

ORIGINAL ARTICLE

A structured home visit program by non-licensed healthcare personnel can make a difference in the management and readmission of heart failure patients

Craig Thomas

Advanced Heart Failure Center, University of Virginia Health System, United States

Correspondence: Craig Thomas, MSN, ACNP-BC. Address: 1221 Lee St, PO Box 800158 Charlottesville Virginia, 22908, USA. E-mail: SCT2Z@hscmail.mcc.virginia.edu

Received: October 10, 2013

Accepted: December 9, 2013

Online Published: December 16, 2013

DOI: 10.5430/jha.v3n3p1

URL: <http://dx.doi.org/10.5430/jha.v3n3p1>

Abstract

The purpose of this observational study is to evaluate the effectiveness of structured home visits by non-licensed healthcare personnel (NLHP) on the patient's adherence to a medication plan, dietary restrictions, and knowledge about when to seek care. This descriptive, qualitative study evaluates the Grand-Aide[®] program that aids in the management of heart failure patients across the continuum of care using NLHP. Patients are offered enrollment in the program starting the day following hospital discharge. Visit frequency is high immediately after discharge and lessens over time as the patient's health knowledge and condition improve. During the visits, NLHP record vital signs including weight, ask the patient protocol questions in a Yes/No format, record and report responses to the supervising Nurse Practitioner, reinforce discharge teaching, and review medications. Preliminary findings from this project provide information about issues found while providing home-visiting services to patients with heart failure. Early recognition of these issues allows for early treatment or correction, preventing further deterioration that could lead to readmission. Programs like this can be an integral part of the health care system that manages patient's care across the continuum, with intensive focus immediately after hospital discharge.

Key words

Disease management program, Grand-aides, Heart failure, Readmission reduction

1 Introduction

Heart failure (HF) disease management creates a significant burden to the healthcare economy and care delivery system as incidence approaches 10 per 1,000 capita over 65 years of age^[1]. According to the Heart Disease and Stroke Statistics 2012 update from the American Heart Association, hospital discharges for HF were unchanged in the last 10 years and account for more than one million discharges annually. Unplanned hospital readmissions account for 15%-20% of Medicare's spending for hospital care. This totals more than \$17 billion annually^[2]. In 2011 the Patient Protection and Affordable Care Act was enacted into law, thereby incentivizing hospitals to reduce all-cause readmissions following a HF

related hospitalization. With national averages of 25% for 30-day readmission and 50% for 6-month readmission, it is imperative that HF experts continue to develop improved strategies to deliver and manage HF care ^[3].

To date there have been a variety of methods used to reduce 30 day readmissions for patients with HF. Some of the strategies include tools to more accurately identify patients at high risk for readmission, tele-monitoring, telephone follow up and early post-discharge follow-up. There are several accepted tools currently used to aide in the identification of high risk readmission patients, including beta-naturetic peptide (BNP) measurements and the Seattle Heart Failure model (SHFM) risk score Though helpful in some ways, these tools are not 100% predictive of untoward outcomes once the patient is discharged from the hospital ^[4]. In 2011 Ky *et al.* found only moderate improvement in prognostic assessment of clinical risk using plasma ST2 levels ^[5]. However, later work by Ky *et al.* showed that the use of multiple biomarkers for risk prediction substantially improved prediction of adverse events above any single current method ^[6].

