Better Management of Chronic Heart Failure through Better Transitions of Care

A CLINICAL CASE STUDIES WORKSHOP

A Midday Symposium and Live Webinar conducted at the 52nd Midyear Clinical Meeting and Exhibition

Monday, December 4, 2017 I 11:30 a.m. – 1:00 p.m. I Orlando, Florida

AGENDA

11:30 a.m.
Welcome and Introductions

11:35 a.m.
Guideline-Directed Medical Therapy & Heart Failure Hospitalizations
Robert J. DiDomenico, Pharm.D., BCPS-AQ Cardiology, FCCP

12:00 p.m.
Transition of Care Services in Heart Failure
Sherry Milfred-LaForest, Pharm.D., BCPS, FCCP

12:25 p.m.
Patient Scenario 1
Robert J. DiDomenico, Pharm.D., BCPS-AQ Cardiology, FCCP

12:40 p.m.
Patient Scenario 2
Sherry Milfred-LaForest, Pharm.D., BCPS, FCCP

12:55 p.m.
Faculty Discussion and Audience Questions
Disclosures

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• In this activity, no persons associated with this activity have disclosed any relevant financial relationships.

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Learning Objectives

- Discuss the role of guideline-directed medical therapy in reducing hospitalizations for patients with chronic heart failure, including the role of newer agents.
- Indicate clinical services that improve patient care and their role in transitions of care.
- Using patient scenarios, develop plans to optimize care for patients with chronic heart failure.

Abbreviations

- ARNI=angiotensin receptor-neprilysin inhibitor
- CI=confidence interval
- CMR=comprehensive medication reconciliation
- CV=cardiovascular
- eGFR=estimated glomerular filtration rate
- GDMT=guideline-directed medical therapy
- HF=heart failure
- HFrEF=heart failure with reduced ejection fraction
- HMO=health maintenance organization
- Hyd=hydralazine
- ISDN=isosorbide dinitrate
- LVEF=left ventricular ejection fraction
- PPO=preferred provider organization
- RAAS=renin-angiotensin-aldosterone system
- RCT=randomized controlled trial
- Sac/val=sacubitril/valsartan
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On average how many unique patients with chronic heart failure (not patient encounters) do you personally provide care to each month?

a. None – I am not directly involved in patient care
b. Less than 20 patients/month
c. 21-50 patients/month
d. 51-100 patients/month
e. More than 100 patients/month

Heart Failure: The Cold Hard Facts

• 5.7 million adults in U.S. have heart failure (2012)
  – Prevalence will increase 46% by 2030
  – 960,000 new cases annually
  – At 45 years old, lifetime risk ~20–45%

• Mortality
  – ~30% at 1 year
  – ~50% at 5 years

• Hospitalizations
  – ~1 million annually

• Annual Cost
  – $30.7 billion (2012)


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Pathophysiology of Heart Failure with Reduced Ejection Fraction (HFrEF) & Neurohormonal Therapies Used to Counteract These Effects

HFrEF Pathophysiology

AVP=arginine vasopressin, Epi=epinephrine, NE=norepinephrine, AT II=angiotensin II, Aldo=aldosterone, Na=sodium, H2O=water, ANP=A-type natriuretic peptide, BNP=B-type natriuretic peptide, NO=nitric oxide

Images courtesy of smokedsalmon (heart), Rattikankeawpun (brain), yodiyim (nervous system), dream designs (kidneys) at FreeDigitalPhotos.com.
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Anti-RAAS Medications

ARNI: Sacubitril/Valsartan

AVP=arginine vasopressin, Epi=epinephrine, NE=norepinephrine, AT II=angiotensin II, Aldo=aldosterone, Na=sodium, H₂O=water, ANP=A-type natriuretic peptide, BNP=B-type natriuretic peptide, NO=nitric oxide

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**Beta-blockers**

AVP = arginine vasopressin, Epi = epinephrine, NE = norepinephrine, AT II = angiotensin II, Aldo = aldosterone, Na = sodium, 
H₂O = water, ANP = A-type natriuretic peptide, BNP = B-type natriuretic peptide, NO = nitric oxide

**Nitrates/Hydralazine**  
(ISDN/Hyd)

AVP = arginine vasopressin, Epi = epinephrine, NE = norepinephrine, AT II = angiotensin II, Aldo = aldosterone, Na = sodium, 
H₂O = water, ANP = A-type natriuretic peptide, BNP = B-type natriuretic peptide, NO = nitric oxide

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### Drug Therapy Options to Treat HFrEF

**Neurohormonal mediators**
- Anti-RAAS drugs
  - Angiotensin converting-enzyme inhibitors (ACEIs), angiotensin receptor blockers (ARBs)
  - Mineralocorticoid receptor antagonists (MRAs)
  - Angiotensin receptor-neprilysin inhibitors (ARNIs)

- Beta-blockers (BBs)
- Nitrates/hydralazine

### Non-neurohormonal therapies
- Ivabradine
- Diuretics
- Digoxin

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### Ivabradine Mechanism of Action

- Decreases heart rate (HR)
- No effect on contractility or blood pressure (BP)

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Why do the guidelines direct us to use these therapies?

