



# Ask the Experts: Building a Toolkit for Managing Heart Failure

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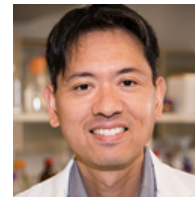
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## FACULTY



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## Ask the Experts

# Building a Toolkit for Managing Heart Failure



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1 hr.

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## Learning Objectives

- Identify clinical controversies & barriers leading to suboptimal use of guideline-directed medical therapy (GDMT) regimens for patients with heart failure with reduced ejection fraction (HFrEF).
- Develop plans to optimize GDMT regimens for patients with HFrEF.
- Adopt strategies to overcome barriers to implementing successful transitions of care programs for patients with HFrEF hospitalized for acute heart failure.

## Abbreviations

- ACEI=angiotensin converting-enzyme inhibitor
- ADEs=adverse drug events
- ARB=angiotensin receptor blocker
- ARNI=angiotensin receptor-neprilysin inhibitor
- BID=twice daily
- BP=blood pressure
- BUN=blood urea nitrogen
- CI=confidence interval
- COR=class of recommendation
- CrCl=creatinine clearance
- CV=cardiovascular
- Non-DHP CCB=non-dihydropyridine calcium channel blocker
- ED=emergency department
- eGFR=estimated glomerular filtration rate
- EMR=electronic medical record
- GDMT=guideline-directed medical therapy
- HF=heart failure
- HFrEF=heart failure with reduced ejection fraction
- HYD=hydralazine
- HR=heart rate
- ISDN=isosorbide dinitrate
- LOE=level of evidence
- LVEF=left ventricular ejection fraction
- MTM=medication therapy management
- MRA=mineralocorticoid receptor antagonist
- NSAIDs=non-steroidal anti-inflammatory drugs
- NSR=normal sinus rhythm
- NYHA=New York Heart Association
- OACs=oral anticoagulants
- PCPs=primary care providers
- RR=respiratory rate
- TOC=transitions of care

# Clinical Barriers and Controversies in Heart Failure

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Director, PGY2 Residency in Cardiology

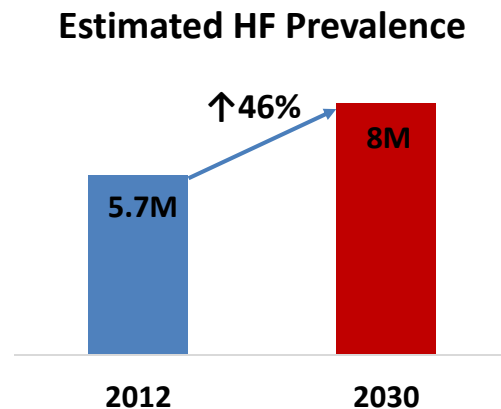
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## HF in 2019

- #big problem, #long way to go
- Prevalence: 5.7 million (U.S.)
- Annual mortality: 75,251
- Lifetime risk @ age 45 years:  
1 in 2-5

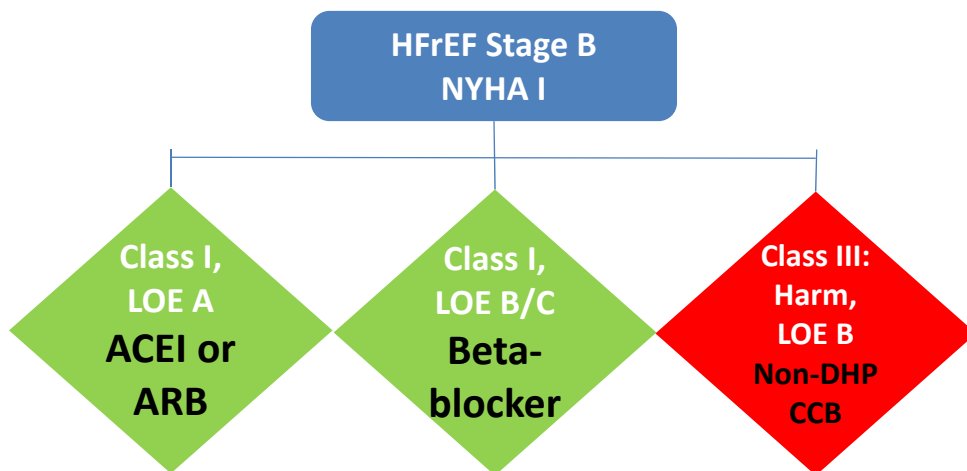


Benjamin EJ et al. *Circulation*. 2018; 137:e67-492.

# Heart Failure Stages

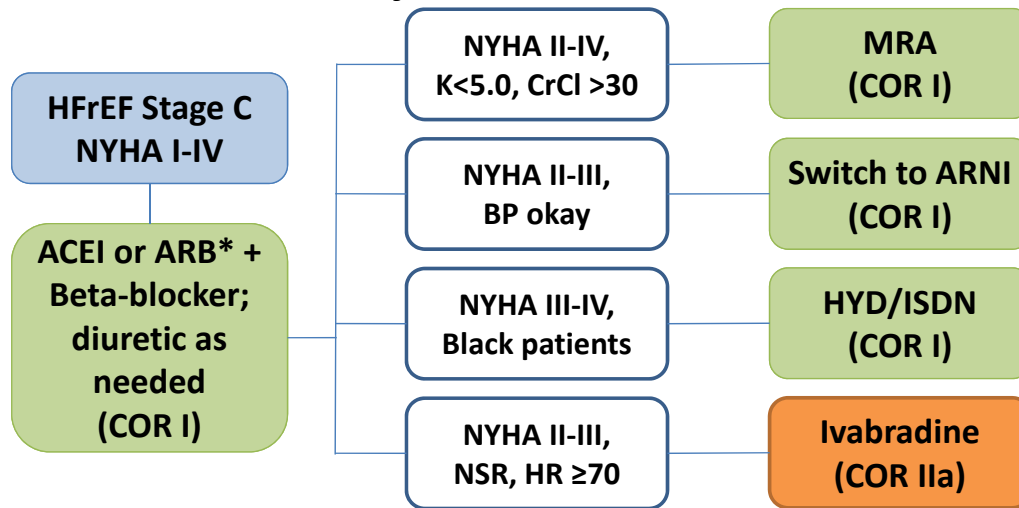
| A                                                                                                           | B                                                            | C                                                                                                                                                                          | D                                                                                                                       |
|-------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| High risk for HF but without structural heart disease or symptoms of HF                                     | Structural heart disease but without signs or symptoms of HF | Structural heart disease with prior or current symptoms of HF                                                                                                              | Refractory HF requiring specialized interventions                                                                       |
| <b>ACEI or ARB</b> in appropriate patients for vascular disease/diabetes mellitus<br>Statins as appropriate | <b>ACEI or ARB</b><br><b>Beta-blocker</b>                    | <b>Diuretic</b><br><b>ACEI or ARB (or ARNI)</b><br><b>Beta-blocker</b><br><b>MRA</b><br><br>Selected patients:<br><b>HYD/ISDN</b><br><b>Digitalis</b><br><b>Ivabradine</b> | Advanced measures<br>Heart transplantation<br>Chronic inotropes<br>Mechanical<br>Circulatory Support<br>Palliative care |

## Pharmacological Treatment for Stage B HFrEF



Yancy C et al. *J Am Coll Cardiol.* 2013; 62:e147-239.

## Pharmacological Treatment for **Stage C** HF With Reduced Ejection Fraction



\*HYD/ISDN for ACEI/ARB intolerant

Yancy C et al. *J Am Coll Cardiol.* 2017; 70:776-803.

