# Impact of a Multidisciplinary Heart Failure Postdischarge Management Clinic on Medication Adherence

Lingyun Lu, PharmD, MSc[1]; Cynthia A. Jackevicius, BScPhm, PharmD, MSc[1,2,3,4,5]; Noelle K. de Leon, PharmD[6]; Alberta L. Warner, MD[1,7]; Donald S. Chang, MD, MPH[1,7]; and Freny Vaghaiwalla Mody, MD[1,7]

*[1]VA Greater Los Angeles Healthcare System, Los Angeles, California; [2]Western University of Health Sciences, Pomona, California; [3]Institute for Clinical Evaluative Sciences, Toronto, Ontario, Canada; [4]University of Toronto, Toronto, Ontario, Canada; [5]University Health Network, Toronto, Ontario, Canada; [6]University of California, San Francisco Medical Center and School of Pharmacy, San Francisco, California; and [7]University of California, Los Angeles, California*

## ABSTRACT

**Purpose:** Disease management programs have been associated with improved adherence to heart failure (HF) medications. However, there remain limited data on the benefit of a comprehensive multidisciplinary HF postdischarge management (PDM) clinic that promptly follows HF-related hospitalization on evidence-based HF medication adherence.

**Objective:** The aim of this study was to evaluate the effects of an HF-PDM clinic on adherence to evidence-based HF medication therapy.

**Methods:** In this retrospective cohort study, we identified patients discharged from the Veterans Affairs Greater Los Angeles Healthcare System between 2009 and 2012 with a primary diagnosis of HF. Data from patients who attended the HF-PDM clinic immediately following HF-related hospitalization between 2010 and 2012 were compared with those from historical controls, who did not attend the HF-PDM clinic, from 2009. The main outcome was adherence to evidence-based HF medications during the 90 days after discharge. *Adherence* was defined as the proportion of days covered at 90 days after discharge (PDC-90) of $\geq 0.80$. The percentages of patients adherent to each medication were compared between the 2 groups using the $\chi^2$ test. A logistic regression model adjusted for potential confounding variables was constructed to evaluate the percentages of patients adherent to evidence-based HF medications.

**Findings:** A total of 277 patients (144 clinic, 133 control) were included in the study. Both univariate and multivariate analyses showed that the clinic was associated with improved medication adherence to angiotensin-converting enzyme inhibitors, a twice-daily β-blocker, and aldosterone antagonists compared with controls. The most significant increases were in adherence to angiotensin-converting enzyme inhibitors, with mean PDC-90 values of 0.84 (control) versus 0.93 (clinic) ($P = 0.008$) and 90-day adherence rates of 69% (control) versus 87% (clinic) ($P = 0.005$).

**Implications:** Care in the multidisciplinary HF-PDM clinic was associated with significant increases in 90-day adherence to evidence-based HF medications in patients who were recently discharged after an HF-related hospitalization. (*Clin Ther.* 2017;39:1200–1209) 

**Key words:** disease management, heart failure, medication adherence.

## INTRODUCTION

Heart failure (HF) is a serious and costly cardiovascular disorder that affected >5 million people with an estimated cost of US $30.7 billion in the United States in 2012.[1] Moreover, an estimated >210,000 patients cared for in Veterans Health Administration facilities were identified as having an HF condition in fiscal year 2012.[2] The progression of HF can be prevented by appropriate and persistent medication therapy. Evidence-based medications, including angiotensin-converting enzyme inhibitors (ACEIs), angiotensin II

*Accepted for publication April 29, 2017.*
http://dx.doi.org/10.1016/j.clinthera.2017.04.012
0149-2918/$ - see front matter

receptor blockers (ARBs), β-blockers (BBs), and aldosterone antagonists (AAs), decrease morbidity and mortality in patients with HF and reduced ejection fraction.[3,4]

Although there have been significant advances in HF treatment in recent decades, the rates of hospitalization and mortality associated with the disease remain high.[1,2] Inadequate medication adherence partially explains the lack of improvement in these outcomes. Researchers have estimated that 40% to 60% of patients with HF are nonadherent with medications.[5] In ONTARGET (Ongoing Telmisartan Alone and in Combination with Ramipril Global Endpoint Trial),[6] nonpersistence with ACEIs and/or ARBs was associated with a nearly 4-fold increase in HR-related hospitalization. Analyses of data from the Get with the Guidelines–HF registry have shown that medication and/or dietary nonadherence is a common precipitant of HF-related hospital admission.[7]

Management of patients in specialized HF clinics has been associated with improved medication adherence, along with reduced hospital readmission.[8–11] Some of these clinics were managed simply by a single provider on a regular outpatient basis or by home monitoring. However, there remains a lack of knowledge of the benefit of a comprehensive multidisciplinary HF clinic on evidence-based HF medication adherence immediately following HR-related hospitalization discharge. To reduce HF-related readmission and to improve medication adherence in patients with HF, a multidisciplinary HF postdischarge management (PDM) clinic was established in July 2010 to focus on identifying the etiology and factors precipitating HF exacerbation, improving medication adherence, titrating evidence-based medication to target doses, and educating patients on lifestyle and diet immediately after hospital discharge. The objective of this study was to evaluate the effects of management in this HF-PDM clinic on adherence to evidence-based medication therapy for HF.

## PATIENTS AND METHODS

### Study Design

We conducted a retrospective, cohort study using data from the electronic health records of the Veterans Affairs Greater Los Angeles Healthcare System (VAGLAHS; Los Angeles, California).

### Program Description

The HF-PDM clinic was started in July 2010 at the VAGLAHS. Patients were enrolled into this multidisciplinary clinic by referral from discharge physicians or case managers and were seen 1 to 2 weeks after their HF-related hospitalization discharge. The duration of the clinic was ~10 to 12 weeks. Within a mean of 5 to 6 clinic visits, patients were seen by a physician assistant, a clinical pharmacist, and a nurse–case manager, with care overseen by an attending cardiologist (Table I). The initial consultation was conducted by the physician assistant and was focused on the determination of HF etiology and the factors precipitating the HF-related admission. During the subsequent visits, each patient's medication regimen was assessed by the clinical pharmacist. Therapeutic modifications were made to adjust doses of diuretics, titrate evidence-based medications to target doses in patients with reduced ejection fraction, and add additional therapy. At each clinic visit during the 12-week follow-up period, the physician assistant or clinical pharmacist presented each patient case, including assessment and plan, to the attending cardiologist. The final care plans were made by the physician assistant or the clinical pharmacist in agreement with the attending cardiologist. The nurse–case manager educated patients on lifestyle modification and dietary fluid and salt restrictions. The final assessment with the physician assistant and nurse–case manager ensured that patients received follow-up at the appropriate outpatient clinics and a referral for other diagnostic procedures, if suitable. At each visit, a provider reviewed medications with the patients and educated them on the importance of medication adherence in HF.

### Patient Population

Patients with a primary diagnosis of HF during the index hospitalization who were admitted and discharged from VAGLAHS between January 1, 2009, and December 31, 2009, were included as historical controls. We used electronic medical records for identifying patients with a principal discharge diagnosis of HF (ICD-9 code 428). Data from these patients were compared with those from the intervention group of patients who received care in the HF-PDM clinic between July 2010 and August 2012. Patients who were hospitalized with a primary diagnosis of HF between July 2010 and August 2012 and