GDMT for HFrEF & All-Cause Mortality

<table>
<thead>
<tr>
<th>Therapy</th>
<th>% Change in Mortality Risk</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACEI</td>
<td>-10%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>ARB (HFrEF)</td>
<td>-10%</td>
<td>0.05</td>
</tr>
<tr>
<td>MRA</td>
<td>-10%</td>
<td>0.95 CI</td>
</tr>
<tr>
<td>Beta blockers</td>
<td>-10%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>ISDN/Hyd (vs Plac)</td>
<td>-10%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>ISDN/Hyd (vs ACEI)</td>
<td>0%</td>
<td>0.02</td>
</tr>
<tr>
<td>Sac/Val (vs ACEI)</td>
<td>0%</td>
<td>0.03</td>
</tr>
<tr>
<td>Ivabradine</td>
<td>0%</td>
<td>0.09</td>
</tr>
<tr>
<td>Digoxin</td>
<td>0%</td>
<td>0.80</td>
</tr>
</tbody>
</table>

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### GDMT for HFrEF & HF Hospitalization

<table>
<thead>
<tr>
<th>% Change in HF Hospitalization</th>
<th>ACEI</th>
<th>ARB</th>
<th>MRA</th>
<th>Beta blockers</th>
<th>ISDN/Hyd (vs ACEI)</th>
<th>ISDN/Hyd (+ ACEI)</th>
<th>Sac/Val (vs ACEI)</th>
<th>Ivabradine</th>
<th>Digoxin</th>
</tr>
</thead>
<tbody>
<tr>
<td>P&lt;0.0001</td>
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### Selected Adverse Effects of GDMT for HFrEF

- **MRAs**
  - Serious hyperkalemia (potassium > 6.0 mEq/L)
    - ~2 – 6%
- **Sacubitril/valsartan**
  - Symptomatic hypotension
    - 14%
- **Ivabradine**
  - Bradycardia
    - ~6%
  - Atrial fibrillation
    - 9.5%
  - Phosphenes
    - 2.7%


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Recommendation Class and Evidence Level

<table>
<thead>
<tr>
<th>Class (Strength) of Recommendation (COR)</th>
<th>Level (Quality) of Evidence (LOE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I (Strong): BENEFIT &gt;&gt;&gt; RISK</td>
<td>Level A</td>
</tr>
<tr>
<td>Is recommended/beneficial</td>
<td>High quality evidence from &gt; 1 RCT</td>
</tr>
<tr>
<td>Class IIa (Moderate): BENEFIT &gt;&gt; RISK</td>
<td>Level B-R (RANDOMIZED)</td>
</tr>
<tr>
<td>Is reasonable; can be beneficial</td>
<td>Moderate quality evidence from &gt; 1 RCT</td>
</tr>
<tr>
<td>Class IIb (Weak): BENEFIT &gt; RISK</td>
<td>Level B-NR (NONRANDOMIZED)</td>
</tr>
<tr>
<td>May/might be reasonable; benefit is unknown/unclear/uncertain</td>
<td>Moderate quality evidence from &gt; 1 NRCT</td>
</tr>
<tr>
<td>Class III: No Benefit (Moderate): BENEFIT = RISK</td>
<td>Level C-LD (LIMITED DATA)</td>
</tr>
<tr>
<td>Is NOT recommended/beneficial</td>
<td>Randomized or nonrandomized observational or registry studies with limitations</td>
</tr>
<tr>
<td>Class III: Harm (Strong): RISK &gt; BENEFIT</td>
<td>Level C-EO (EXPERT OPINION)</td>
</tr>
<tr>
<td>Is NOT recommended; potentially harmful</td>
<td>Expert opinion based on clinical experience</td>
</tr>
</tbody>
</table>

RCT=randomized controlled trial, NRCT=nonrandomized controlled trial


HFrEF GDMT Algorithm

Stage B

ACEI or ARB + Beta-blocker

Stage C

+/↑ Diuretics as needed

NYHA Class ≥ II

NYHA Class ≥ III

CrCl ≥ 30
K+ < 5.0

Adequate BP on ACEI or ARB

HR ≥ 70 on max beta-blocker

Intolerance to ACEI or ARB

Black ancestry

CrCl=creatinine clearance in mL/min, K+=serum potassium in mEq/L, HR=heart rate in bpm


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What about heart failure readmissions?


**Relative risk reduction, 38% (95% CI, 18-53)**

\[ P<0.001 \]

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**HF Hospitalizations Over Time**

**eplerenone**

Hazard ratio, 0.58 (95% CI, 0.47-0.70) \(P<0.001\)


**HF Hospitalizations Over Time**

**sacubitril/valsartan & ivabradine**

Hazard ratio, 0.74 (95% CI, 0.66-0.83) \(P<0.0001\)


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### GDMT at Discharge & Outcomes

<table>
<thead>
<tr>
<th></th>
<th>Risk adjusted mortality at 60 – 90 days</th>
<th>Risk-adjusted readmission at 60 – 90 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDMT at Discharge</td>
<td>Hazard ratio (95% CI)</td>
<td>Hazard ratio (95% CI)</td>
</tr>
<tr>
<td></td>
<td>P value</td>
<td>P value</td>
</tr>
<tr>
<td>ACEI or ARB</td>
<td>0.61 (0.35-1.06)</td>
<td>0.51 (0.34-0.78)</td>
</tr>
<tr>
<td></td>
<td>0.08</td>
<td>0.002</td>
</tr>
<tr>
<td>Beta-blocker</td>
<td>0.48 (0.30-0.79)</td>
<td>0.73 (0.55-0.96)</td>
</tr>
<tr>
<td></td>
<td>0.004</td>
<td>0.02</td>
</tr>
</tbody>
</table>


