Factors Affecting Heart Failure Readmission Rates in VA Patients

Grazina Silanskas, PharmD; Claresta L. Bergman, PharmD, BCPS; and Blair J. Kaplan, PharmD, BCPS

This study suggests that modifying the existing discharge template to include additional provider prompts may help improve heart failure outcomes.

Heart failure (HF) continues to grow as a significant health problem in the U.S., accounting for 1.1 million hospitalizations annually.[1] About 5.8 million Americans have HF, and 670,000 new cases are diagnosed each year.[1] The prevalence of HF increases with age. Persons aged > 65 years comprise the largest group of patients hospitalized for the condition. Heart failure-related hospitalizations place a major financial burden on patients, caregivers, and the national health care system. In 2010, the estimated cost of health care for HF was $35 billion with hospitalizations accounting for 1% to 2% of the total annual health care costs.[1-3] Furthermore, > 50% of patients with HF are rehospitalized before their first outpatient follow-up.[4]

To ensure patients are ready for discharge, HF guidelines recommend specific interventions for all hospitalized patients. These recommendations include successful transition from IV to oral diuretic therapy as well as the initiation of a b-blocker and an angiotensin-converting enzyme inhibitor (ACE-I) or an angiotensin receptor blocker (ARB) in stable patients with a left ventricular ejection fraction (LVEF) < 40% and without contraindications. Additionally, patients and their caregivers should receive comprehensive discharge instructions regarding medications, the importance of adherence and regular follow-up, sodium and fluid restriction, weight monitoring, physical activity, and a plan for worsening symptoms. When available, assistance with the hospital-to-home transition should also be provided.[5,6]

Dr. Silanskas is an outpatient clinical pharmacist and **Dr. Bergman** is a clinical pharmacy specialist, both at the Jesse Brown VAMC, Pharmacy Service in Chicago, Illinois. **Dr. Kaplan** was an inpatient clinical pharmacy specialist at the Jesse Brown VAMC at the time of the study. She currently holds a senior specialist global medical review position at AbbVie in North Chicago.

HEART FAILURE MEASURES

Recognizing common factors essential to HF care, the Joint Commission has implemented HF core measures that all U.S. hospitals are required to meet to maintain accreditation status. These guideline-supported measures include receipt of diet, weight, and medication instructions; measured or scheduled assessment of LVEF; ACE-I or an ARB prescribed in patients with LVEF < 40%; and smoking cessation counseling before discharge for all patients with HF.

In addition to HF core measures, 30-day HF readmission rates have also become available to the general public as another hospital quality indicator. In 2009, the Centers for Medicare & Medicaid Services began publicly reporting 30-day HF readmission rates for Medicare patients. A CMS report indicated a 24.8% national 30-day HF readmission rate from July 1, 2007, through June 30, 2010.[7] Unfortunately, even with the increased quality improvement effort, national HF rehospitalization rates have remained relatively steady in recent years.[3]

The VA health care system has a growing number of veterans with HF, and it is the leading discharge diagnosis in patients treated at VA hospitals. The number of HF-related hospitalizations at the VA health care system increased from just over 74,000 in fiscal year 2002 to 96,000 in 2009.[8]

To advance the care of veterans with HF and implement best practices, the VA launched the Chronic HF-Quality Enhancement Research Initiative (CHF-QUERI). The major goals of this initiative are to reduce hospitalization rates, increase use of life-prolonging care, empower patients and their caregivers in self-management, and improve appropriateness of HF therapies and tests. As part of its efforts, CHF-QUERI launched the HF Provider Network (HF Network), involving more than 712 VA health care providers (as of July 2014 there were more than 900 providers) committed to im-

proving HF management throughout the entire VA health care system. The HF Network has already put into practice several quality improvement initiatives.

The National Hospital to Home initiative led by the American College of Cardiology and the Institute for Healthcare Improvement was launched throughout the VA system in January 2010.[9] The main goal of this initiative is to reduce all-cause hospital readmission rates in patients with a discharge diagnosis of HF by improving medication management, early follow-up after discharge, and symptom management.