Non-invasive monitoring has shown a positive impact on reducing readmissions in subsets of the HF population. There are multiple different types of studies that have shown some benefit to HF patients, but none demonstrate strong effectiveness for all HF patients. For example, an outpatient model in Denver showed a 19% reduction in the hospital length of stay, but the statistical significance was low and the technology was challenging with many patients not having land-line phones ^[7]. HeartCycle devices collect patient information and link it to electronic health records and providers to alert probable arising health issues. Even with the embedded feedback loop technology in the HeartCycle systems we still await patient data to support its efficacy ^[8]. In the TELE-HF and TIM-HF studies both made use of remote tele-monitoring of vital signs and daily weights but failed to demonstrate an effect on readmissions or mortality ^[9]. With the increased use and indication for highly sophisticated implantable devices, internal physiologic measures such as intrathoracic impedance, pressure monitoring sensors have shown mixed results as to their predictive value of worsening HF and in some studies have shown an increase in hospitalizations and clinic visits ^[10]. The most promising device-related early alert was demonstrated in the Remote Monitoring Reduces Healthcare Utilization and Improves Quality of Care in Heart Failure Patients with Implantable Defibrillators: EVOLVO study. This study included 200 patients using Medtronic's CareLink system using audible alerts and demonstrated 23% reduction in hospital readmissions. It is unclear exactly what mechanism was responsible for the noted reduction, however, using this technology and alert system could prove beneficial as part of a remote monitoring program. Using the audible alerts could help alert patients to early decompensation even when they believe they are following their treatment regimen correctly. Though some of the alerts were falsely positive, having a lower specificity allows for adequate early detection. At six months in the CHAMPION study individuals in the treatment arm had a 28% reduction in HF readmissions ^[11]. This demonstrated that measurement of pulmonary artery pressure via implanted device and the medical regimen thereby adjusted could have an effect on readmissions. Like-wise the measurement of left atrial pressure showed promising results in an observational study when the physician had this data available to aide in management ^[12].

The broadly adopted approach to HF patient monitoring is disease management via nursing-based follow up, although the frequency and intensity necessary is still uncertain ^[13]. Programs usually involve phone follow up from heart failure nurses and/or follow up in clinic within seven days of discharge ^[14]. As standard and widely accepted as this approach remains, the DIAL trial showed that benefits continued up to three years beyond the last phone call. This suggests that intensive follow up may not be as key as the patient's adherence to recommendations and the providers use of evidenced-based medication therapies. In the end it is clear that the real key to success with reducing HF readmissions lay in patients' adherence to the known evidence-based therapies. Five goals must be achieved for a disease management program to be successful: the data collected must be collected accurately and early enough to allow intervention, the data must be transmitted quickly in a format that is usable and allows intervention, the personnel receiving the data has to be qualified to interpret and intervene, the patient must receive and follow the recommendations, the system must provide timely feedback to ensure resolution or need for further intervention ^[13].

It is clear that no one approach to HF disease management is the gold standard for all HF patients. What works for the high-risk acutely decompensated, recently hospitalized patient does not show the same results for the stable, low risk patient. Technology certainly provides data for clinicians to correlate and make treatment adjustments, though it does not ensure adherence or future notification of a worsening or unresolved condition after the intervention. Described previously, HF patients need a system that mimics the change process and gives attention to all of the significant patient elements^[13]. Butler states, “Home visits for all HF patients is a Utopian fantasy”^[15]. In this observational study we sought to determine the effect of early and frequent contact by non-licensed healthcare personnel (NLHP) on readmission and adherence to medication plan.

2 Method

The Grand-Aide Chronic condition/transitional program was implemented in the adult HF patient population of an academic medical center. One nurse practitioner and three certified nursing assistants were hired for the program and underwent eight weeks of training.

2.1 Participant identification

To qualify for the program participants must be at least 18 years old, admitted to the hospital with HF exacerbation, live within 60 miles of the medical center, not be followed by home health nursing services or reside in a skilled nursing facility and agree to participate.

Identification of participants occurs through review of the daily census of admitted adult patients at the medical center. Chart reviews were conducted to evaluate qualification for the program looking at reason for admission, home location and healthcare services currently receiving. For those who qualify via chart review, a nurse practitioner from the program meets with the potential participant and family to introduce the program. Those who agree to participate are assigned one of the certified nursing assistants and often meet them while still hospitalized.

2.2 Sampling of findings

Through the home visit interactions the staff of the program identified variances between the participants’ healthcare regimen and the intended plan. Participants visits commenced the day following hospital discharge and continued daily for about five days, then at least weekly afterward depending on need. These findings were collected and categorized into seven categories. These categories included: (a) medication dose incorrect on discharge papers, (b) participant taking incorrect medication, (c) participant taking incorrect dose of medication, (d) participant out of prescribed medication, (e) new onset of HF symptoms, (f) abnormal lab work, and (g) abnormal vital signs.