### Opportunities for Improvement?

#### Clinical Predictors of HF Readmission

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

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**GDMT for HF at Discharge**
*Are patients on near-optimal regimens?*

![Bar graph showing prescription rates of GDMTs for HF at discharge.](image)

- Overall
- EF ≥50%
- EF 40-49%
- EF <40%
- EF <40% (Bress)

*ACEI/ARB* blue
*Beta-blocker* red
*MRA* light blue
*ACEI/ARB + BB* orange
*ACEI/ARB + BB + MRA* dark red

EF = ejection fraction


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**GDMT for HFrEF & HF Hospitalizations**

**Summary**

- Each of the GDMTs for HFrEF is associated with reduced rates of heart failure hospitalizations
- GDMTs for HFrEF with potentially “early” benefit from reduced hospitalizations include ACEIs, beta-blockers, MRAs, & ivabradine
  - These may have potential in reducing “early” readmissions
- Utilization & escalation of GDMTs prior to discharge is suboptimal
  - Opportunity for pharmacists to improve care

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Transitions of Care Services Associated with Improved Heart Failure Outcomes

Sherry Milfred-LaForest, Pharm.D., BCPS, FCCP
Clinical Pharmacy Specialist, Cardiology & Organ Transplantation
Louis Stokes Cleveland VA Medical Center
Cleveland, Ohio

Recommendations for Transitional Care Programs in HF

• Systematically implement principles of transition of care programs in high-risk individuals with chronic HF
  – Medication reconciliation
  – Very early telephone contact (within 24-72 hours)
  – Early office follow up (within 7 days of discharge)
  – Patient education on sign and symptom recognition and chronic self-care behaviors

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Recommendations for Transitional Care Programs in HF

- Routinely assess patients for high-risk characteristics that may be associated with poor outcomes
  - Cognitive impairment, poor health literacy, non-English speaking, long travel time to medical appointments
- Ensure qualified and HF-trained providers deliver the intervention
- Allot adequate time to deliver complex interventions and assess patient/caregiver response in inpatient and outpatient settings
- Implement hand-off procedures in hospital and at post-discharge visits


Discharge Education Best Practices

- Identify and address barriers to adherence
- Include CMR
- Vary teaching method based on patient needs
- Engage caregivers
- Make it multidisciplinary
- Use in both inpatient and outpatient settings when possible

### 2-Day Post-Discharge Telephone Call

- Are symptoms back to their baseline?
- Home weight at discharge?
  - Does patient have a scale?
- Education on symptoms, daily weight monitoring, low-sodium diet, who to call for worsening of symptoms
- Careful review of discharge medication list
  - Assess for medication discrepancies
- Obstacles/barriers to adherence at this point
- Communicate to other providers


### 7-14 Day Post-Discharge Appointment

- Assess clinical status and function and provide clinical decisions of moderate to high complexity
- Address test results and other medical issues/concerns
- Address barriers to adherence and self-care
- Make referrals to telehealth, home care, cardiac rehab, dietician, social work, comprehensive HF program
- Review home weights, establish “dry/target” home weight range
  - What weight or symptoms would lead you to call a provider?

Pharmacist Roles in Transitional Care

- Inpatient pharmacist
  - Discharge education
  - CMR
    - Admission
    - Discharge (with education)

- Outpatient pharmacist
  - Multidisciplinary clinic
    - Transitional care
    - Longitudinal outpatient care
  - Identification/resolution of medication system barriers
  - CMR
  - GDMT titration/monitoring


Pharmacist Roles in Transitional Care

- Pharmacist-directed care
  - Pharmacist intervention without direct collaboration with medical provider
    • Medication education/reconciliation in community setting

- Pharmacist-collaborative care
  - Pharmacist-led intervention with collaboration from medical provider
    • Pharmacist directing changes in therapy with input from medical providers when needed (e.g., for physical assessment)
    • Resolution of medication discrepancies with medical providers

- Pharmacist as a part of a multidisciplinary team
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Optimal Impact of Pharmacist in Transitional Care

- Pharmacist-directed care
  - Significant reductions in all-cause hospitalization AND HF hospitalizations in some, but not all, studies in meta-analysis
  - Non-significant reduction in mortality
- Pharmacist-collaborative care
  - Greater reductions in rate of HF hospitalizations vs. pharmacist-directed care
- Pharmacist care as part of a multidisciplinary team produces largest impact on HF and all-cause hospitalizations


Why medication reconciliation?

- Medication discrepancies have been found in 14-67% of patients following hospital discharge
  - 30-50% of these are unintentional nonadherence
    - up to 50% result from system level errors in discharge process
  - Elderly, polypharmacy are risk factors for discrepancies
  - Rehospitalization rates higher among patients with identified medication discrepancies vs. those without

Medication Reconciliation Is Only Part of the Solution...

- Prospective RCT
- 120 patients – 64 intervention, 56 standard care
- Post discharge home CMR
  - Within 96 hours, 1 month, and 6 months
  - Communication and action upon discrepancies not described
- Primary outcome: all-cause HF hospitalizations, length of stay, and death
  - No significant differences in HF hospitalizations or mortality (p=0.131 and 0.514 respectively)
  - Days of HF-related hospitalization greater in intervention group (Incidence rate ratio [IRR] 2.34, p<0.001)
- Medication Reconciliation in a vacuum does not work!