The Jesse Brown VAMC (JBVAMC) is an active participant of the Hospital to Home initiative, embracing the goals of reducing HF readmission rates and improving the transition of veterans from inpatient to outpatient care. The JBVAMC also has been successfully meeting or exceeding HF core measures except for providing discharge instructions. In May 2011, 91% of patients received discharge instructions, falling just slightly below the 93% target goal. Despite the implementation of HF care improvement initiatives and successful core measure performance, from July 1, 2007, to June 30, 2010, the average HF 30-day readmission rate at JBVAMC was reported to be 28.4%, compared with the national average of 24.8%. Additionally, the average readmission rate for fiscal year 2011 was 31% at JBVAMC, showing a further increase in readmission rates.

The cost of a hospital bed at JBVAMC ranges from about $2,000 to $5,000 per day. According to the American Heart Association's Get With the Guidelines-HF registry, the mean hospital length of stay for HF in 2009 was 5.5 days.[1] Consequently, HF hospitalizations could potentially cost JBVAMC nearly $7 million annually. Therefore, HF readmissions not only affect patients and caregivers, but also represent a financial burden for JBVAMC.

Table 1. Baseline Characteristics

Demographics	
Age (mean ± SD)	69.6 ± 10.9
Male (%)	99% (n = 108)
Ethnicity (%):	
African American	78% (n = 85)
White	20% (n = 22)
Other	2% (n = 2)
HF History	
Prior diagnosis of HF	87% (n= 95)
History of systolic HF	58% (n = 63)
Hospitalized for HF 30 days prior to the index HF hospitalization	6% (n = 6)
Medications on admission	
ACE-I/ARB (if LVEF < 40%)	83% (n = 63)
ß-blocker (if LVEF < 40%)[a]	76% (n = 63)
Diuretic:	
None	28% (n = 31)
Furosemide	65% (n = 71)
Bumetanide	4% (n = 4)
Hydrochlorothiazide	3% (n = 3)
Hydralazine and isosorbide dinitrate (ISDN)	3% (n = 3)
Aldosterone antagonist	12% (n = 13)
Digoxin	17% (n = 18)
NSAIDs	5% (n = 5)

[a] 65% (n = 41) on HF-recommended ß-blocker.
ACE-I = angiotensin-converting enzyme inhibitor; ARB = angiotensin receptor blocker; HF = heart failure; LVEF = left ventricular ejection fraction.

METHODS

The purpose of this study was to identify factors contributing to the high HF readmission rates in veterans enrolled at JBVAMC. This study was an Institutional Review Board and VA Research and Development Committee-approved retrospective, electronic chart review of patients with an ICD-9 principal discharge diagnosis code for HF and hospitalization for HF exacerbation anytime between October 1, 2010, and March 1, 2011. A patient chart was reviewed for 6 months after inclusion. A report was generated to identify patients discharged from JBVAMC with a principal discharge diagnosis of HF between October 1, 2010, and March 1, 2011, using the following ICD-9 HF codes: 402.01, 402.11, 402.91, 404.01, 404.03, 404.11, 404.13, 404.91, 404.93, 428.0, 428.1, 428.20,

Table 2. Baseline Characteristics by Group

Demographics	Readmit within 30 days	Readmit after 30 days or not at all	Readmit within 90 days	Readmit after 90 days or not at all	≥ 2 readmissions in 6 months	< 2 readmissions in 6 months
Age (mean ± SD)	67 ± 10	70 ± 11	64 ± 10	71 ± 11	65.3 ± 12.7	69.9 ± 10.8
Male (%)	100%	99%	100%	99%	100%	99%
Ethnicity (%):						
African American	100%	77%	95%	74%	100%	77%
White	0%	21%	5%	24%	0%	21%
Other	0%	2%	0%	2%	0%	2%
HF History	**Readmit within 30 days**	**Readmit after 30 days or not at all**	**Readmit within 90 days**	**Readmit after 90 days or not at all**	**≥ 2 readmissions in 6 months**	**< 2 readmissions in 6 months**
Prior diagnosis of HF	83%	87%	95%	85%	100%	86%
History of systolic HF	67%	57%	67%	56%	100%	55%
Hospitalized for HF 30 days prior to the index HF hospitalization	17%	5%	10%	5%	33%	4%

HF = heart failure.