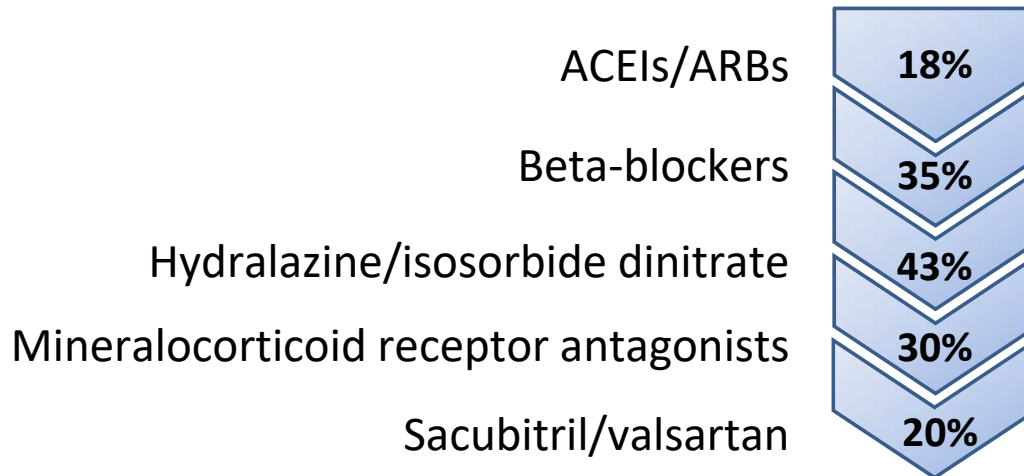
## Titrating GDMT

- Generally, consider titrating doses of GDMT every 2 weeks

|                                  | Starting Dose              | Target Dose                |
|----------------------------------|----------------------------|----------------------------|
| Bisoprolol                       | 1.25 mg daily              | 10 mg daily                |
| Carvedilol                       | 3.125 mg twice daily       | 25-50 mg twice daily       |
| Metoprolol succinate             | 12.5-25 mg daily           | 200 mg daily               |
| Sacubitril/valsartan             | 24/26-49/51 mg twice daily | 97/103 mg twice daily      |
| Captopril                        | 6.25 mg three times daily  | 50 mg three times daily    |
| Enalapril                        | 2.5 mg twice daily         | 10-20 mg twice daily       |
| Lisinopril                       | 2.5-5 mg daily             | 20-40 mg daily             |
| Candesartan                      | 4-8 mg daily               | 32 mg daily                |
| Losartan                         | 25-50 mg daily             | 150 mg daily               |
| Valsartan                        | 40 mg twice daily          | 160 mg twice daily         |
| Spirolactone                     | 12.5-25 mg daily           | 25-50 mg daily             |
| Eplerenone                       | 25 mg daily                | 50 mg daily                |
| Hydralazine/isosorbide dinitrate | 25/20 mg three times daily | 75/40 mg three times daily |

Yancy CW et al. *J Am Coll Cardiol.* 2018; 71:201-30.

## Mortality Reduction in HFrEF



Yancy CW et al. *J Am Coll Cardiol.* 2018; 71:201-30.

## Clinical Controversies and Barriers to Medication Optimization

- HP is a 67-year-old female with a history of HFrEF (LVEF 18%) being seen for the first time in clinic after a recent hospitalization. She remains in NYHA functional class III.
  - **Current medications:** enalapril 10 mg once daily, metoprolol tartrate 25 mg twice daily, furosemide 20 mg once daily
  - **Vitals:** BP 89/67 mm Hg, HR 84 bpm, RR 18 breaths/min
  - **Pertinent labs:**
    - Sodium 136 mEq/L, potassium 4.8 mEq/L, creatinine 1.22 mg/dL, BUN 23 mg/dL, eGFR 46 mL/min/m<sup>2</sup>
    - NT-proBNP 4,300 pg/mL
- HOW DO WE FURTHER OPTIMIZE CARE FOR THIS PATIENT?

# Which Beta-blocker?

## Beta-blocker Pharmacology Comparison

|                            | Carvedilol                                   | Metoprolol succinate | Metoprolol tartrate | Bisoprolol |
|----------------------------|----------------------------------------------|----------------------|---------------------|------------|
| Pharmacology               | $\beta_1, \beta_2, \alpha_1$                 | $\beta_1$            | $\beta_1$           | $\beta_1$  |
| Half-life (hours)          | 7-10                                         | 3-7                  | 3-4                 | 9-12       |
| Duration of action (hours) | 12                                           | 24                   | <b>8-12</b>         | 24         |
| Others                     | <b>Antioxidant,<br/>↓ Insulin resistance</b> |                      |                     |            |

*Hemodynamics, degree of neurohormonal blockade, cardioprotection?*

Talbert RL. *Heart Fail Rev.* 2004; 9:131-7. Leopold G. *J Cardiovasc Pharmacol.* 1986; 8 suppl 11:S16-20.



## Carvedilol Or Metoprolol European Trial (COMET)

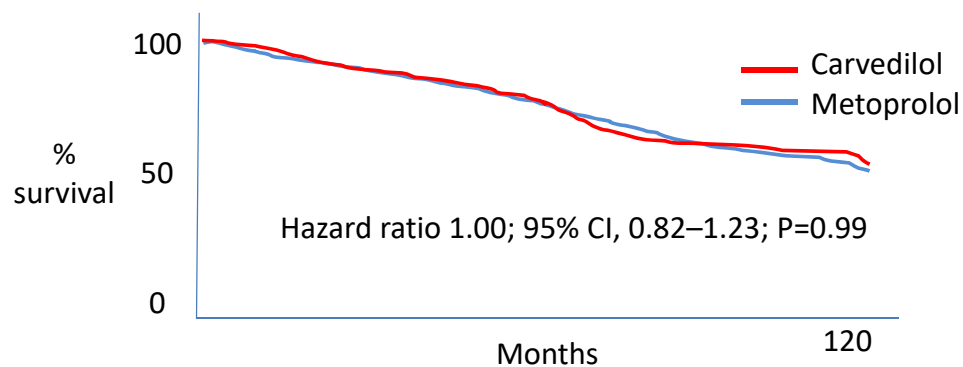
- N=1511 HFrEF, NYHA II-IV
- Carvedilol 25 mg twice daily (41.8 mg/day) vs. metoprolol tartrate 50 mg twice daily (85 mg/day)

| %                           | Carvedilol | Metoprolol | Hazard Ratio<br>(95% confidence interval) |
|-----------------------------|------------|------------|-------------------------------------------|
| All-cause mortality         | 34         | 40         | <b>0.83</b> (0.74–0.93)                   |
| CV death                    | 29         | 35         | <b>0.80</b> (0.70–0.90)                   |
| Death or hospital admission | 74         | 76         | 0.94 (0.86–1.02)                          |

Poole-Wilson PA. *Lancet*. 2003; 362:7-13.

## Carvedilol or Metoprolol Evaluation Study

- N=14,016 Norwegian HF and German HF registries
- Selecting 740 propensity-score matched pairs, comparing carvedilol vs. metoprolol succinate (at equivalent doses)



Fröhlich H et al. *Circ Heart Fail*. 2015; 8:887-96.