2.3 Home visit protocol

During home visits NLHP ask a set, standard questionnaire developed by Grand Aide Foundation (GAF). These questions are written for a yes or no response and this is recorded in the medical record. The questions were developed to highlight any concerning changes in patient symptoms. Vital signs including blood pressure, heart rate, pulse oximetry, temperature are also obtained and recorded. These findings are reported back to the program supervisor whereby an education plan and medical management plan are created. Teachings are then reinforced by the home visit staff as appropriate for the particular patient. Before the completion of the visit the next visit is scheduled.

3 Results

3.1 Recruitment period

Participants included in this study were enrolled in the program from December 3, 2012 to March 1, 2013. The follow up

findings are ongoing, but those provided in this analysis were obtained from program initiation to March 31, 2013.

3.2 Participant characteristics

Of the 27 participants enrolled in the first two months of the program: (a) 63% were male, 37% female; (b) 56% were Caucasian, 44% African American; NYHA class II 15%, class III 78%, class IV 7%; with a mean age of 60. Significant comorbidities noted in the participants were HTN (77%), chronic kidney disease (44%), and diabetes (40%).

3.3 Participant flow

For the 27 participants, two have voluntarily withdrawn from the program, one was subsequently admitted to a skilled nursing facility, thereby no longer meeting eligibility, and another expired during a latter hospitalization. All other participants remain enrolled and participating in the program.

3.4 Intervention fidelity

An intended goal of this program was introduction of the visiting certified nursing aide to the patient while still hospitalized. Due to rapid program growth, enrollment and participant illness severity, this goal was not always met.

3.5 Baseline data

In total there were 30 findings identified via the home visits. Some participants had multiple findings at one visit, others with findings on different visits and yet others with no findings. As expected more findings were identified in the first several visits post discharge. There were no trends in duration of enrollment and specific findings. Abnormal vital signs were the most common occurrence followed by running out of medications and then new onset of HF symptoms (see the Figure). Of these findings many necessitated intervention from the program staff to correct or referral for additional tests and treatments. One of the abnormal vital signs found was intermittent bradycardia. This resulted in a 24 hr heart monitor being placed, noted sinus pauses recorded with that patient undergoing pacemaker placement. Other findings include patients misunderstanding the purpose of a medication and consequently taking it incorrectly. For example, one participant thought that losartan was for gout flairs instead of colchicine, another thought lisinopril was the diuretic, Lasix[®]. In both situations the CHA clarified the purpose of the medication, dosing plan, and thus prevented further harm. Correction of medication errors was the single most frequent intervention performed in the program. The next most frequent was adjustment of medication dose and frequency by the supervisor.