428.21, 428.22, 428.23, 428.30, 428.31, 428.32, 428.33, 428.40, 428.41, 428.42, 428.43, and 428.9.

Patients were included if aged ≥ 18 years with one of the ICD-9 HF codes as the principal discharge diagnosis within the study period. Patients were excluded from the study if transferred to or from an outside hospital, discharged without an ICD-9 principal diagnosis code for HF, electively admitted for HF, not treated for HF during hospitalization, left the hospital against medical advice, had chart documentation with comfort measures only, were discharged/transferred to hospice, had active HF medications listed under non-VA medications in the electronic medication profile, or did not receive follow-up at JBVAMC. Study participants were included in the study once, which was classified as their index HF hospitalization, and were followed for 6 months thereafter.

The primary endpoint was the difference in patient characteristics between 2 groups of patients: those readmitted for HF within 30 days of the index hospitalization and those readmitted after 30 days or not at all.

The study had multiple secondary endpoints. One was the difference in patient characteristics between 2 groups of patients: those readmitted for HF within 90 days of the index hospitalization and those readmitted after 90 days or not at all. Another secondary endpoint was the difference in patient characteristics between 2 groups of patients: those with ≥ 2 readmissions for HF within 6 months and those with < 2 HF readmissions within 6 months. Additional secondary endpoints included percentage of patients readmitted for HF within 30 days of the index HF hospitalization, time to readmission if applicable, time to death if applicable, and average number of readmissions per patient within 6 months.

Index data collected included age, gender, ethnicity, prior diagnosis of HF, date of diagnosis, hospitalization for HF within 30 days of the index HF admission, in-hospital cardiac arrest, comorbid conditions, systolic blood pressure (BP), heart rate, respiratory rate, weight, serum sodium, blood urea nitrogen, serum creatinine, hematocrit, and glucose. For this study, comorbid conditions gathered were diabetes mellitus, coronary artery disease, prior percutaneous coronary intervention, aortic stenosis, stroke, chronic obstructive pulmonary disease, and dementia.

Medication profiles were reviewed at the time of admission to

Table 3. Postdischarge Characteristics by Group

	Readmit within 30 days	Readmit after 30 days or not at all	Readmit within 90 days	Readmit after 90 days or not at all	≥ 2 readmissions in 6 months	< 2 readmissions in 6 months
Follow-up scheduled with:						
PCP	17%	58%	33%	61%	33%	57%
Cardiology	33%	19%	24%	19%	33%	19%
CHF clinic	0%	17%	24%	14%	0%	17%
Urgent care	33%	6%	14%	6%	17%	7%
Not scheduled	17%	2%	10%	2%	17%	3%
Medication compliance (%)	33%	80%	43%	85%	33%	80%
Missed follow-up (%)	50%	6%	14%	7%	17%	3%
Days to first outpatient follow-up (mean; median)	12; 11	22; 13	20; 12	22; 15	18; 12	21; 14
Enrolled in:						
CHF clinic	17%	25%	29%	24%	0%	26%
CHF PharmD clinic	0%	5%	0%	6%	0%	5%
CCHT program	33%	28%	38%	26%	50%	27%
Dietitian consultation	0%	0%	0%	0%	0%	0%

CCHT = Care Coordination Home Telehealth; CHF = chronic heart failure; PCP = primary care provider.

determine whether the patient was prescribed an ACE-I/ARB, b-blocker, diuretic, hydralazine and isosorbide dinitrate, aldosterone antagonist, digoxin, NSAIDs, nonvasoselective calcium channel blocker, and an antiarrhytmic other than amiodarone and dofetilide. Hospitalization data included the most recent LVEF, the number of days on oral diuretic therapy after stopping IV diuretics, the number of days admitted, and documentation of an in-person inpatient dietitian consultation.