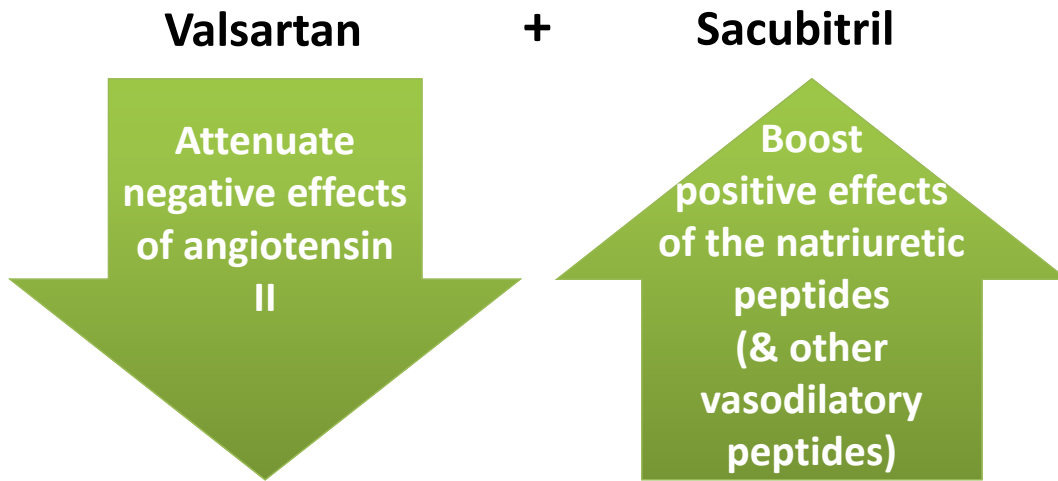
## Approach to Beta-blocker Selection

|                | Carvedilol<br>immediate release | Metoprolol<br>succinate | Bisoprolol          |
|----------------|---------------------------------|-------------------------|---------------------|
| Adherence      | Controlled release              | +                       | +                   |
| Low BP         |                                 | +                       | +                   |
| High BP        | +                               |                         |                     |
| Diabetes       | +                               |                         |                     |
| Evidence-based | +                               | +                       | +                   |
| Target doses   | 25-50 mg<br>twice daily         | 200 mg<br>once daily    | 10 mg<br>once daily |

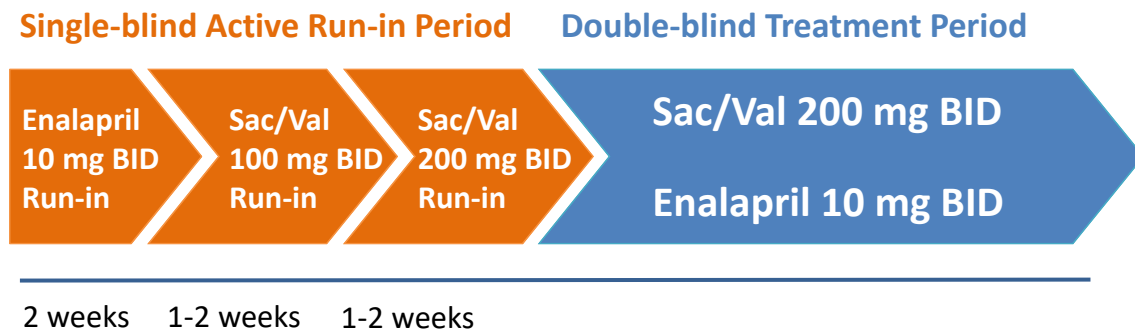
*If you must use metoprolol tartrate, use at least 75 mg twice daily*

## ARNI or not to ARNI?

## Angiotensin Receptor and Neprilysin Inhibitor (ARNI)



## PARADIGM-HF – Study Design



Sac/Val = sacubitril/valsartan

McMurray JJ et al. *Eur J Heart Fail.* 2013; 15:1062-73.

## PARADIGM-HF - Results

| %                       | Sac/Val<br>(n=4187) | Enalapril<br>(n=4212) | Hazard Ratio<br>(95% CI) | P<br>Value |
|-------------------------|---------------------|-----------------------|--------------------------|------------|
| Primary endpoint        | 21.8                | 26.5                  | 0.80<br>(0.73-0.87)      | <0.001     |
| Cardiovascular death    | 13.3                | 16.5                  | 0.80<br>(0.71-0.89)      | <0.001     |
| Hospitalization for HF  | 12.8                | 15.6                  | 0.79<br>(0.71- 0.89)     | <0.001     |
| Symptomatic Hypotension | 14.0                | 9.2                   |                          | <0.001     |

McMurray JJ et al. *N Engl J Med.* 2014; 371:993-1004.

## Perceived Barriers to ARNI

- Cost, access
  - Patient assistance program:
    - Be a U.S. resident
    - Meet income requirements
    - Have limited or no private or public prescription coverage
    - <https://www.pharma.us.novartis.com/our-products/patient-assistance/patient-assistance-foundation-enrollment>
- Clinical
  - Risk of hypotension
  - Twice daily regimen
  - Risk of angioedema
  - Risk of renal dysfunction

## PARADIGM-HF Stratified

- Systolic blood pressure (*Eur Heart J.* 2017; 38:1132–43.)
  - Low systolic BP (<110 mm Hg) was associated with increased risk for primary endpoint and all-cause mortality
  - Similar tolerability and benefit compared to enalapril
- LVEF (*Circ Heart Fail.* 2016; 9:e002744.)
  - Lower LVEF was associated with increased risk of primary endpoint and all-cause mortality
  - Similar benefit compared to enalapril regardless of LVEF

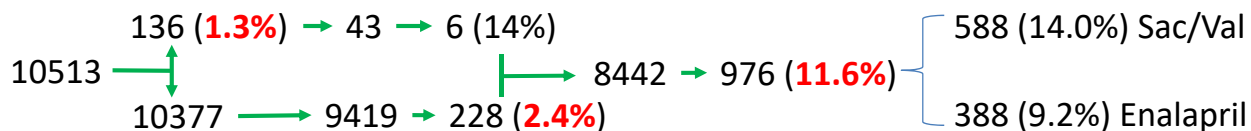
## PARADIGM-HF and Hypotension

Single-blind Active Run-in Period

Double-blind Treatment Period



2 weeks    1-2 weeks    1-2 weeks

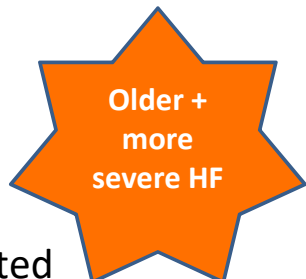


Vardeny O et al. *Circ Heart Fail.* 2018; 11:e004745.

## PARADIGM-HF and Hypotension

- Predictors:

- Lower systolic BP
- Older age
- ICD implanted
- Higher creatinine
- Atrial fibrillation history
- North America
- Diabetes



- Outcomes:

- Study drug did not affect predictors of hypotension (except diabetes – higher risk in enalapril arm)
- Similar benefit compared to enalapril in those that experienced hypotension

Vardeny O et al. *Circ Heart Fail.* 2018; 11:e004745.

## Real World vs. Clinical Trial

- PARADIGM-HF exclusion criteria:

- eGFR  $\leq 30$  mL/min/m<sup>2</sup>
- Systolic BP  $\leq 100$  mm Hg
- Potassium  $\geq 5.2$  mmol/L
- Not on ACEI (enalapril 10 mg/day or equivalent)

- Cleveland Clinic analysis

- Met FDA criteria: 71%
- Met PARADIGM-HF criteria: 26%

Perez AL et al. *JACC Heart Fail.* 2017; 5:460-3.