Medication Reconciliation in Multidisciplinary Setting

- Multidisciplinary post-discharge clinic focusing on medication reconciliation
  - Pilot study of 80 patients (post-discharge)
  - Pharmacist providers with scope of practice, medical providers as needed for additional physical assessment (pharmacist collaborative care)
  - CMR with patients’ actual bottles/pill box in clinic (“brown bag”)
  - Mean time to clinic visit 10 days post-discharge
  - 53% of patients with discrepancies from discharge medication list
    - 77% had medication reconciliation done at discharge
  - Medications optimized in 70% of patients at this visit
  - 9% readmission rate

Milfred-LaForest S. Prog Cardiovascular Dis. 2017; (in press).
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Post-Discharge Education

- Conflicting data
  - HOOPS trial: no difference in mortality and readmissions with pharmacist education of low-risk population
  - Recurring pharmacist adherence assessment showed improved adherence with diuretic and decrease in emergency department visits and hospitalizations
  - Longitudinal ongoing multidisciplinary education series was able to decrease 30-day readmissions


Pharmacist Post-Discharge Calls Project RED

- Patients discharged from family medicine service
- Telephone call attempted within 2-4 days
  - Review of current clinical status
  - Medication reconciliation
  - Resolution of discrepancies
  - Reminder of follow-up appointments
- Comparison of patients who were able to be reached vs. those who were not

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Pharmacist Post-Discharge Calls – Project RED

![Graph showing patient re-hospitalizations and 30-day patient visits with statistical significance](image)


TeleMONITORING vs. TeleMANAGEMENT

- RCTs have shown minimal benefit in mortality and readmissions
  - Daily weight/BP monitoring to nurse or central reviewer
  - Health “coaching” vs. management of findings
  - Highly dependent on patient adherence to monitoring

- May produce some benefit
  - Use of more precise data (e.g., pulmonary artery pressure monitor)
  - Increase data monitored improves mortality benefit
    - Medication adherence
    - ECG monitoring
  - Intervention upon findings with prompt changes in pharmacotherapy or education

Pharmacist in Multidisciplinary Clinic

- Multidisciplinary post-discharge clinic series
  - Target first visit within 7-14 days of discharge
  - 12 weeks following admission for HF
  - Physical assessment, including determination of etiology of HF and precipitating factors for hospitalization
  - Medication titration, education


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### Multidisciplinary Post-Discharge Clinic

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Control (n=133)</th>
<th>Clinic (n=144)</th>
<th>Adj Hazard ratio (95% CI) P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>HF Readmission, n (%)</td>
<td>31 (23.3%)</td>
<td>11 (7.6%)</td>
<td>0.17 (0.07-0.41) p &lt; 0.001</td>
</tr>
<tr>
<td>Death (all cause), n (%)</td>
<td>7 (5.3%)</td>
<td>2 (1.4%)</td>
<td>0.12 (0.02-0.93) p = 0.043</td>
</tr>
<tr>
<td>HF Readmission and Death, n (%)</td>
<td>38 (28.6%)</td>
<td>13 (9%)</td>
<td>0.14 (0.06-0.31) p &lt; 0.001</td>
</tr>
</tbody>
</table>

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**Medication Adherence In Multidisciplinary Post-Discharge Clinic**

![Graph showing medication adherence](image)

AA=aldosterone antagonist, PDC-90=ratio of days’ supply of medication to days prescribed


**Home-Hospital-Home Care Transitions**

One Size Does Not Fit All

<table>
<thead>
<tr>
<th>Pre-hospital</th>
<th>In-Hospital</th>
<th>Postdischarge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Care Medications</td>
<td>Discharge med rec</td>
<td>Refer to pharmacy programs?</td>
</tr>
<tr>
<td>Medication history</td>
<td>Medication education</td>
<td>Medication Therapy Management (MTM)</td>
</tr>
<tr>
<td>ePrescribe?</td>
<td>PredischARGE dispense?</td>
<td>Phone call?</td>
</tr>
<tr>
<td>Physician follow-up</td>
<td>Identify precipitating causes</td>
<td>In-home visit?</td>
</tr>
<tr>
<td>Optimize HF regimen</td>
<td></td>
<td>Physician follow-up within 7–10 days</td>
</tr>
<tr>
<td>Identify self-care barriers</td>
<td>Patient and caregiver education THROUGHOUT hospital stay</td>
<td>Refer to disease management team?</td>
</tr>
<tr>
<td>Med Assistance</td>
<td>Assess readiness for discharge</td>
<td></td>
</tr>
</tbody>
</table>

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Key Takeaways

- While most GDMTs for HFrEF are associated with improved survival, all except for diuretics are associated with lower heart failure hospitalization rates.
- For patients hospitalized for HFrEF, optimization of GDMT before discharge occurs infrequently, representing an opportunity for pharmacists to improve care & outcomes.
- Education should be tailored to patients’ needs and barriers.
- Education needs to be longitudinal across the inpatient and outpatient settings.