Data collected at discharge included diet/weight/medication instructions, weight, BP, American College of Cardiology/American Heart Association HF stage and New York Heart Association (NYHA) HF functional class, if documented. Discharge medication profiles were assessed for the number of medications (< 9 or ≥ 9), documentation of active prescriptions for an ACE-I/ARB and a β-blocker (or contraindication documented), diuretic, hydralazine and isosorbide dinitrate, aldosterone antagonist, and digoxin. Other data collected were documentation of a scheduled follow-up appointment with primary care physician, urgent care, chronic HF (CHF) clinic, or cardiologist, and whether the patient was discharged to home, skilled nursing facility, shelter, or homeless. Additionally, if the patient was discharged on a diuretic, the dose was compared with the baseline diuretic. If the diuretic at discharge was different from the home diuretic, equivalent doses were used for comparison with that of the baseline diuretic.

Postdischarge data collection included telephone follow-up within 48 hours of discharge, medication compliance since the initial hospitalization, date of first outpatient follow-up after initial hospital discharge, enrollment in CHF clinic/CHF-PharmD/Care Coordination Home Telehealth (CCHT) program, outpatient dietitian consultations, and date of death if applicable. Medication adherence was defined as ≥ 80% of lowest percentage filled medication of all HF medications, determined by the refill history in the computerized patient record system (CPRS). First outpatient follow-up was defined as a visit in which HF was addressed in the assessment and plan.

Table 4. Readmission Data

	Readmit within 30 days	Readmit within 90 days	≥ 2 readmissions in 6 months
Target dose ACE-I/ARB (if LVEF < 40%)	25%	50%	67%
Target dose ß-blocker (if LVEF < 40%)	0%	14%	17%
Patients with digoxin level measured (if applicable)[a]	0% = 0 of 1	80% = 4 of 5	50% = 1 of 2

[a] No serum digoxin level > 0.9 ng/mL.
ACE-I = angiotensin-converting enzyme inhibitor; ARB= angiotensin receptor blocker; LVEF = left ventricular ejection fraction.

If readmitted within the study period, data collection included the date of first nonelective hospital readmission for HF, BP, heart rate, weight, serum digoxin level, serum creatinine, serum potassium, and whether the patient was on a target dose of HF recommended medications (if LVEF < 40% and no contraindication). Heart failure recommended medications for which target doses are established include ACE-I/ARB and b-blockers. For this study, target doses of ACE-Is were captopril 50 mg 3 times daily, enalapril 10 mg twice daily, fosinopril 40 mg daily, lisinopril 20 mg daily, ramipril 10 mg daily, and trandolapril 4 mg daily. Target doses for ARBs were candesartan 32 mg daily, losartan 50 mg daily, and valsartan 160 mg twice daily. β-blocker target doses were bisoprolol 10 mg daily, carvedilol 25 mg twice daily (50 mg twice daily if patients' weight was > 85 kg), and metoprolol succinate 200 mg daily.[5,6] A statistical analysis was not performed on the data.

RESULTS

A total of 137 patient charts were reviewed, and 109 patients were included in the study. Patients were excluded if they transferred to or from an outside hospital (n = 8), had no follow-up at JBVAMC (n = 8), left the hospital against medical advice (n = 4), were electively admitted (n = 4), were not treated for HF (n = 3), or only had comfort measures documented in the chart (n = 1). The patients included were predominantly male (99%) and African American (78%) and had a mean age of 70 years. The majority of the patients had a prior diagnosis of HF (87%) and a history of systolic HF (58%). Most patients were previously prescribed an ACE-I/ARB (83%) and a b-blocker (76%) at the time of admission (Table 1).

