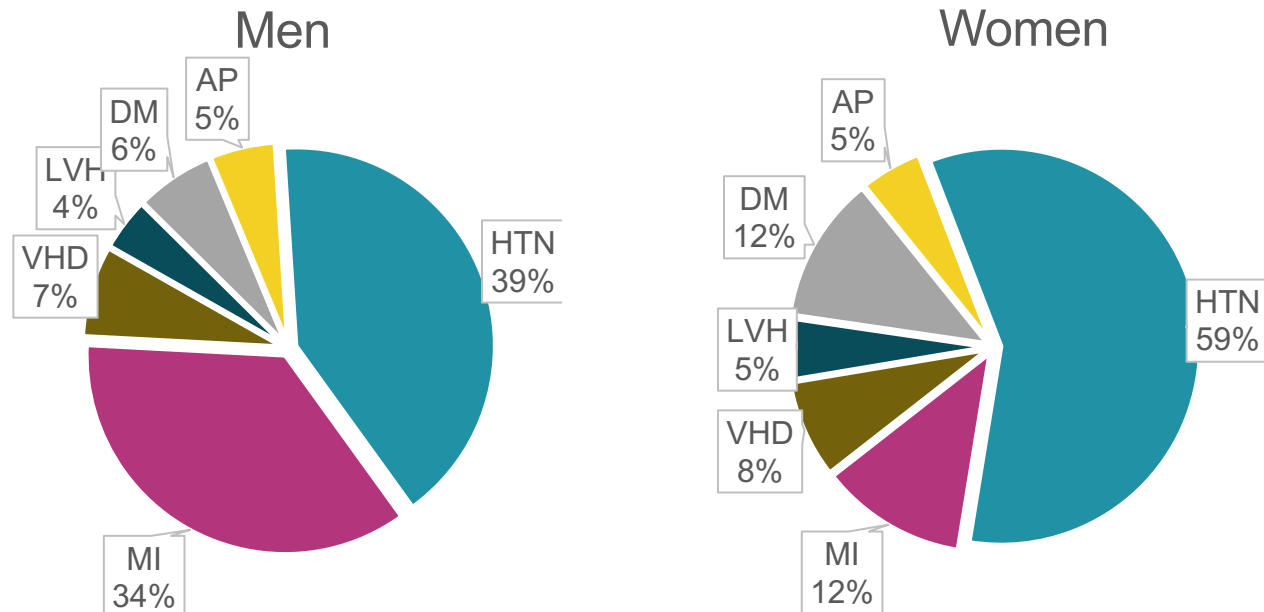
Population-attributable risk defined as:
100 x prevalence x [hazard ratio – 1])/(prevalence x [hazard ratio – 1] +1)

Levy D, Larson MG, Vasan RS, et al. JAMA. 1996;275(20):1557-1562.

Heart Failure in African Americans

- Incidence of HF 50% higher.

- Occurs at an earlier age.

- More left ventricle (LV) dysfunction.

- More hypertension, diabetes, obesity; more non-ischemic.

- Worse New York Heart Association (NYHA) functional class.

- Higher morbidity (hospitalizations).

Trend in 2009-2018 Expenditure Change by Clinical Condition
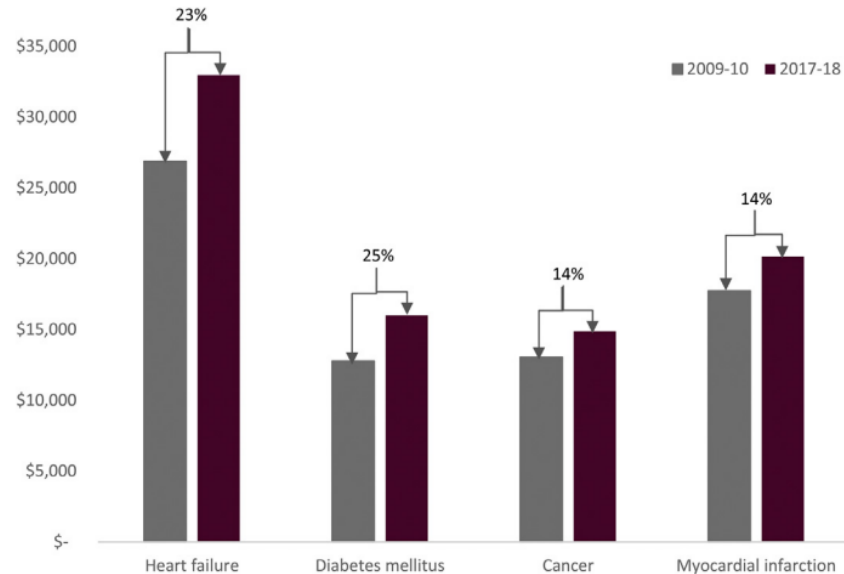
The rate of overall expenditure growth from 2009-2018 was higher for HF-related spending compared with that of cancer or myocardial infarction.

Bhatnagar R, Fonarow GC, Heidenreich PA, Ziaeian B. JACC Heart Fail. 2022;10(8):571-580.

Causes of Heart Failure

Risk Factors

- Hypertension
- Obesity
- Prediabetes/ Diabetes
- ASCVD

Ischemic Heart Disease & Myocardial Infarction

Non-Ischemic Causes

- Chemotherapy, cardiotoxic medications
- Rheumatologic or autoimmune
- Endocrine or metabolic
- Familial, inherited or genetic heart disease
- Heart rhythm-related *(tachycardia-mediated, PVCs, RV pacing)*

- Hypertension
- Infiltrative cardiac disease *(amyloid, sarcoid, hemochromatosis)*
- Myocarditis
- Peripartum cardiomyopathy
- Stress cardiomyopathy *(Takotsubo)*
- Substance abuse

Heidenreich PA, Bozkurt B, Aguilar D, et al. Circulation. 2022;145(18):e895-e1032.