Case Discussion
JL: 73 year-old Hispanic Male

- **Past medical history**
  - HFrEF (4th hospitalization in 1 year)
  - Atrial fibrillation
  - Diabetes
  - Aortic valve replacement (mechanical)
  - Chronic kidney disease

- **Current Inpatient Medications**
  - Lisinopril 20 mg daily
  - Metoprolol succinate 25 mg daily
  - Furosemide 40 mg twice a day
  - Warfarin 5 mg daily
  - Glipizide 10 mg daily
  - Amiodarone 200 mg daily

- **Vital signs**
  - Blood pressure 116/78 mm Hg
  - Heart rate 58 bpm

- **Echocardiogram**
  - LVEF < 20% (1 month ago)

- **Labs**
  - Sodium 134 mEq/L
  - Potassium 4.3 mEq/L
  - Creatinine 1.3 mg/dL
  - eGFR ~50 mL/min/1.73m²

- **Insurance**: Medicare HMO/PPO
- **Spanish-speaking, poor historian, history of medication nonadherence, polypharmacy**

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**Case Discussion: Optimizing Therapy**

- **Is this patient on optimal guideline-directed medical therapy for HFrEF?**

- **What, if any, changes do you recommend?**
  - To address symptoms?
  - To reduce the risk of adverse clinical outcomes?
Which of the following accurately summarizes JL’s current GDMT?

a. Optimal selection & dosing of GDMT
b. Optimal selection of GDMT, suboptimal dosing
c. Suboptimal selection of GDMT, dosing of current GDMT adequate
d. Suboptimal selection & dosing of GDMT

Which of the following changes do you advise to reduce JL’s symptoms?

a. Add ivabradine
b. Add digoxin
c. Increase furosemide dose
d. Increase lisinopril dose
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**HFrEF GDMT Algorithm**

<table>
<thead>
<tr>
<th>Stage B</th>
<th>Stage C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ACEI or ARB + Beta-blocker</strong></td>
<td>+/- Diuretics as needed</td>
</tr>
<tr>
<td><strong>NYHA Class I</strong></td>
<td><strong>NYHA Class II - IV</strong></td>
</tr>
</tbody>
</table>

- **Stage B**
  - CrCl ≥ 30 K⁺ < 5.0
  - Adequate BP on ACEI or ARB
  - HR ≥ min max beta-blocker
  - CrCl=creatinine clearance in mL/min, K⁺=serum potassium in mEq/L, HR=heart rate in bpm

- **Stage C**
  - NYHA Class ≥ II
  - Intolerance to ACEI or ARB
  - Intolerance to ACEI or ARB
  - +/− MRA
  - Δ ACEI/ARB to ARNI
  - + Ivabradine
  - Δ ACEI/ARB to ISDN/Hyd
  - Black ancestry
  - + ISDN/Hyd

Which of the following changes do you advise to reduce JL’s risk of adverse clinical outcomes?

a. Add isosorbide dinitrate/hydralazine
b. Add spironolactone
c. Change lisinopril to sacubitril/valsartan
d. Increase metoprolol dose

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### HFrEF GDMT Algorithm

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<tr>
<td><strong>NYHA Class I</strong></td>
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</tr>
<tr>
<td>CrCl ≥ 30 K⁺ &lt; 5.0</td>
<td>CrCl=creatinine clearance in mL/min, K⁺=serum potassium in mEq/L, HR=heart rate in bpm</td>
</tr>
<tr>
<td>ACEI or ARB + Beta-blocker</td>
<td>+ Diuretics as needed</td>
</tr>
<tr>
<td>Adequate BP on ACEI or ARB</td>
<td>CrCl ≥ 30 K⁺ &lt; 5.0</td>
</tr>
<tr>
<td>HR ≥ 70 on max beta-blocker</td>
<td>Intolerance to ACEI or ARB</td>
</tr>
<tr>
<td>Black ancestry</td>
<td>Intolerance to ACEI or ARB</td>
</tr>
<tr>
<td>Δ ACEI/ARB to ARNI</td>
<td>+ Ivabradine</td>
</tr>
<tr>
<td>+ MRA</td>
<td>+ Δ ACEI/ARB to ISDN/Hyd</td>
</tr>
<tr>
<td>NYHA Class ≥ II</td>
<td>+ ISDN/Hyd</td>
</tr>
<tr>
<td>NYHA Class ≥ III</td>
<td></td>
</tr>
</tbody>
</table>


### GDMT for HF at Discharge

Are patients on near-optimal regimens?

- **p<0.0001** across groups each HF medication

<table>
<thead>
<tr>
<th>EF=ejection fraction</th>
<th>Overall</th>
<th>EF ≥50%</th>
<th>EF 40-49%</th>
<th>EF &lt;40%</th>
<th>EF &lt;40% (Bress)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACEI/ARB</td>
<td>49.4%</td>
<td>62.0%</td>
<td>50.6%</td>
<td>55.2%</td>
<td>52.0%</td>
</tr>
<tr>
<td>Beta-blocker</td>
<td>25.1%</td>
<td>34.0%</td>
<td>23.3%</td>
<td>26.3%</td>
<td>23.0%</td>
</tr>
<tr>
<td>MRA</td>
<td>28.5%</td>
<td>29.4%</td>
<td>24.8%</td>
<td>23.8%</td>
<td>23.0%</td>
</tr>
<tr>
<td>ACEI/ARB + BB</td>
<td>20.0%</td>
<td>22.0%</td>
<td>18.0%</td>
<td>20.0%</td>
<td>18.0%</td>
</tr>
<tr>
<td>ACEI/ARB + BB + MRA</td>
<td>10.0%</td>
<td>12.0%</td>
<td>8.0%</td>
<td>8.0%</td>
<td>7.0%</td>
</tr>
</tbody>
</table>