Six patients were readmitted within 30 days of the index hospitalization,whereas 103 patients were readmitted after 30 days or not at all. With respect to secondary endpoints, there were 21 patients readmitted within 90 days of the index hospitalization, whereas 88 patients were readmitted after 90 days or not at all. Additionally, 6 patients were readmitted ≥ 2 times within 6 months of the index hospitalization, whereas 103 patients were readmitted < 2 times within 6 months.

Baseline characteristics seemed similar across the study groups, except a greater percentage of patients readmitted within 30 days of the index HF hospitalization had a prior history of systolic HF and were hospitalized for HF 30 days prior to the index hospitalization (Table 2). In addition, patients readmitted within 30 days tended to receive a shorter duration of oral diuretic therapy after discontinuation of IV diuretics (mean 0.2 days vs 1.1 days). Patients in this group with an LVEF < 40% were less likely to be discharged on an ACE-I/ARB (75% vs 95%) and a b-blocker (50% vs 85%) than were the patients who were readmitted after 30 days or not at all. These trends continued for patients readmitted within 90 days of the index hospitalization and for those readmitted after 90 days or not at all. The mean length of stay for the index HF hospitalization was about 5 days and was comparable among all study groups.

From the evaluation of postdischarge characteristics, no patients readmitted within 30 days had a follow-up appointment scheduled with the CHF clinic. In comparison with patients readmitted after 30 days or not at all, more patients had follow-up at an urgent care clinic (33% vs 6%) or no follow-up appointment scheduled at the time of discharge (17% vs 2%). Half of all the patients with a scheduled follow-up missed their appointment. Additionally, medication adherence was lower (33% vs 80%), and none of the patients were enrolled in the CHF-PharmD clinic (0% vs 5%). A similar trend continued for the secondary endpoint groups (Table 3). Last, none of the study patients had an outpatient dietitian consultation.

On readmission, the majority of patients readmitted within 30 days were not on a target dose of an

ACE-I/ARB (75%), and none were on a target dose of a b-blocker. The same trend continued for the secondary endpoint groups. None of the study patients had a serum digoxin level > 0.9 ng/mL. However, serum digoxin level was not measured in all readmitted patients prescribed digoxin (Table 4).

In regard to other secondary endpoints, 6 patients (5.5%) were readmitted for HF within 30 days of the index HF hospitalization. The average number of readmissions per patient in 6 months was < 1, mean time to readmission was 85 days (n = 33), and mean time to death was 88 days (n = 5) when applicable.

DISCUSSION

Based on the trends observed in this study, multiple recommendations can be made to further improve the quality of care and reduce HF readmissions at JBVAMC. The medical center physicians currently use a discharge note template, which already includes sections such as HF discharge instructions and follow-up appointments. The template also prompts providers to prescribe an ACE-I in appropriate patients.

When JBVAMC providers are ready to enter discharge notes into the CPRS, they first select the discharge note template from available note template options. The electronic template contains spaces for the provider to enter a patient's primary reason for hospitalization, date of admission, discharge medication list, specific or suggested dates for follow-up with outpatient provider(s), general diet/weight/medication instructions, a space to answer whether the patient has HF, a space to record NYHA HF class if applicable, and a space to record whether the patient is prescribed or will be prescribed an ACE-I if appropriate, or whether ACE-I is contraindicated. The providers are able to modify and add information to the discharge note template as they see appropriate.

The findings of this study suggest that modifying the existing discharge template to include additional provider prompts in a form of designated spaces asking for specific information may help improve HF care outcomes. If providers are prompted to answer whether an oral diuretic was continued for at least 24 hours after stopping IV diuretics for HF, adherence to the HF guideline-recommended duration of oral diuretic therapy may improve. Additionally, b-blocker prescribing in appropriate systolic HF patients may increase if providers are prompted. To enhance continuity of care, the discharge note template may be modified to include a section in which the providers can document patients followed by outside providers. This can be done by incorporating a space in the discharge template to enter the patient's non-VA provider information if applicable and may help further coordinate the care of such patients to ensure that they are not lost.