Benefits of Lowering Blood Pressure

	Average Percent Reduction
Stroke incidence	35-40%
Myocardial infarction	20-25%
Heart failure	50%

Racial Disparities in Risks for Heart Failure

- Among Blacks, a greater proportion of HF risk (68% versus 49% among whites) was attributable to modifiable risk factors:

  - High systolic blood pressure, elevated fasting glucose level, coronary heart disease, LV hypertrophy, and smoking.

  - LV hypertrophy was 3-fold more prevalent in Blacks than in Whites.

- Hispanics carry a predominance of HF risk factors and health care disparities suggesting elevated HF risk.

Tsao CW, Aday AW, Almarzooq ZI, et al. Circulation. 2022;145(8):e153-e639.

Heart Failure Gender Disparities: Women Compared to Men

- Tend to have more preserved LV function (HFpEF).

- Onset at older ages.

- Greater prevalence of hypertension, obesity, and anemia.

All Cause Mortality by Gender

O'Meara E, Clayton T, McEntegart MB, et al. Circulation. 2007;115(24):3111-3120.
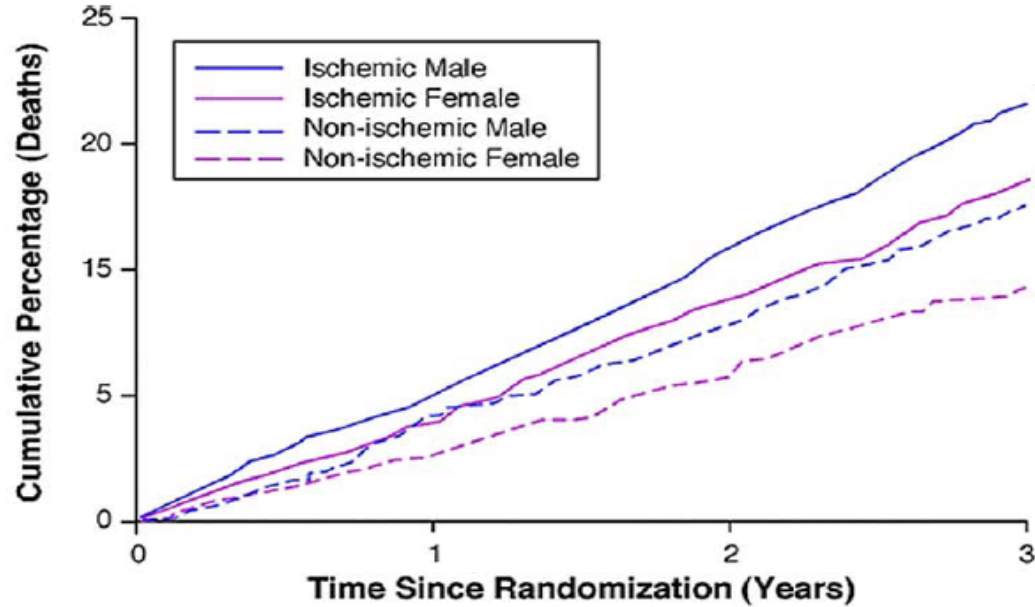
Gender Differences in Heart Failure

Schirmer SH, Hohl M, Böhm M. Eur Heart J. 2010;31(10):1165-1167. doi:10.1093/eurheartj/ehq073.
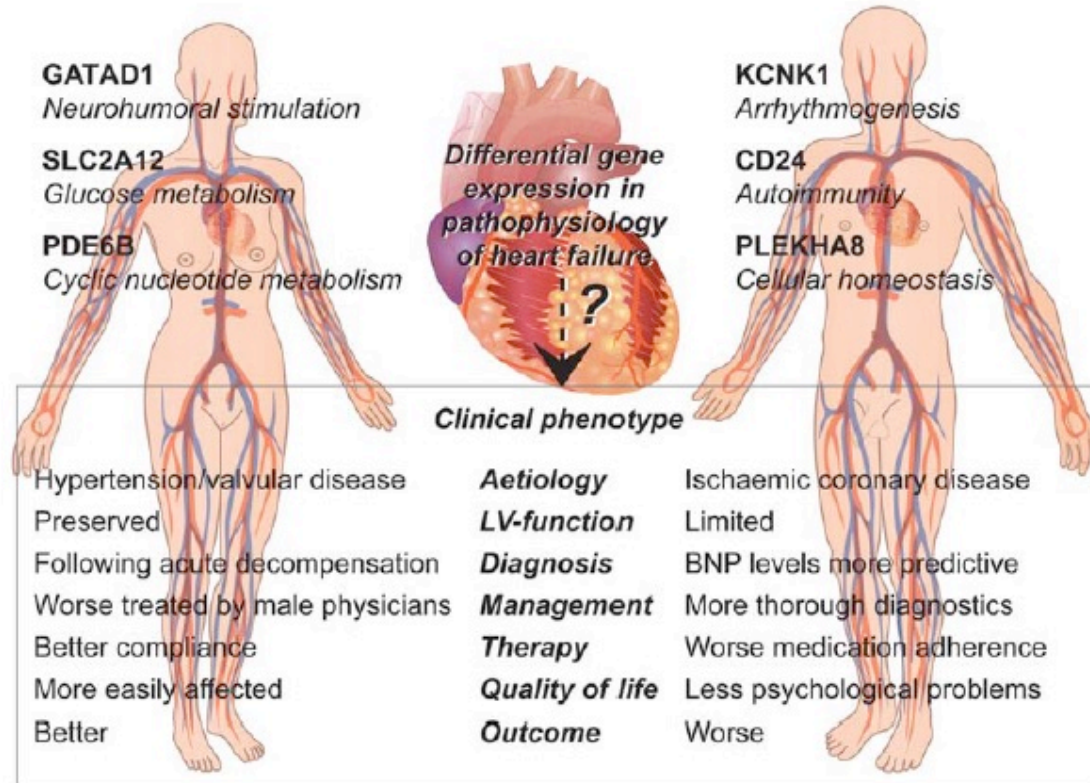
When to Suspect Heart Failure

- Unexplained dyspnea

- H/o hypertension

- H/o CAD

- Volume overload (elevated JVP, edema)

- Elevated BNP (note: BNP levels are lower in obese pts)

The Cardiovascular Disease Continuum

Dzau V, Braunwald E. Am Heart J. 1991;121(4 Pt 1):1244-1263.