## PIONEER-HF

- Assess safety and efficacy of sacubitril/valsartan initiation among patients hospitalized for acute heart failure after hemodynamic stabilization
- Sacubitril–valsartan target dose 200 mg twice daily vs. enalapril target dose 10 mg twice daily

↓ NT-proBNP @ 4 and 8 weeks with sacubitril/valsartan

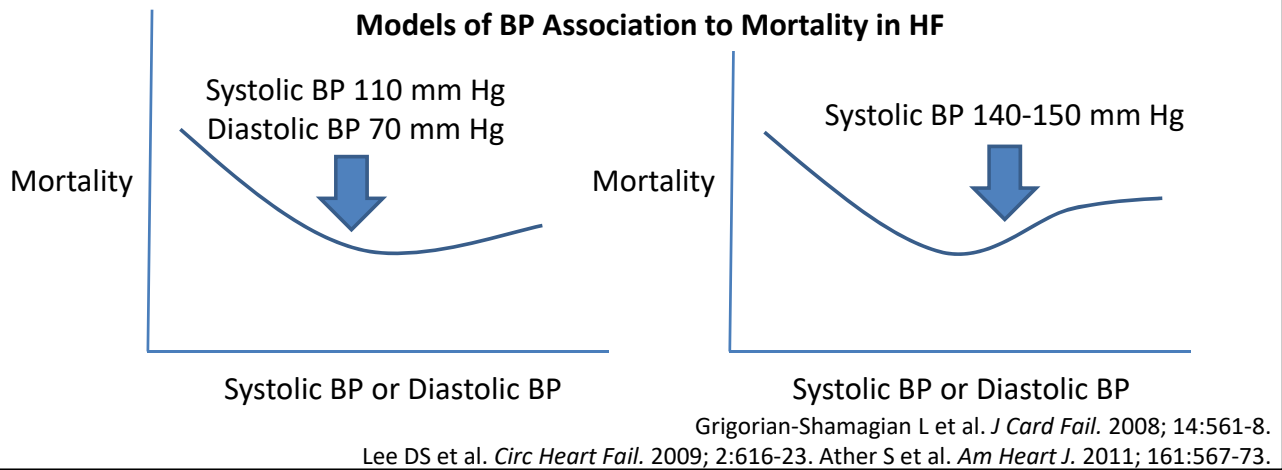
No significant differences: worsening renal function, hyperkalemia, symptomatic hypotension, angioedema, or clinical events

Velazquez EJ et al. *N Engl J Med.* 2019; 380:539-48.

## Low Blood Pressure?

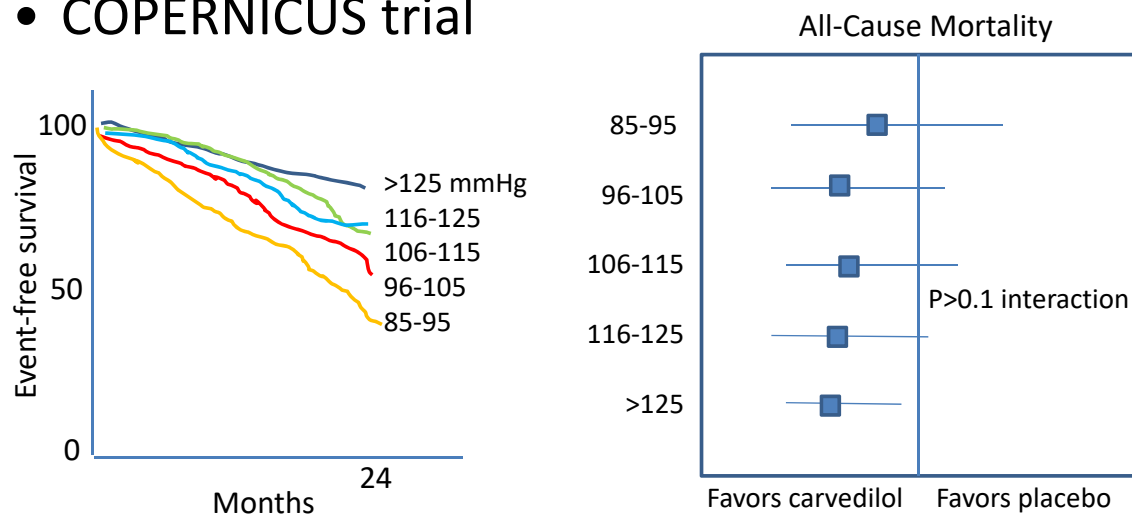
## BP and HF Outcomes

- Low BP has been associated with lower survival in ambulatory patients with HF, but changes in BP with therapy have not



## GDMT, BP, and Outcomes\*

- COPERNICUS trial



\*slide contains corrected data



## Potential Benefits of Lower Blood Pressure in HF

Reduced afterload  
Reduced ventricular wall tension  
Improved vascular vasoreactivity



Improved diastolic function  
Increased stroke volume  
Reduced myocardial oxygen consumption

## Approach to Assessment of Low BP

- Symptomatic?
- Perfusing?
- Volume status?
- Separate dose administration times?
- Unnecessary polypharmacy?

## Circling Back on Loops

### Loop Diuretic Comparison

|                                   | Furosemide                  | Bumetanide    | Torsemide                                  | Ethacrynic Acid |
|-----------------------------------|-----------------------------|---------------|--------------------------------------------|-----------------|
| Relative Potency                  | 40                          | 0.5-1         | 20                                         | 50              |
| <b>Bioavailability (%)</b>        | ≈50 (10-90)                 | <b>&gt;90</b> | <b>&gt;90</b>                              | 100             |
| Half-life (hours)                 | 2-3                         | 1-1.5         | 3-6                                        | 0.25-2          |
| <b>Duration of Action (hours)</b> | 6-8                         | 4-6           | <b>18-24</b>                               | 2-4             |
| Notes                             | Absorption reduced by meals |               | Absorption not reduced in HF; antifibrotic | No sulfur group |

DiNicolantonio JJ. *Future Cardiol.* 2012; 8:707-28. Brater DC et al. *Kidney Int.* 1984; 26:183-9. Vargo DL et al. *Clin Pharm Ther.* 1995; 57:601-9. Molnar J, Somberg JC. *Am J Ther.* 2009; 16:86-92.

## Torsemide vs. Furosemide in HF: Meta-Analysis of RCTs

| HF READMISSIONS       | Sample Size | OR                       |
|-----------------------|-------------|--------------------------|
| Mueller et al. (2003) | 237         | 0.62 (0.10, 3.79)        |
| Murray et al. (2001)  | 234         | 0.25 (0.14, 0.45)        |
| Stroupe et al. (2000) | 193         | 0.43 (0.22, 0.85)        |
| <b>Overall</b>        | <b>664</b>  | <b>0.33 (0.22, 0.50)</b> |

| MORTALITY             | Sample Size | OR                       |
|-----------------------|-------------|--------------------------|
| Mueller et al. (2003) | 237         | 1.27 (0.43, 3.79)        |
| Murray et al. (2001)  | 234         | 0.73 (0.37, 1.42)        |
| Stroupe et al. (2000) | 193         | 0.77 (0.37, 1.61)        |
| <b>Overall</b>        | <b>664</b>  | <b>0.82 (0.52, 1.28)</b> |

Shah P et al. *Eur J Heart Fail.* 2018; 57:e38-e40.

## Torsemide vs. Furosemide in HF: Duke Experience

- N=4,580 admitted with HF to Duke Hospital (2000–2010), then discharged on either torsemide (14%) or furosemide (86%)

| Adjusted Model                      | Odds Ratio or Hazard Ratio | P-value |
|-------------------------------------|----------------------------|---------|
| 30-day mortality or hospitalization | 1.22                       | 0.1789  |
| 30-day hospitalization              | 1.29                       | 0.1607  |
| 5-year mortality                    | 1.09                       | 0.2279  |

Mentz RJ et al. *J Cardiovasc Pharmacol.* 2015; 65:438-43.