Furthermore, the discharge template may be modified to include a prompt to place a CHF clinic consult to increase provider awareness about the availability of CHF and CHF-PharmD clinics at JBVAMC. CHF and CHF-PharmD clinics collaborate to provide comprehensive care to HF patients. After an initial evaluation at the CHF clinic, patients are referred to the clinical pharmacist for further medication therapy management when necessary. Currently, the physicians are encouraged to refer HF patients to the CHF clinic after discharge, but not all providers know that such a service is available. The prompt within the discharge note template would provide CHF/CHF-PharmD clinic provider contact information, clinic times, and a link that would take the provider to an appropriate screen for placing the consult.

LIMITATIONS

There are several limitations to this study, including its retrospective design and small sample size. Another source of potential study limitation was the initial process for creating a study patient list. The study list was designed to use ICD-9 codes to capture readmissions only for HF and only at JBVAMC. This was achieved by specifying any of the HF ICD-9 codes as the principal discharge diagnosis. However, the providers may not have always used a HF specific ICD-9 code for the principal discharge diagnosis, even if a patient was admitted primarily for HF. The provider may have chosen another principal discharge diagnosis for which the patient received treatment during the hospitalization.

There are multiple ways to obtain HF patient lists, one includes using the diagnosis-related group codes instead of ICD-9 codes. Due to the way the patient list was obtained and an inherent possibility that some patients admitted for HF had a non-HF ICD-9 code recorded as their principal discharge diagnosis, some eligible patients may not have appeared on the generated list. Additionally, this study captured readmission rates for only HF whereas the national HF 30-day readmission rate represents all-cause readmissions for HF patients. This difference may be reflected in the low 30-day readmission rate observed.

Another possible limitation was the timing of the launch of the CHF-PharmD clinic and the initiative for telephone follow-up 48 hours post-discharge. The CHF-PharmD clinic was launched in April 2011, and the

initiative for telephone follow-up 48 hours postdischarge began in January 2011. As the start dates fell within the study period, these services may not have been available to all patients. Therefore, the data describing patient enrollment in CHF-PharmD clinic and those who received postdischarge telephone follow-up may not accurately reflect current practice. Last, statistical tests were not used in the study data analysis leaving any differences found open to interpretation. To minimize these limitations, larger prospective studies with statistical analysis capturing all-cause readmissions are necessary to further evaluate patient characteristics that may be contributing to HF readmissions at JBVAMC.

CONCLUSIONS

In general, earlier and more frequent readmissions were more common in patients who were converted to oral diuretic therapy for < 24 hours before discharge and were not discharged on an ACE-I/ARB and a b-blocker when appropriate. Additionally, most of the readmitted patients had no follow-up scheduled at discharge, were nonadherent with medications and follow-up appointments, and were not enrolled in the CHF and/or CHF-PharmD clinic. The majority of patients with systolic HF were not at target doses of either the ACE-I/ARB or the b-blocker when readmitted. Overall, JBVAMC had a low percentage of patients readmitted for HF within 30 days, but there is still room for improvement in reducing HF readmissions.

At the time of discharge, all JBVAMC patients receive printed instructions and recommendations for their care after hospitalization. The patient handout includes the most current medications, diet/weight/medication instructions, and actual or suggested dates for follow-up appointments and/or tests. It may enhance awareness regarding dietician services to patients if the current discharge instruction template can be modified to provide information regarding the outpatient dietitian class. This could include date, time, and location of classes as well as dietician contact information. (Appendixes 1 and 2 provide sample discharge note templates and can be found at http://www.fedprac.com.)

When these recommendations have been implemented, further studies will be warranted to assess the impact of the interventions. ●

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