Index Event

Compensatory Mechanisms

60 %

Ejection Fraction

Secondary Damage

20 %

Time (yrs)

Asymptomatic → Symptomatic

Mann DL. Circulation. 1999;100(9):999-1008.
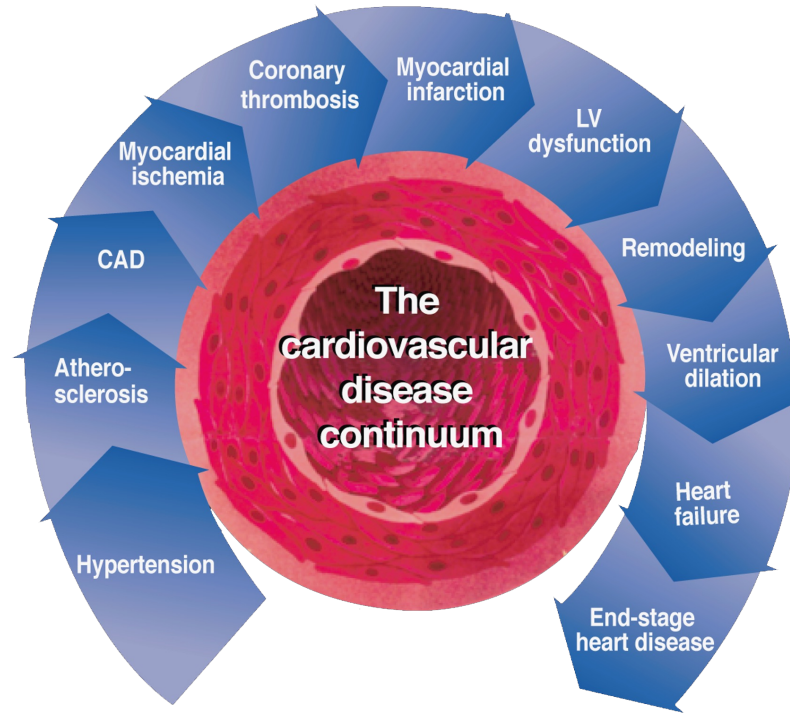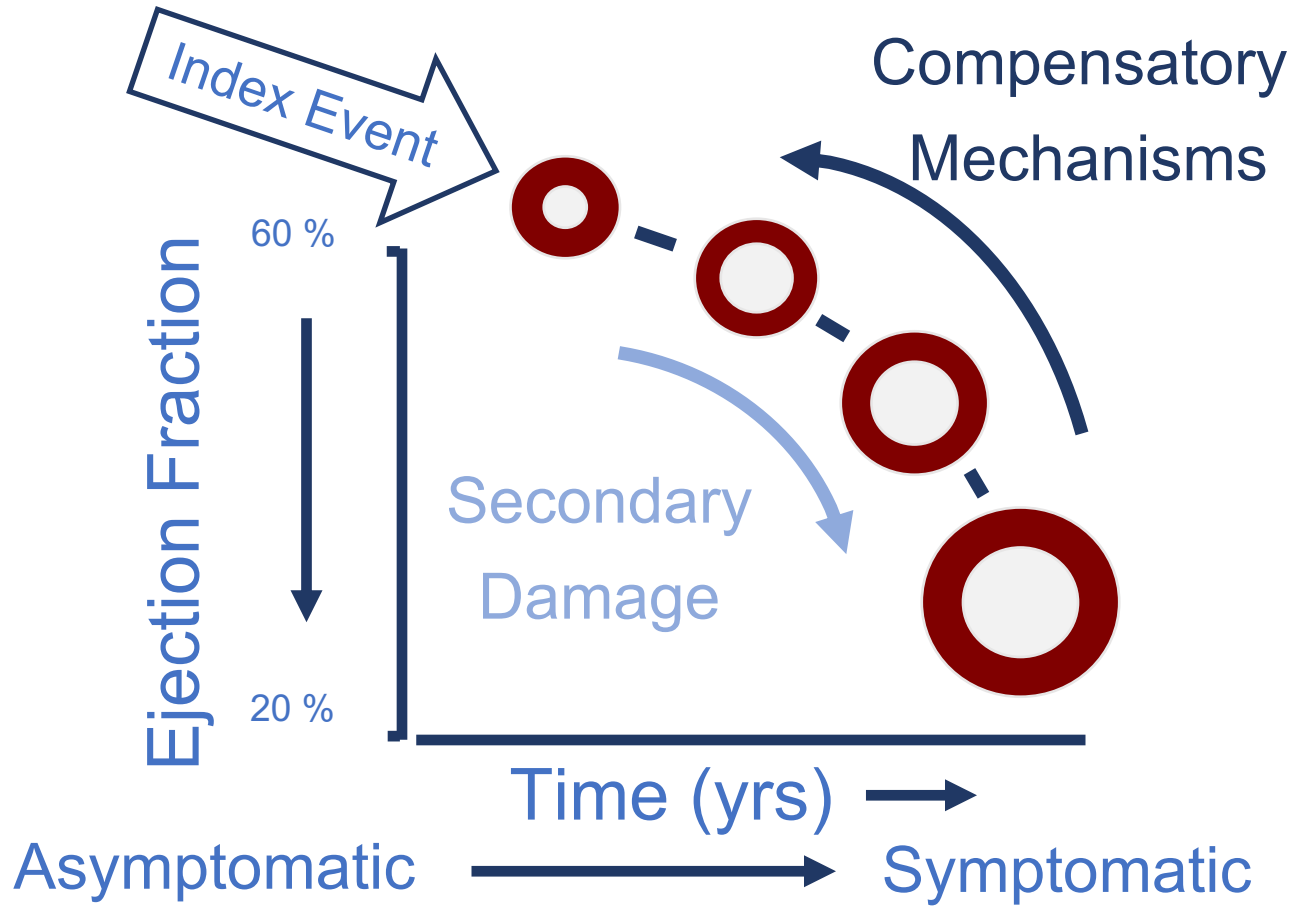
Pathophysiology of Congestion