## Approach to Selection of Loop in HFrEF

|                                       | Furosemide  | Bumetanide               | Torsemide  |
|---------------------------------------|-------------|--------------------------|------------|
| Dosing for persistent volume overload | Twice daily | Two to three times daily | Once daily |
| Absorption issues                     |             | +                        | ++         |
| Adherence issues                      |             |                          | ++         |
| Higher doses needed                   |             | ++                       |            |

*Ethacrynic Acid for true sulfonamide intolerance*

## Tools to Address Barriers for Optimizing Heart Failure Transitions of Care



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University of Illinois at Chicago College of Pharmacy

Chicago, Illinois

## How Do We Further Optimize Care for This Patient Prior to Discharge?

- HP is a 67-year-old African-American female with HFrEF (LVEF 18%) **hospitalized for the first time for acute heart failure**. Poor historian, lives with her daughter who assists with her care
- **Current medications:** enalapril 10 mg once daily, metoprolol tartrate 25 mg twice daily, furosemide 20 mg once daily, metformin 500 mg twice daily, atorvastatin 40 mg daily, levothyroxine 0.1 mg daily, enteric-coated aspirin 81 mg daily
- **Vitals:** BP **109/67** mm Hg, HR 84 bpm, RR 18 breaths/min
- **Pertinent labs:**
  - Sodium 136 mEq/L, **potassium 4.8 mEq/L, creatinine 1.22 mg/dl**, BUN 23 mg/dl, eGFR 46 mL/min/m<sup>2</sup>

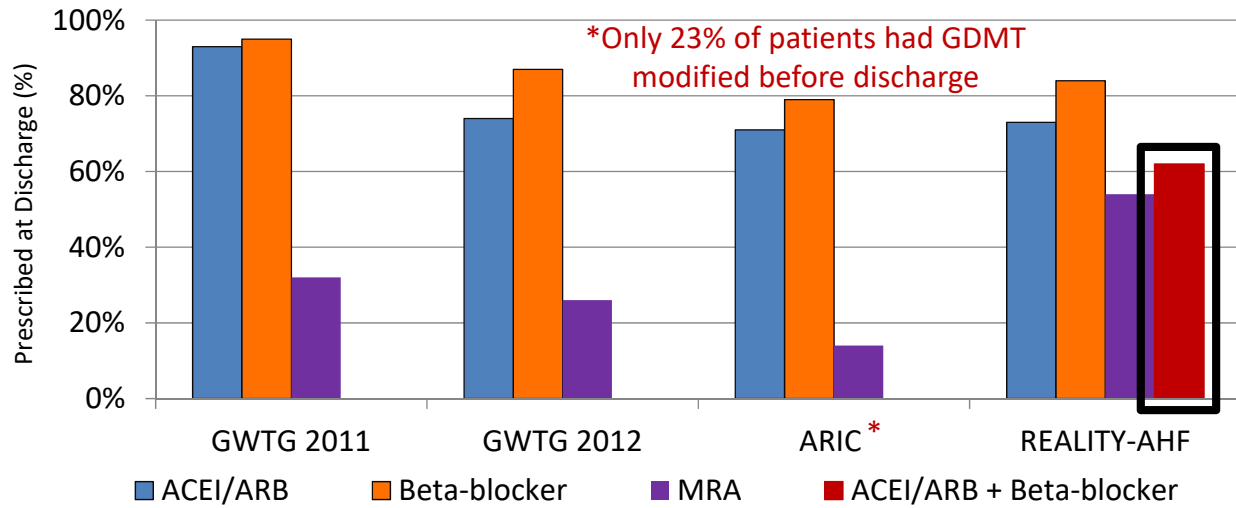
## Clinical Predictors of HF Readmission Opportunities for Improvement?

- Acute coronary syndrome, ischemia
- Increasing age
- Anemia
- Arrhythmia
- Depression
- Hyponatremia
- Low LVEF
- NYHA class IV symptoms
- Pneumonia/respiratory pathology
- **Suboptimal HF medication regimen**
- Uncontrolled hypertension
- Worsening renal function

Fonarow G. *Arch Intern Med.* 2008; 168:847-54.

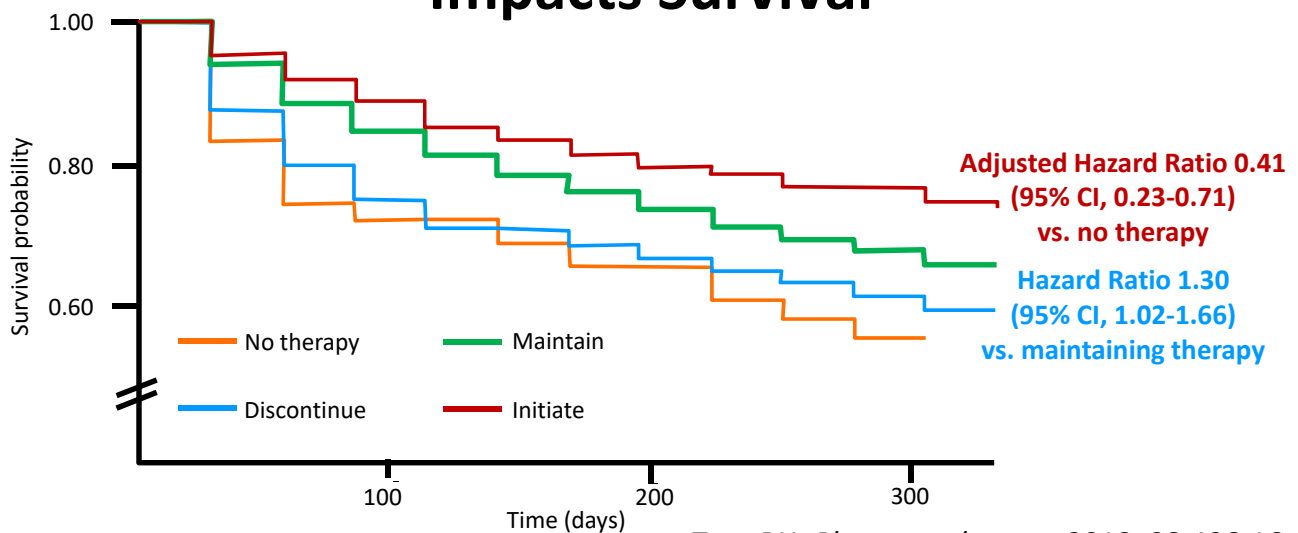
Murray M. *Clin Pharmacol Ther.* 2009; 85:651-8. Annema C. *Heart Lung.* 2009; 38:427-34.

## GDMT for Patients with HFrEF at Discharge Are we optimizing regimens?



Krantz MJ. *Am J Cardiol.* 2011; 107:1818-23. Steinberg B. *Circulation.* 2012; 126:65-75. Tran RH. *Pharmacotherapy.* 2018; 38:406-16. Yamaguchi T. *Am J Cardiol.* 2018; 122:1:969-74.

## GDMT Modification During Hospitalization Impacts Survival



Tran RH. *Pharmacotherapy.* 2018; 38:406-16.

## Consider Additional GDMT for HFrEF

- ✓ ACEI or ARB
- ✓ Beta-blocker
- ✓ Diuretic
- Aldosterone antagonist
- Hydralazine/nitrate
- Sacubitril/valsartan
- Ivabradine
- Digoxin



## Hospitalization = Opportunity to Titrate Dose!

- Generally, consider titrating doses of GDMT every 2 weeks

|                                  | Starting Dose              | Target Dose                |
|----------------------------------|----------------------------|----------------------------|
| Bisoprolol                       | 1.25 mg daily              | 10 mg daily                |
| Carvedilol                       | 3.125 mg twice daily       | 25-50 mg twice daily       |
| Metoprolol succinate             | 12.5-25 mg daily           | 200 mg daily               |
| Sacubitril/valsartan             | 24/26-49/51 mg twice daily | 97/103 mg twice daily      |
| Captopril                        | 6.25 mg three times daily  | 50 mg three times daily    |
| Enalapril                        | 2.5 mg twice daily         | 10-20 mg twice daily       |
| Lisinopril                       | 2.5-5 mg daily             | 20-40 mg daily             |
| Candesartan                      | 4-8 mg daily               | 32 mg daily                |
| Losartan                         | 25-50 mg daily             | 150 mg daily               |
| Valsartan                        | 40 mg twice daily          | 160 mg twice daily         |
| Spirolactone                     | 12.5-25 mg daily           | 25-50 mg daily             |
| Eplerenone                       | 25 mg daily                | 50 mg daily                |
| Hydralazine/isosorbide dinitrate | 25/20 mg three times daily | 75/40 mg three times daily |

Yancy CW et al. *J Am Coll Cardiol.* 2018; 71:201-30.