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**HFrEF GDMT Algorithm**

Stage B

- **ACEI or ARB + Beta-blocker**

Stage C

- + Diuretics as needed

CrCl ≥ 30
K+ < 5.0

- + MRA

- **Δ ACEI/ARB to ARNI**

NYHA Class ≥ II

- Adequate BP on ACEI or ARB

- HR ≥ 70 on max beta-blocker

- Intolerance to ACEI or ARB

NYHA Class ≥ III

- Black ancestry

NYHA Class ≥ IV

- Δ ACEI/ARB to ISDN/Hyd

- + ISDN/Hyd

CrCl=creatinine clearance in mL/min, K+=serum potassium in mEq/L, HR=heart rate in bpm


**PARADIGM HF & SHIFT Studies**

Baseline Use of GDMT

<table>
<thead>
<tr>
<th>GDMT</th>
<th>PARADIGM HF (%)</th>
<th>SHIFT (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACE inhibitor or ARB</td>
<td>100</td>
<td>93</td>
</tr>
<tr>
<td>Beta-blocker</td>
<td>93</td>
<td>89</td>
</tr>
<tr>
<td><strong>MRA</strong></td>
<td><strong>56</strong></td>
<td><strong>60</strong></td>
</tr>
<tr>
<td>Diuretic</td>
<td>80</td>
<td>83</td>
</tr>
<tr>
<td>Digitalis</td>
<td>30</td>
<td>22</td>
</tr>
</tbody>
</table>

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HFrEF GDMT Algorithm

Stage B

- ACEI or ARB + Beta-blocker
- + Diuretics as needed

Stage C

- NYHA Class ≥ II
- ?
- CrCl ≥ 30
- K⁺ < 5.0
- Adequate BP on ACEI or ARB
- Δ ACEI/ARB to ARNI
- NYHA Class ≥ III
- ?
- Intolerance to ACEI or ARB
- Δ ACEI/ARB to ISDN/Hyd
- NYHA Class ≥ IV
- ?
- Black ancestry
- + MRA
- + Ivabradine

CrCl=creatinine clearance in mL/min, K⁺=serum potassium in mEq/L, HR=heart rate in bpm


JL: 73 year-old Hispanic Male

- Past medical history
  - HFrEF (4th hospitalization in 1 year)
  - Atrial fibrillation
  - Diabetes
  - Aortic valve replacement (mechanical)
  - Chronic kidney disease
- Medications
  - Lisinopril 20 mg daily
  - Metoprolol succinate 25 mg daily
  - Furosemide 40 mg twice a day
  - Warfarin 5 mg daily
  - Glipizide 10 mg daily
  - Amiodarone 200 mg daily
- Vital signs
  - Blood pressure 116/78 mm Hg
  - Heart rate 58 bpm
- Echocardiogram
  - LVEF < 20% (1 month ago)
- Labs
  - Sodium 134 mEq/L
  - Potassium 4.3 mEq/L
  - Creatinine 1.3 mg/dL
  - eGFR ~50 mL/min/1.73m²
- Insurance: Medicare HMO/PPO
- Spanish-speaking, poor historian, history of medication nonadherence, polypharmacy

No change
JL: The Transition to Home

- Past medical history
  - HFrEF (4th hospitalization in 1 year)
  - Atrial fibrillation
  - Diabetes
  - Aortic valve replacement (mechanical)
  - Chronic kidney disease
- Discharge medication reconciliation (per home medication list)
  - Lisinopril 20 mg daily
  - Metoprolol succinate 25 mg daily
  - Furosemide 80 mg twice a day
  - Warfarin 5 mg daily
  - Glipizide 10 mg daily
  - Torsemide 10 mg daily
  - Amiodarone 200 mg daily
- Vital signs
  - Blood pressure 110/74 mm Hg
  - Heart rate 60 bpm
- Echocardiogram
  - LVEF < 20% (1 month ago)
- Labs
  - Sodium 134 mEq/L
  - Potassium 4.3 mEq/L
  - Creatinine 1.3 mg/dL
  - eGFR ~50 mL/min/1.73m²
- Insurance: Medicare HMO/PPO
- Spanish-speaking, poor historian, history of medication nonadherence, polypharmacy

Case Discussion: Transition to Home

- What are this patient’s risk factors for HF readmission?
- Are there objective signs for difficulty with medication management?
- How would you assess potential barriers to medication adherence?
- What are some potential pharmacist interventions that might decrease his risk for readmissions?
What barrier(s) to effective transition of care to home are present?

a. History of multiple readmissions
b. Spanish-speaking
c. History of medication nonadherence
d. Polypharmacy, duplicate medications/providers
e. All of the above

Recommendations for Transitional Care Programs in HF

- Routinely assess patients for high-risk characteristics that may be associated with poor outcomes
  - Cognitive impairment, poor health literacy, non-English speaking, long travel time to medical appointments
- Ensure qualified and HF-trained providers deliver the intervention
- Allot adequate time to deliver complex interventions and assess patient/caregiver response in inpatient and outpatient settings
- Implement hand-off procedures in hospital and at post-discharge visits

JL: The Transition to Home

- Past medical history
  - HFrEF (4th hospitalization in 1 year)
  - Atrial fibrillation
  - Diabetes
  - Aortic valve replacement (mechanical)
  - Chronic kidney disease