Hospitalization

Intrathoracic
impedance
changes

Symptoms

Filling pressures
increase

-30   -20   - 10   0   **Days**

Autonomic
adaptation

Weights
change

31
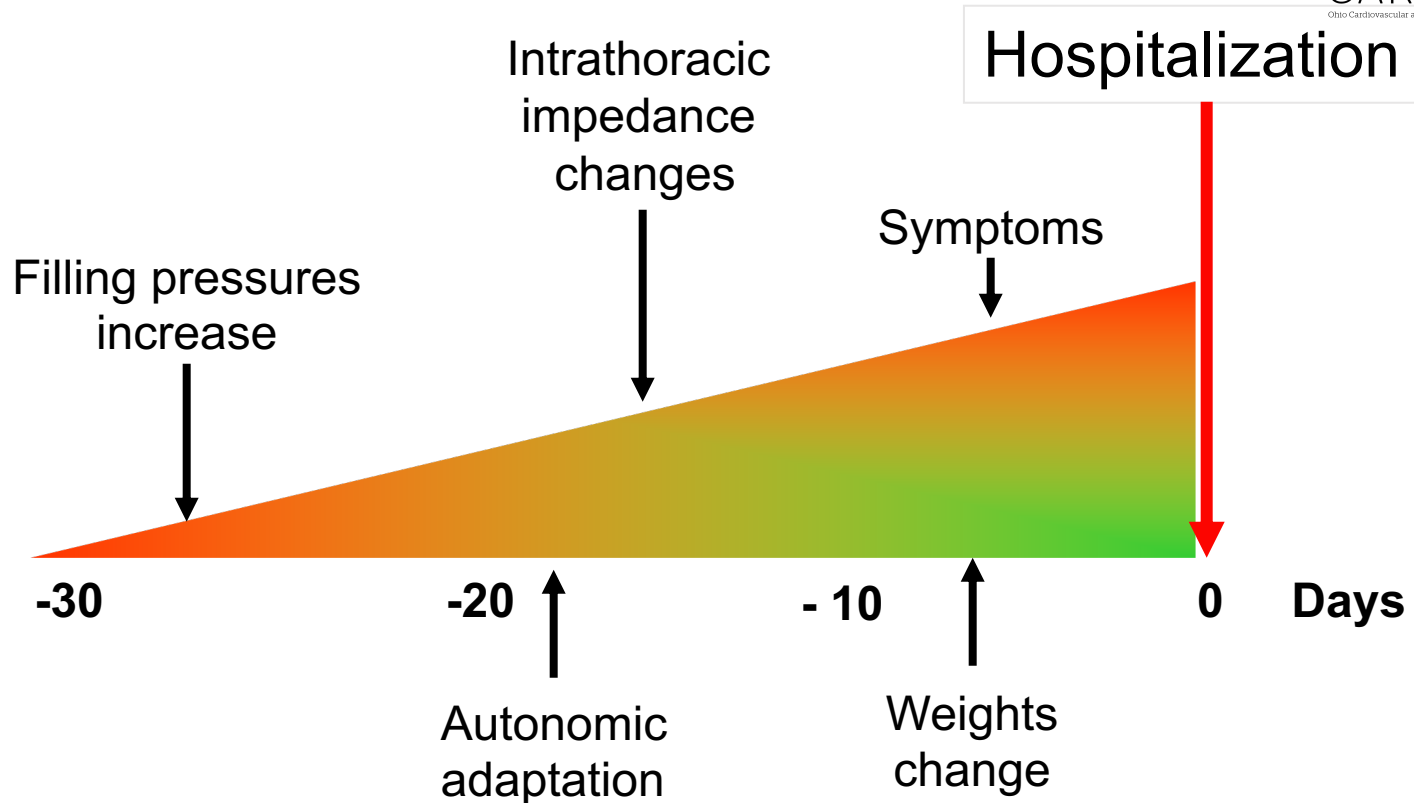
Initial Evaluation of Patients with Heart Failure

History and Physical exam

Class 1 Recommendations:

- Measure vitals signs and assess for evidence of congestion

- Evaluate for the presence of advanced HF

- In patients with cardiomyopathy use a 3-generation family history to screen for inherited disease

- Use H&P to direct diagnostic strategies to uncover causes which require disease specific management

- Identify cardiac & non-cardiac diseases, lifestyle & behavioral factors, and SDOH which may cause or worsen HF

Laboratory and ECG testing

Class 1 Recommendations:

CBC, UA, serum electrolytes, serum creatinine, BUN, glucose, lipid profile, LFTs, iron studies, and TSH

12-lead ECG to optimize management

For patients presenting with HF, the specific cause of HF should be explored using additional laboratory testing for appropriate management

Abbreviations: BUN=blood urea nitrogen; CBC= complete blood count; ECG=electrocardiogram; H&P=history and physical; HF=heart failure; LFTs= liver function tests; SDOH,=social determinates of health; TSH=thyroid-stimulating hormone

Heidenreich PA, Bozkurt B, Aguilar D, et al. Circulation. 2022;145(18):e895-e1032.