# GDMT Dose Matters!

## Dose-dependent Effect on Left Ventricle

- MOCHA
  - Dose-related increase in LVEF with carvedilol
- REVERT
  - Dose-dependent improvement in left ventricular remodeling

Bristow MR. *Circulation*. 1996; 94:2807-16. Colucci WS. *Circulation*. 2007; 116:49-56.

## GDMT Dose-dependent Effect on Outcomes

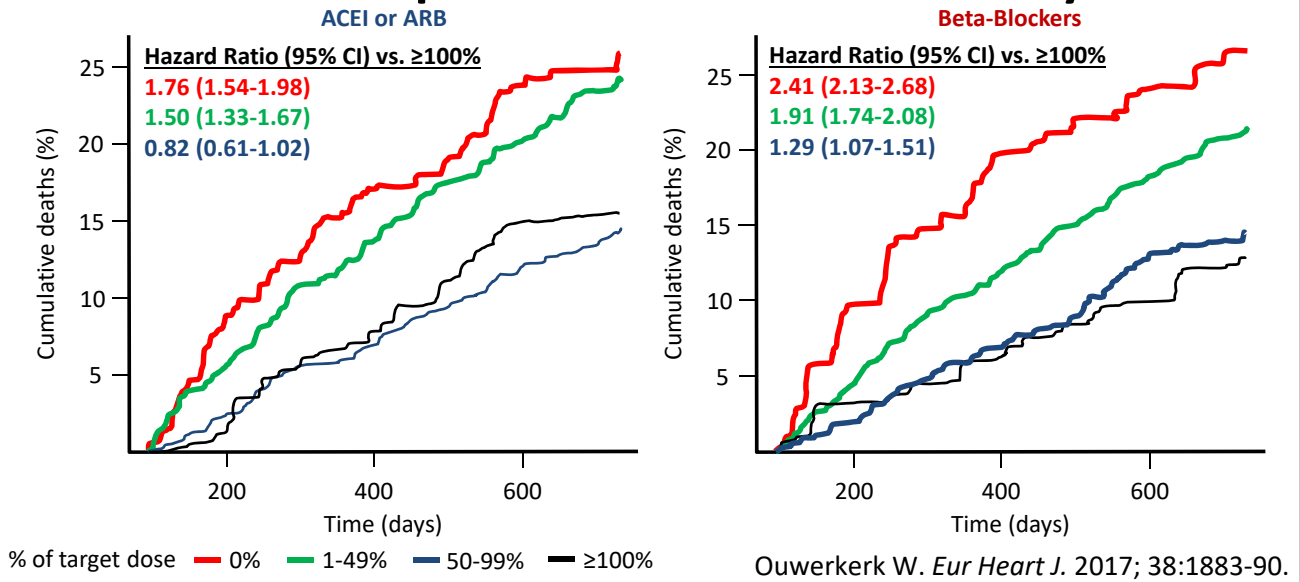
| Trial                | Hazard Ratio for death or HF hospitalization | 95% Confidence Interval |
|----------------------|----------------------------------------------|-------------------------|
| <b>ACEI or ARBs</b>  |                                              |                         |
| ATLAS (lisinopril)   | 0.85                                         | 0.78-0.93               |
| HEAAL (losartan)     | 0.90                                         | 0.82-0.99               |
| Egiziano et al.      | ACEI: 0.91<br>ARB: 0.85                      | 0.87-0.95<br>0.77-0.95  |
| <b>Beta-blockers</b> |                                              |                         |
| HF-ACTION            | 0.96 per 10-mg dose increase                 | 0.93-0.99               |
| McAlister et al.     | No dose-response relationship                |                         |

Packer M. *Circulation*. 1999; 100:2312-8. Konstam MA. *Lancet*. 2009; 374:1840-8. Egiziano G. *Arch Intern Med*. 2012; 172:1263-5. Fiuzat M. *J Am Coll Cardiol*. 2012; 60:208-15. McAlister FA. *Ann Intern Med*. 2009; 150:784-94.



# GDMT Dose Matters!

## Dose-dependent Effect on Mortality



# GDMT Dosing: Room For Improvement!

## CHAMP-HF (U.S.)

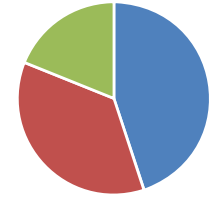
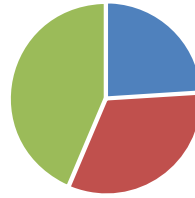
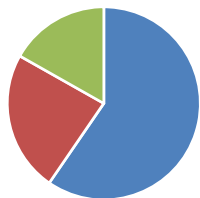
## CHECK-HF (Dutch)

ACEI/ARB/ARNI

Beta-blockers

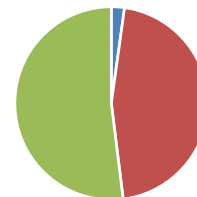
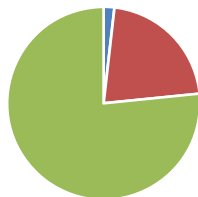
ACEI/ARB