- Medication reconciliation (per home medication list)
  - Lisinopril 20 mg daily
  - Metoprolol succinate 25 mg daily
  - Furosemide 80 mg BID
  - Warfarin 5 mg daily
  - Glipizide 10 mg daily
  - Torsemide 10 mg daily
  - Amiodarone 200 mg daily

- Vital signs
  - Blood pressure 110/74 mm Hg
  - Heart rate 60 bpm

- Echocardiogram
  - LVEF < 20% (1 month ago)

- Discharge Labs
  - Sodium 138 mEq/L
  - Potassium 4.6 mEq/L
  - Creatinine 1.3 mg/dL
  - eGFR ~50 mL/min/1.73m²

- Insurance: Medicare HMO/PPO
- Spanish-speaking, poor historian, history of medication nonadherence, polypharmacy

What pharmacist intervention(s) may improve JL’s transition from hospital to home?

a. Provide comprehensive discharge education and medication reconciliation with patient and caregiver
b. Perform discharge medication reconciliation
c. Refer to multidisciplinary heart failure clinic
d. Contact his primary care provider
e. Contact his outpatient pharmacy(ies)
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Comprehensive Discharge Education

<table>
<thead>
<tr>
<th>Barriers To Adherence and Self Care</th>
<th>Possible Resolutions/Considerations</th>
</tr>
</thead>
</table>
| Non-English speaking               | • Involve family member or interpreter  
                                       • Patient education leaflets available in Spanish? |
| Polypharmacy                       | • Resolve discrepancies, simplify regimen  
                                       • How does he manage medications? Does he have family who can assist/take over this task?  
                                       • Bring medication bottles/pill box to follow-up appointment |
| Follow-up appointments             | • Multidisciplinary is ideal – “one stop shop”  
                                       • Quick follow-up (frequent admissions)  
                                       • Transportation? |
| Self-management skills             | • Who and when to call for symptoms post-discharge  
                                       • Does he have a scale? Can we get him one at discharge?  
                                       • Does he need home care? |

Maximizing Impact

- **Discharge education**  
  - Focus on “high-risk” or “high-utilizer” population  
  - Barrier identification  
  - Medication reconciliation

- **Post-discharge follow-up**  
  - Multidisciplinary is ideal (may not be available)  
  - Prompt follow-up  
    - Focus on causes of admission  
    - suggestions for resolution  
    - Skills needed for self-management  
    - GDMT titration

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JL: The Transition Home

- Discharge medication list:
  - Lisinopril 20 mg daily
  - Metoprolol succinate 25 mg daily
  - Furosemide 80 mg twice a day
  - Spironolactone 12.5 mg daily
  - Warfarin 5 mg daily
  - Glipizide 10 mg daily
  - Amiodarone 200 mg daily

- Discharge labs:
  - Sodium 139 mEq/L
  - Potassium 4.4 mEq/L
  - Creatinine 1.1 mg/dL
  - eGFR ~60 mL/min/1.73 m²

- Discharge weight (hospital scale): 184 lbs

- 48 hour phone call (to caregiver)
  - Did not fill discharge prescription for furosemide or spironolactone because did not get to pharmacy yet, taking pre-admission furosemide dose
  - Takes all medications from bottles once a day
  - Current weight 189 lbs (home scale)
  - A little more dyspneic than discharge
  - Has follow-up with primary care scheduled for 3 weeks from today
  - Eating Meals on Wheels at lunch and snacks rest of the day
  - Would like help in home with meal preparation

What Barriers Can Be Addressed in a Post-Discharge Phone Call

- Does patient have any concerning symptoms since discharge?
  - Does patient know warning signs/symptoms?
- Does patient have medications? (be specific)
- How is patient taking their medications? (be open-ended)
- Do they have a follow-up appointment, can they get there?
- Do they have a number to call if they are having worsening symptoms or have questions?
- What processes should you follow if you identify concerning symptoms during call?
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What short-term solutions may decrease readmission risk for JL?

a. Instruct patient/caregiver to increase furosemide to prescribed discharge dose
b. Request provider consult home care
c. Schedule outpatient visit with clinical pharmacist for medication regimen assessment/education
d. Evaluation by HF provider within 7 days
e. All of the above

Pharmacist Roles in Transitional Care

- Inpatient pharmacist
  - Discharge education ✓
  - CMR
    - Admission ✓
    - Discharge (with education)

- Outpatient pharmacist
  ✓ Multidisciplinary clinic
  - Transitional care
  - Longitudinal outpatient care
  - Identification/resolution of medication system barriers
  ✓ CMR
  ✓ GDMT titration/monitoring


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Key Takeaways

- While most GDMTs for HFrEF are associated with improved survival, all except for diuretics are associated with lower heart failure hospitalization rates.
- For patients hospitalized for HFrEF, optimization of GDMT before discharge occurs infrequently, representing an opportunity for pharmacists to improve care & outcomes.
- Education should be tailored to patients needs and barriers.
- Education needs to be longitudinal across the inpatient and outpatient settings.

Selected Resources

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Selected Resources

- Standardized discharge processes
- Project BOOST
  www.hospitalmedicine.org/Web/Quality_Innovation/SHM_Signature_Programs/Mentored_Implementation/Web/Quality_Innovation/Mentored_Implementation/Project_BOOST/Project_BOOST.aspx
- Project RED
  www.bu.edu/fammed/projectred/
- The Care Transitions Program
  www.caretransitions.org/
- Guided Care Model
  www.johnshopkinssolutions.com/solution/guided-care-2/

Consider these practice changes. Which will you make?