Diagnostic Algorithm for Heart Failure and LVEF Based on Heart Failure Classification

CARDI·OH
Ohio Cardiovascular and Diabetes Health Collaborative

Assessment
- Clinical history
- Physical exam
- ECG, labs

Natriuretic Peptide
NT-proBNP >125 pg/mL
BNP ≥35 pg/mL

Transthoracic Echocardiography

HF Diagnosis Confirmed
- Determine cause and classify
- Evaluate for precipitating factors
- Initiate treatment
- Serial HF assessment

Initial Classification:

HFrEF
LVEF ≤ 40%

HFmrEF
LVEF 41%-49%

HFpEF
LVEF ≥ 50%

Abbreviations: BNP=B-type natriuretic peptide; ECG=electrocardiogram; HF=heart failure; HFimpEF=heart failure with improved ejection fraction; HFmrEF=heart failure with mildly reduced ejection fraction; HFpEF=heart failure with preserved ejection fraction; HFrEF=heart failure with reduced ejection fraction; LV=left ventricle; LVEF=left ventricular ejection fraction; NT-proBNP=N-terminal pro-B type natriuretic peptide.
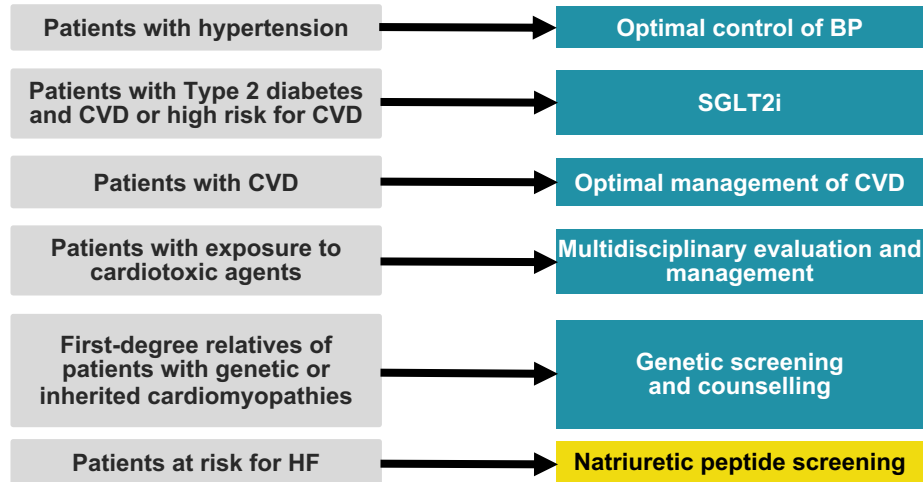
Heidenreich PA, Bozkurt B, Aguilar D, et al. Circulation. 2022;145(18):e895-e1032.

Recommendations for Patients at Risk of Heart Failure

At Risk for HF (Stage A)

Primary Prevention

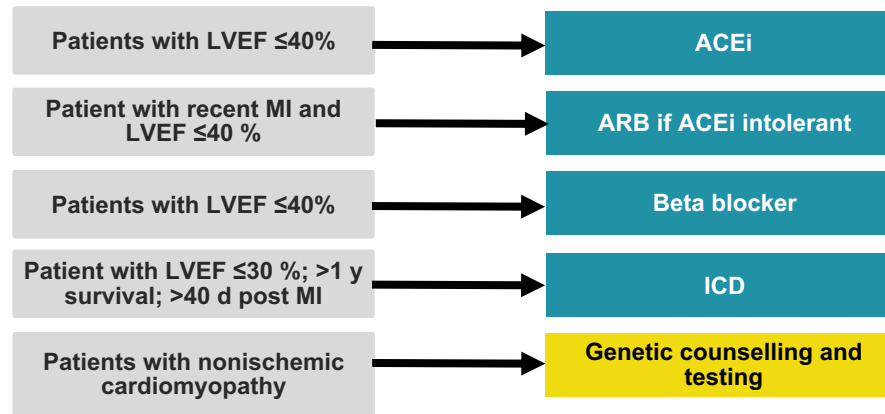|	
Patients with hypertension	→ Optimal control of BP
Patients with Type 2 diabetes and CVD or high risk for CVD	→ SGLT2i
Patients with CVD	→ Optimal management of CVD
Patients with exposure to cardiotoxic agents	→ Multidisciplinary evaluation and management
First-degree relatives of patients with genetic or inherited cardiomyopathies	→ Genetic screening and counselling
Patients at risk for HF	→ Natriuretic peptide screening

Continue Lifestyle modification and management strategies implemented in Stage A, through Stage B →

Abbreviations: ACEi=angiotensin-converting enzyme inhibitor; ARB=angiotensin receptor blocker; BP=blood pressure; CVD=cardiovascular disease; HF=heart failure; ICD=implantable cardioverter-defibrillator; LVEF=left ventricular ejection fraction; MI=myocardial infarction; SGLT2i=sodium glucose cotransporter 2 inhibitor.

Heidenreich PA, Bozkurt B, Aguilar D, et al. Circulation. 2022;145(18):e895-e1032.

Recommendations for Patients with Pre-Heart Failure

Pre-HF (Stage B/LV dysfunction)
Preventing the Syndrome

Patients with LVEF ≤40%	→ **ACEi**
Patient with recent MI and LVEF ≤40 %	→ **ARB if ACEi intolerant**
Patients with LVEF ≤40%	→ **Beta blocker**
Patient with LVEF ≤30 %; >1 y survival; >40 d post MI	→ **ICD**
Patients with nonischemic cardiomyopathy	→ **Genetic counselling and testing**

Continue Lifestyle modification and management strategies implemented in Stage A, through Stage B →

Abbreviations: ACEi=angiotensin-converting enzyme inhibitor; ARB=angiotensin receptor blocker; BP=blood pressure; CVD=cardiovascular disease; HF=heart failure; ICD=implantable cardioverter-defibrillator; LVEF=left ventricular ejection fraction; MI=myocardial infarction; SGLT2i=sodium glucose cotransporter 2 inhibitor.