Beta-blockers



MRA

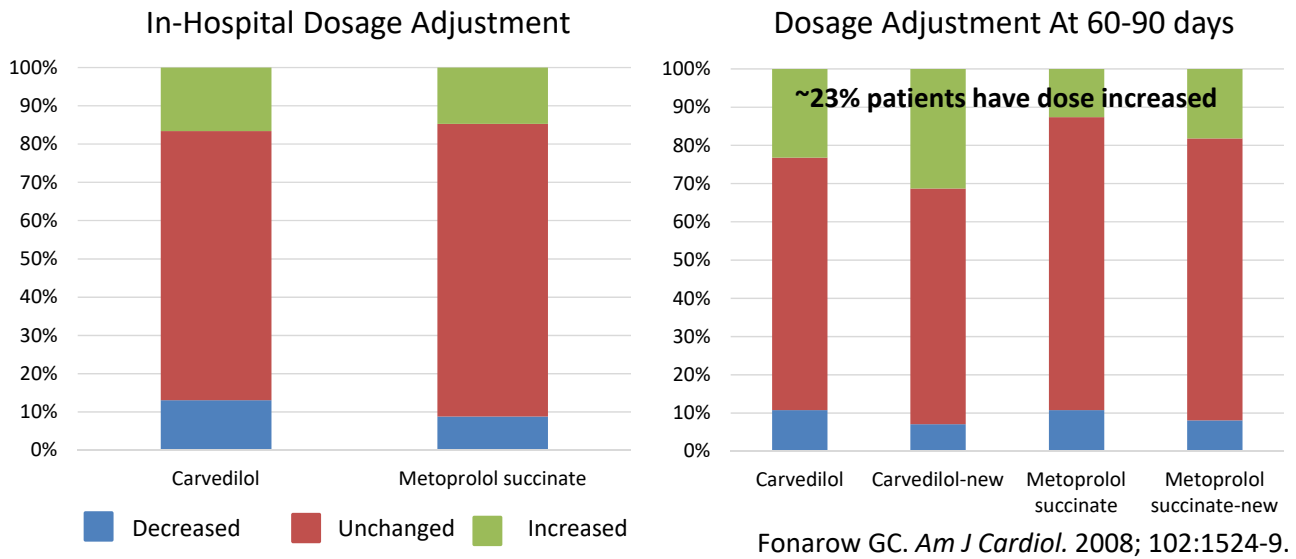
MRA



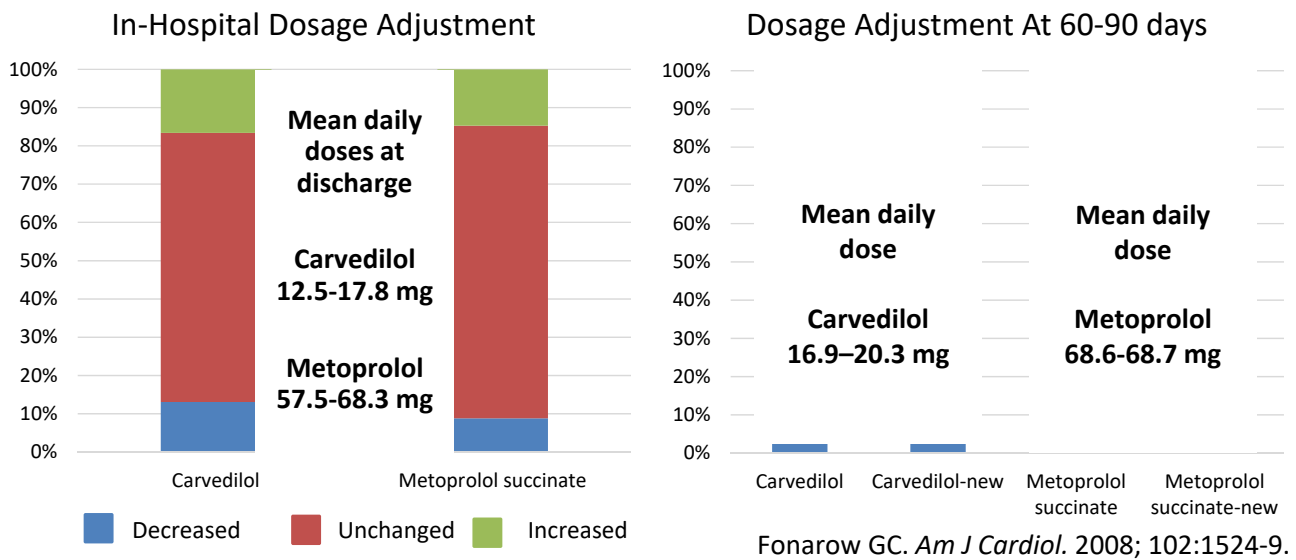
■ < 50% target dose  
 ■ 50-100% target dose  
 ■  $\geq 100\%$  target dose

Greene SJ. *J Am Coll Cardiol.* 2018; 72:351-6. Brunner-LaRocca HP. *J Am Coll Cardiol.* 2019; 7:13-21.

## Beta-Blocker Dosage Adjustments During & After Hospitalization



## Beta-Blocker Dosage Adjustments During & After Hospitalization



# Effective Care Transitions to Optimize Post-Discharge Outcomes

## Patient Education & Discharge Counseling Heart Failure and Post-Myocardial Infarction

- Address barriers
- **Perform thorough review of medications**
- **Use inpatient and outpatient settings**
- Assess readiness to learn
- Vary teaching methods
- **Engage caregivers**
- **Engage other team members**
- Optimize written materials
- Emphasize self-care
- Employ teach-back method
- **Assess patient resources**
- Refer to disease management programs
- Focus on smooth care transitions

Wiggins B. *Pharmacotherapy*. 2013; 33:558-80.

## Inpatient Medication Histories & Reconciliation Clinical & Economic Outcomes

### Medication Histories

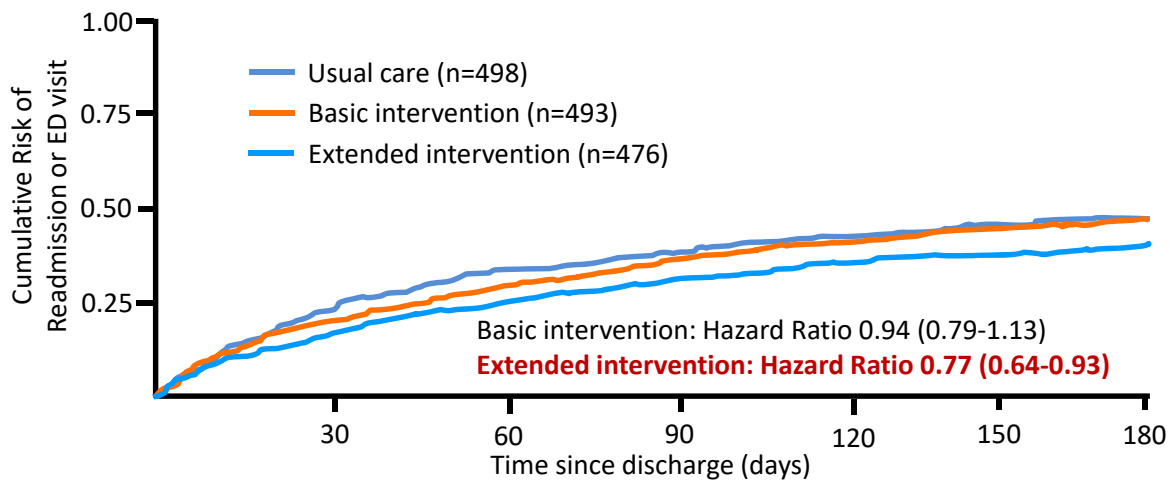
- ↓↓ Adverse drug events (ADEs)
- ↓↓ Drug costs
- ↓↓ Total costs
- ↓↓ Inpatient mortality

### Medication Reconciliation

- ↓↓ Medication discrepancies
- ↓↓ Potential ADEs
- ↓↓ Preventable ADEs
- ↓↓ Health care resource use

Bond CA et al. *Pharmacotherapy*. 1999; 19:1354-62. Bond CA et al. *Pharmacotherapy*. 2000; 20:609-21.  
 Bond CA et al. *Pharmacotherapy*. 2004; 24:427-40. Bond CA et al. *Pharmacotherapy*. 2006; 26:735-47.  
 Bond CA et al. *Pharmacotherapy*. 2007; 27:481-93. Mueller S. *Arch Intern Med*. 2012; 172:1057-69.

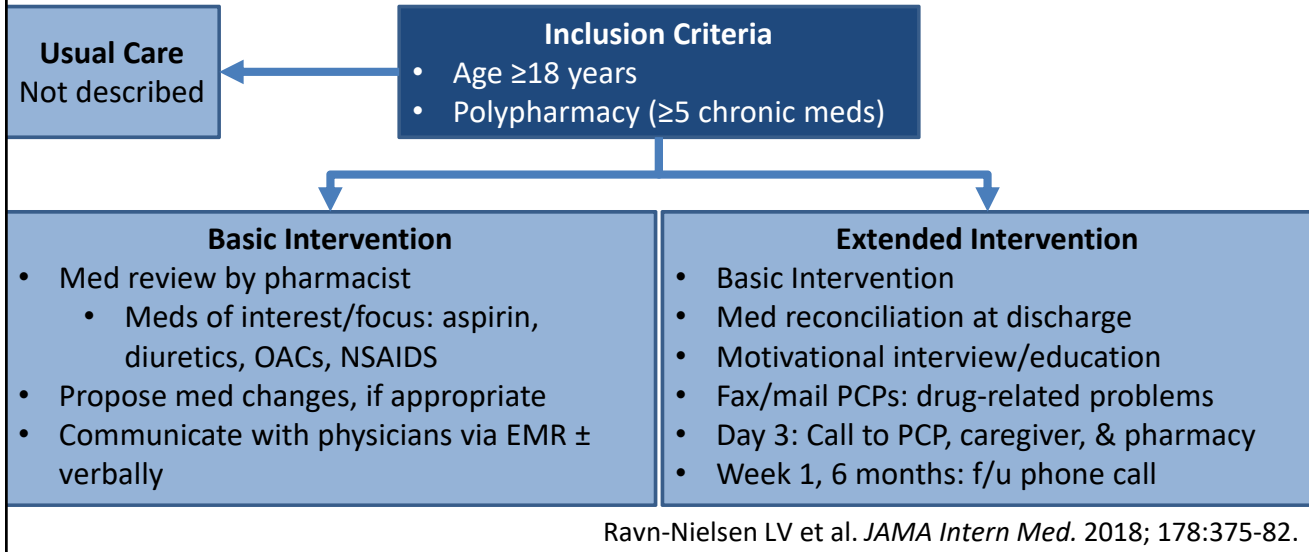
## Pharmacist Involvement in TOC Improves Outcomes! OPTIMIST Study



Ravn-Nielsen LV et al. *JAMA Intern Med*. 2018; 178:375-82.