- Read the updates to heart failure treatment guidelines.
- Compare my organization’s protocols with the updates to heart failure treatment guidelines.
- Evaluate my organization’s utilization & escalation of GDMT for HFrEF prior to discharge.
- Assess my organization’s process for medication reconciliation prior to discharge.
- Provide education targeted for patients at high risk for readmission.
- Determine the feasibility of post-discharge pharmacist involvement (e.g., post-discharge telephone contact, multidisciplinary clinic).
Thank you for participating!

ASHP CE Processing
- Deadline: **January 31**
- [x] elearning.ashp.org
- [x] Code: _____________
- [x] Complete evaluation
- [x] Additional instructions in handout

- Coming March 2018
  - This activity is available online
  - Making both part 1 and part 2 available on-demand for colleagues unable to participate in the live activities

Download the handout at [www.ashpadvantage.com/go/chfcare/midyear](http://www.ashpadvantage.com/go/chfcare/midyear)
Case Discussion: Optimizing Therapy

JL is a 73 year-old Spanish-speaking male with heart failure 1 year ago hospitalized for acute decompensated heart failure. Including his index hospitalization 1 year ago, this is his 4th heart failure hospitalization in the last year. The patient is a poor historian, has a history of medication nonadherence but reports taking his medications since his last discharge 1 month ago. He missed his last outpatient follow up in the heart failure clinic but reports seeing his primary care provider who is unaffiliated with your institution. The medication history summarizes medications prescribed at his last discharge as well as medications written by his PCP & filled at the pharmacy. He has been diuresed with IV furosemide for the last 3 days and is ready for discharge.

**Past medical history:**
- HFrEF
- Atrial fibrillation
- Aortic valve replacement (mechanical)
- Diabetes
- Chronic kidney disease

**Medications:**
- Lisinopril 20 mg daily
- Metoprolol succinate 25 mg daily
- Furosemide 40 mg twice daily
- Warfarin 5 mg daily
- Glipizide 10 mg daily
- Amiodarone 200 mg daily

**Height:** 65 inches  
**Weight:** 91 kg

**Vital signs:**
- Blood pressure 116/78 mmHg
- Heart rate 58 bpm
- Respiratory rate 22 bpm
- Oxygen saturation 99% on RA

**Laboratories:**
- Sodium 134 mEq/L
- Potassium 4.3 mEq/L
- Creatinine 1.3 mg/dL
- eGFR: ~50 mL/min/1.73m²

**Transthoracic echocardiogram** (1 month prior): left ventricular ejection fraction < 20%

**Insurance:** Medicare HMO/PPO

**Questions to consider:**

1. Is this patient on optimal guideline-directed medical therapy for heart failure with reduced ejection fraction?

2. What, if any, changes would you recommend to address his symptoms?

3. What, if any, changes would you recommend to reduce the risk of adverse clinical outcomes?
Case Discussion: Transition to Home

JL has been discharged home. During outpatient transition of care follow-up, his discharge medication reconciliation per his home medication list is provided below. His discharge laboratories are provided below.

**Past medical history:**
- HFrEF
- Atrial fibrillation
- Aortic valve replacement (mechanical)
- Diabetes
- Chronic kidney disease

**Medications:**
- Lisinopril 20 mg daily
- Metoprolol succinate 25 mg daily
- Furosemide 80 mg twice daily
- Warfarin 5 mg daily
- Glipizide 10 mg daily
- Amiodarone 200 mg daily
- Torsemide 10 mg daily

**Height:** 65 inches

**Weight:** 85 kg

**Vital signs:**
- Blood pressure 110/74 mmHg
- Heart rate 60 bpm
- Respiratory rate 22 bpm
- Oxygen saturation 99% on RA

**Laboratories:**
- Sodium 138 mEq/L
- Potassium 4.6 mEq/L
- Creatinine 1.3 mg/dL
- eGFR:~50 mL/min/1.73m²

**Transthoracic echocardiogram** (1 month prior): left ventricular ejection fraction < 20%

**Insurance:** Medicare HMO/PPO

**Questions to consider:**

1. What are this patient’s risk factors for HF readmission?

2. Are there objective signs for difficulty with medication management?

3. How would you assess potential barriers to medication nonadherence?

4. What are some potential pharmacist interventions that might decrease his risk for readmissions?
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2. Click on Process CE for the Midyear Clinical Meeting and Exhibition.

3. Enter the Attendance Codes that were announced during the sessions and click Submit.

4. Click Claim for any session.

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2. Enter the Enrollment Code announced during the webinar in the Enrollment Code box and click Redeem. The title of this activity will appear in a pop-up box on your screen. Click on Go or the activity title.

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**Part 1:** Learn from the Experts—Improving the Management of Chronic Heart Failure during Transitions of Care

Now available online on-demand. (1.0 hour CE for those who did not participate in the live activity)

**Part 2:** Engage with Peers—Better Management of Chronic Heart Failure through Better Transitions of Care: A Clinical Case Studies Workshop

To be released in March 2018 (1.5 hours CPE for those who did not participate in the live activity)

www.ashpadvantage.com/go/chfcare

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