Heidenreich PA, Bozkurt B, Aguilar D, et al. Circulation. 2022;145(18):e895-e1032.

35

Treatment of Symptomatic Heart Failure

STEP 1
Established diagnosis of HFrEF
Address congestion
Initiate GDMT

STEP 2
Titrate to Target dosing as tolerated, labs, health status, and LVEF

STEP 3
Consider these patient scenarios

STEP 4
Implement additional GDMT and device therapy, as indicated

HFrEF
LVEF ≤40%

ARNI in NYHA II-III;
ACEi or ARB in NYHA II-IV

Beta blocker

MRA

SGLT2i

Diuretics as needed

LVEF ≤40%
Persistent HFrEF

LVEF >40%
HFImpEF

NYHA III-IV, in African American patients

NYHA I-III; LVEF ≤35%;
>1 y survival

NYHA I-III; ambulatory IV; LVEF ≤35%;
NSR and QRS ≥150 ms with LBBB

Hydral-nitrates

ICD

CRT-D

Consider additional therapies

Heidenreich PA, Bozkurt B, Aguilar D, et al. Circulation. 2022;145(18):e895-e1032.

36

Specialty Referral to Advanced Heart Failure

Consider if "I-Need-Help" to aid with recognition of patients with advanced HF:

I Intravenous inotropes

N New York Heart Association class IIIB or IV, or persistently elevated natriuretic peptides

E End-organ dysfunction

E EF ≤35%

D Defibrillator shocks

H Hospitalizations >1

E Edema despite escalating diuretics

L Low systolic BP ≤90mmHg

P Prognostic medication; intolerance of GDMT

Abbreviations: BP=blood pressure; EF=ejection fraction; GDMT=guideline-directed medical therapy; LVAD=left ventricular assist device.

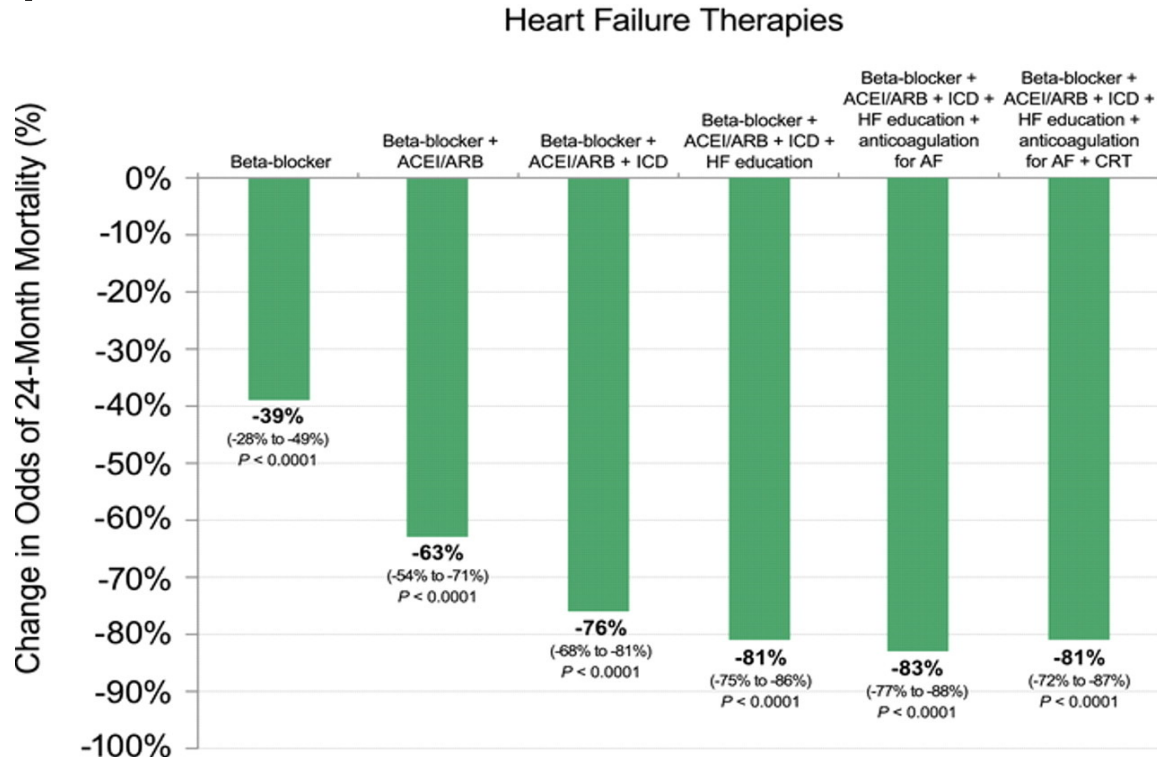Heidenreich PA, Bozkurt B, Aguilar D, et al. Circulation. 2022;145(18):e895-e1032.

Patients with LVEF $\leq$40%: 4 Drug Regimen for All

- ACEI, ARB, or ARNI (sacubitril/valsartan)

- Beta blocker

- MRI (spironolactone)

- SGLT2i

- Diuretics as needed

Reassess LV Function in 3-6 Months

- If LVEF remains low (≤35%):
    - African Americans: Nitrates/hydralazine
    - ICD
    - Wide QRS complex: Bi-V pacing
- If >40%: success!
- Education, medication dosing, volume assessment, BP/HR

Cumulative % Reduction in Mortality Risk at 24 Months

Heart Failure Therapies

Fonarow GC, Albert NM, Curtis AB, et al. J Am Heart Assoc. 2012;1(1):16-26.