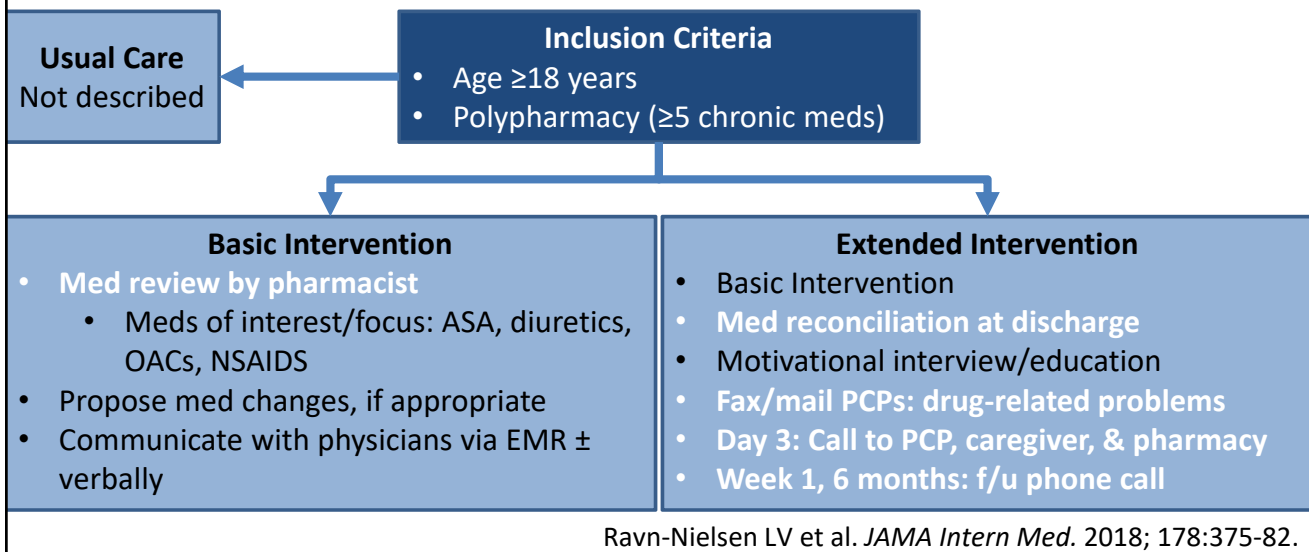
# OPTIMIST Study Design

## Transition of Care Interventions



# OPTIMIST Study Design

## Transition of Care Interventions



# Heart Failure Transitions of Care Programs

## Barriers & Potential Solutions

### Barriers

- Lack of time/resources
- Patient out-of-pocket costs/insurance issues
- Lack of administration/ leadership support

### Potential Solutions

- Utilize technicians ± students
- Focus intervention(s) on "high-risk" patients
- Partner with outpatient pharmacy
- Bill for MTM services?

## Pharmacy Student Medication Reconciliation

### Student-managed services

- Pharmacist "reach"  
↑ more than 2-fold
- Clinical interventions
- Post-discharge calls

### RXCARES

Reconciliation  
**X**-Drug Interaction  
**C**oordination &  
**C**ommunication  
**A**ccess & **A**dherence  
**R**isk reduction  
**E**vidence-Based Medicine  
 review / **E**limination of  
 meds  
**S**avings

### MoPhE

**M**obile  
**P**harmacy  
**E**ducation



Lubowski TJ. *Am J Pharm Educ.* 2007; 71:94.  
 Walker PC. *Am J Pharm Educ.* 2010; 74:20.  
 Lancaster JW. *Am J Pharm Educ.* 2014; 78:34.

Bursua A, Thambi M.  
 University of Illinois Hospital.

## Focus Efforts on “High-Risk” Patients

- Targeted patients (e.g., elderly, polypharmacy)
  - OPTIMIST: ≥5 meds
  - RXCARES
    - ≥10 meds
    - Age ≥65 AND ≥5 meds OR ≥2 admissions in last 1 year
- Targeted medications/disease states
  - MoPhE: anticoagulants, diabetes, inhaler technique
- Utilize EMR/Clinical Decision Support?

## Reimbursement for Transitions of Care?

- Several inpatient clinical pharmacy services eligible under evaluation & management inpatient procedural codes
  - History-taking, physical exam, medical decision-making
  - Categorized by complexity
- Medicare/Medicaid ineligible

### Steps to Consider

1. Review payer mix
2. Review state laws governing MTM criteria
3. Establish billing values with finance department
4. Pharmacist must conduct face-to-face visit & document
5. Establish reporting system

Traynor K. *Am J Health-Syst Pharm.* 2014; 71:774-6.

Sanchez D. *Pharmacy Purchasing & Products.* 2014; 11:30.

Wild D. *Pharmacy Practice News.* <http://www.pharmacypracticenews.com/Operations-Management/Article/02-15/An-Inside-Job-Hospital-Adds-1-6-Million-in-Billables-Via-MTM/29415/ses=ogst>. (Accessed 2018 Oct 29.)

# Optimizing GDMT for Patients with HFrEF

## What Should Be in Your Toolkit?

- Knowledge to identify & resolve clinical barriers for optimization of GDMT
- Skills for medication histories, reconciliation, & patient education for appropriate patients
- Post-discharge follow-up
- Human resource management
  - More efficient use of technicians ± students
- Reimbursement capabilities (MTM billing?)



## Selected Resources

### Guidelines & Consensus Statements

- Yancy C et al. 2013 ACCF/AHA guideline for management of heart failure. *J Am Coll Cardiol.* 2013; 62:e147-239.
- Yancy C et al. 2017 ACC/AHA/HFSA Focused Update of the 2013 ACCF/AHA Guideline for the Management of Heart Failure. *J Am Coll Cardiol.* 2017; 70:776-803.
- Yancy CW et al. 2017 ACC Expert Consensus Decision Pathway for Optimization of Heart Failure Treatment. *J Am Coll Cardiol.* 2018; 71:201-30.

### Other Selected Resources

- Tran RH et al. *Pharmacotherapy.* 2018; 38:406-16.
- Ouwerkerk W et al. *Eur Heart J.* 2017; 38:1883-90.
- Fonarow GC et al. *Am J Cardiol.* 2008; 102:1524-9.
- Ravn-Nielsen LV et al. *JAMA Intern Med.* 2018; 178:375-82.
- Traynor K. *Am J Health-Syst Pharm.* 2014; 71:774-6.
- Sanchez D et al. *Pharmacy Purchasing & Products.* 2014; 11:30.  
[https://www.pppmag.com/article\\_print.php?id=1534](https://www.pppmag.com/article_print.php?id=1534).



## **Consider these practice changes. Which will you make?**

- Read the 2017 ACC Expert Consensus Pathway.
- Compare my organization's protocols with the most up to date heart failure treatment guidelines.
- Evaluate my organization's utilization & escalation of GDMT for HFrEF prior to discharge.
- Assess my pharmacy department's participation in care transitions (e.g., frequency of medication histories upon admission & medication reconciliation upon discharge, participation in patient education).
- Engage both patients & caregivers in educational encounters.
- Determine the feasibility of post-discharge pharmacist involvement (e.g., post-discharge telephone contact, multidisciplinary clinic).