SOLVD: Effects of Enalapril by Race

	African Americans		European Americans	
	Risk Ratio (CI)	p Value	Risk Ratio (CI)	p Value
All-Cause Mortality	0.89 (0.69-1.13)	NS	0.95 (0.76-1.18)	NS
Cardiovascular Death	0.92 (0.71-1.20)	NS	0.96 (0.76-1.22)	NS
Hospitalization for CHF	0.96 (0.74-1.24)	NS	0.56 (0.43-0.73)	<0.001
Death or Hospitalization for CHF	0.91 (0.75-1.12)	NS	0.75 (0.62-0.91)	<0.01

Therapies That Improve Outcomes in Patients with Heart Failure

Medications

- ACE inhibitors
- Angiotensin receptor blockers
- Beta blockers
- Aldosterone blockers
- Hydralazine/nitrates
- Iron replacement
- Digoxin
- n-3-PUFA
- Sacubitril/valsartan
- Ivabradine

Devices/procedures

- Implantable defibrillators
- Bi-V pacing
- Disease-specific self management
- Exercise training
- Pulmonary artery pressure monitoring
- Ventricular assist devices
- Transplantation

It's complicated…

Heart Failure: What to Know

- Common and carries a poor prognosis.

- Characterized by activation of multiple pathways.

- Neurohormonal activation contributes to ventricular remodeling and the progression of LV dysfunction.

- Evidence-based medicine supports the use of multiple approaches for the treatment of HF, including ACEI/ARB or other RAAS blockade, beta blockade, MRA, SGLT2i.

Heidenreich PA, Bozkurt B, Aguilar D, et al. Circulation. 2022;145(18):e895-e1032.

Heart Failure: What to Do

- For patients at risk of developing HF:

    - Aggressive control of risk factors, especially hypertension, obesity, and diabetes.

    - Monitor for co-morbidities (renal disease, obstructive sleep apnea, anemia, rhythm abnormalities).

- For patients with LVEF <40%:

    - 4 drug regimen in all: RAAS blockade, beta blockade, MRA, SGLT2i.

    - Dosing important, especially for RAAS and beta blockade.

Heidenreich PA, Bozkurt B, Aguilar D, et al. Circulation. 2022;145(18):e895-e1032.

Doses for Common Heart Failure Medications

Class	Drug	Starting Dose	Target Dose
RASi	Lisinopril/enalapril	5-10 mg qd	20 mg bid
	Candesartan	4-8 mg qd	32 mg qd
	Valsartan	40 mg bid	160 mg bid
	Sacubitril/valsartan	24/26 mg bid	97/103 mg bid
BB	Metoprolol succinate	12.5-25 mg qd	200 mg qd
	Carvedilol	3.12 mg bid	25-50 mg bid
MRA	Spironolactone	12.5 mg qd	25-50 mg

What To Do (cont)

- For patients with LVEF >50%:
  - Control of HTN
  - Treatment of comorbidities (obesity, diabetes, afib)
  - Use of SGLT2i in all with diabetes, most without diabetes
  - MRA (spironolactone or eplerenone) in most
  - Beta blockers may be deleterious

Heidenreich PA, Bozkurt B, Aguilar D, et al. Circulation. 2022;145(18):e895-e1032.

What To Do (cont)

- For patients with LVEF 41-50%:
  - Some behave more like HFrEF, some more like HFpEF
  - Treatment of comorbidities
  - Use of SGLT2i in all with diabetes, most without diabetes
  - MRA (spironolactone or eplerenone) in most

Heidenreich PA, Bozkurt B, Aguilar D, et al. Circulation. 2022;145(18):e895-e1032.

Heart Failure Patients: Who Remains at Risk?

- Symptomatic patients (NYHA class 3 or 4)
- LVEF remains low (especially $\leq$35%)
- BNP remains high
- Low doses of beta blockers and/or RAS inhibitors
- Comorbidities not recognized or adequately treated
- Hospitalized for HF

Repeat Hospitalizations Predict Mortality
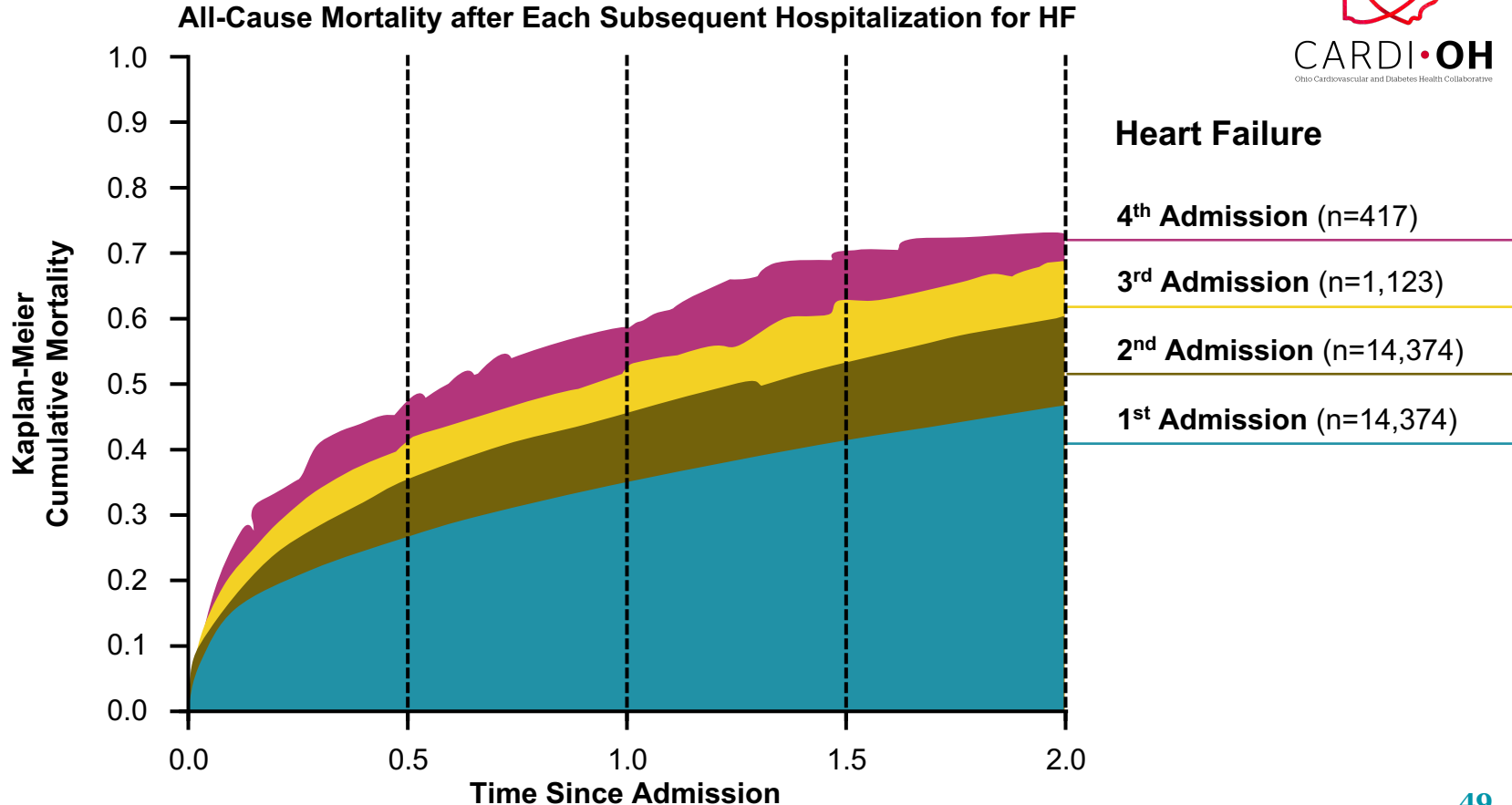
All-Cause Mortality after Each Subsequent Hospitalization for HF

Heart Failure

4th Admission (n=417)

3rd Admission (n=1,123)

2nd Admission (n=14,374)

1st Admission (n=14,374)

Y-axis: Kaplan-Meier Cumulative Mortality

X-axis: Time Since Admission

Setoguchi S, Stevenson LW, Schneeweiss S. Am Heart J. 2007;154(2):260-266.

The Cardiovascular Disease Continuum

Dzau V, Braunwald E. Am Heart J. 1991;121(4 Pt 1):1244-1263.
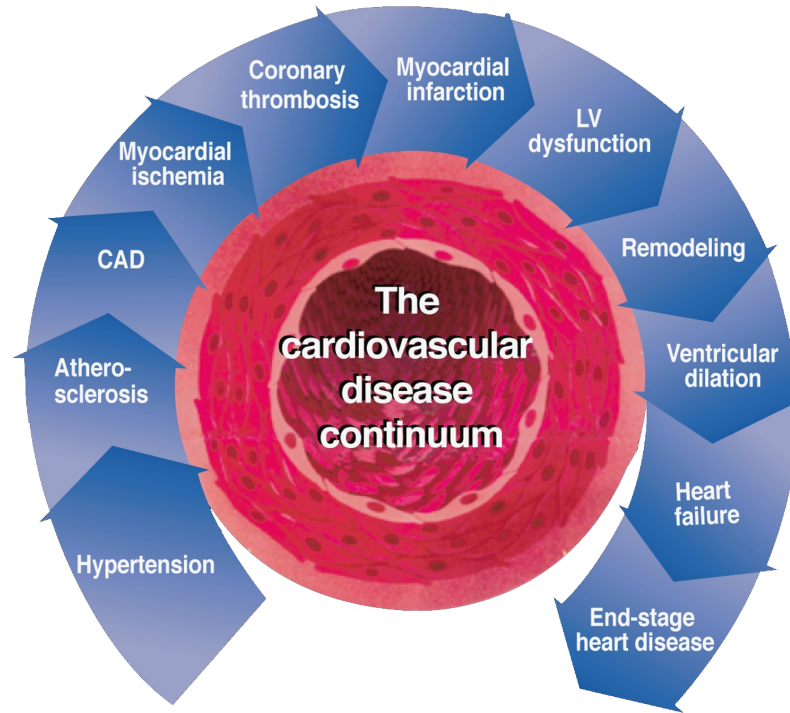
Audience Question and Answer

Amy Zack, MD

Case Western Reserve University School of Medicine

Speakers

Mark E. Dunlap, MD, MPH
Case Western Reserve University School of Medicine
The MetroHealth System

Amy Zack, MD (Moderator)
Case Western Reserve University School of Medicine
Cleveland Clinic

Next Steps and Wrap Up

Shari Bolen, MD, MPH
Case Western Reserve University School of Medicine

CME Reminder

- Registration is required for CME credit:

URL in chat window   **OR**   Use QR Code
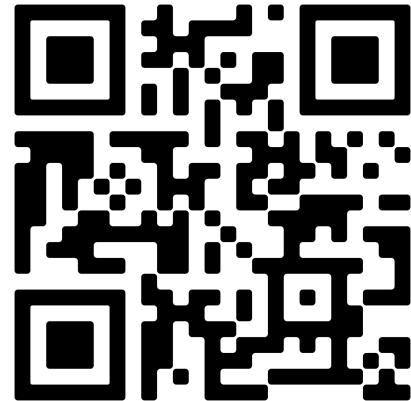
We Want to Hear from You!

Please complete a brief evaluation of the webinar.

Thank you for attending the Webinar.
Please click Continue to participate in a short survey.

you will be leaving zoom.us to access the external URL below

https://redcap.case.edu/surveys/?s=JARHTWAM4YCW7PE8

Are you sure you want to continue?

Continue   Stay on zoom.us

Hit the **Continue** button in your new browser tab to access the evaluation survey. The survey link will also be emailed to you.

THANK YOU!

Learn More!
Visit Cardi-OH.org to learn more about the collaborative, read up on the latest best practices, and subscribe to the Cardi-OH *Update* newsletter.

Follow Us!
Twitter @cardi_OH
Facebook @cardiohio