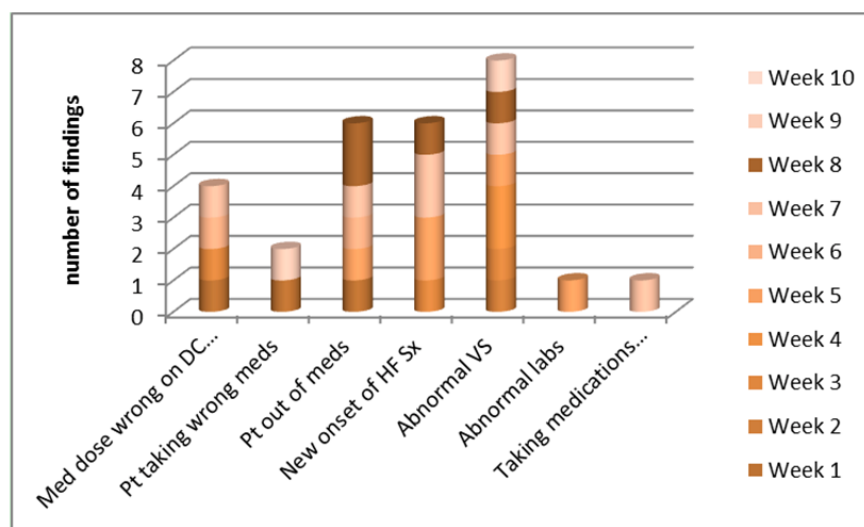


Figure. Type and number of findings during home visits

4 Discussion

Preliminary findings suggest that through home visits the healthcare team identifies issues that affect overall health and could lead to rehospitalization. The findings demonstrate abnormal vital signs, medication variances and new onset of symptoms are the leading issues encountered. Many of these findings could only be recognized via frequent, in-home visits. Early detection can lead to early treatment and improved patient outcomes. This particular patient population is vulnerable as they may not qualify for home health services due to lack of insurance or lack of home-bound status, yet the medical treatment plan is complex and prone to patient error. The presence of NLHP in the home to evaluate the home environment helps mitigate circumstances that might lead to outpatient treatment failure. The hospital setting is controlled and execution of a medical plan can work quite well in that setting. Transitioning the plan of care to the home environment is challenging, as there are aspects of the patient's life that are not revealed during a hospitalization. Working with patients in their "real life" or home environment on an ongoing basis can provide the information that allows for a medical plan that meets the intended goals of treatment. The preliminary outcome data of this project are promising. Patients followed in this program have a 54.3% reduction in all-cause 30 day readmission when compared to the baseline data for the same period.

In the hospital setting healthcare staff rely on patients to recall medication names and dosage much of the time. With the more common use of electronic health record (EHR) systems, incorrect medication lists can be easily persist over several hospital and clinic visits. Situations like this could be avoided if the patient was seen in her home and when meeting with a patient in their home it is apparent when home medication regimen is not following the expected plan. Once recognized the issue can be evaluated and corrected.

Patients are taught the signs and symptoms of HF to report to their healthcare provider while they are in the brief, clinic visit or overwhelming hospital stay. This information is often not retained and the symptoms to watch for are not individualized to each patient. Over the course of the program, participants work with their certified nursing aide, having the teaching reinforced at each visit and individualized with help of the supervising nurse practitioner. Through this process and small exacerbations patients begin to recognize their symptoms and why they are occurring. The patients learn when to report these symptoms, when to be concerned, and when to seek emergency help. Once largely restricted by their HF, patients are now finding success in managing their disease and live a life that doesn't require frequent ED visits or hospitalizations.

The cost of this program is minimal when compared to financial penalties for excessive readmissions for this patient population. The annual cost for three home visit staff, one nurse practitioner, supplies, travel expenses and technology is estimated at \$1,400 per patient enrolled.

Findings from this project provide information about the variety of issues found while providing home-visiting services to patients with heart failure. Early recognition of these issues allows for early treatment or correction and prevents further deterioration that could lead to readmission. Preliminary data from this study suggests this program is helpful in reducing 30-day all cause readmissions. Programs like this can be an integral part of the health care system that manages patient's care across the continuum, between hospital and out-patient as well as between out-patient encounters.

References

- [1] Roger, V. L., Go, A. S., Lloyd-Jones, D. M., Benjamin, E. J., Berry, J. D., Turner, M. B. Heart disease and stroke Statistics-2012 update. *Circulation*. 2012; 125(1): e2-e220. <http://dx.doi.org/10.1161/CIR.0b013e31823ac046>
- [2] Jencks, S. F., Williams, M. V., Coleman, E. A. Rehospitalizations among patients in the medicare fee-for-service program. *N Engl J Med*. 2009; 360(14): 1418-1428. <http://dx.doi.org/10.1056/NEJMsa0803563>
- [3] Ross, J. S., Chen, J., Lin, Z., Bueno, H., Curtis, J. P., Keenan, P. S., *et al.* Recent national trends in readmission rates after heart failure hospitalization. *Circulation: Heart Failure*. 2010; 3(1): 97-103. <http://dx.doi.org/10.1161/CIRCHEARTFAILURE.109.885210>

- [4] Jessup, M., Abraham, W. T., Casey, D. E., Feldman, A. M., Francis, G. S., Yancy, C. W. 2009 focused update: ACCF/AHA guidelines for the diagnosis and management of heart failure in adults. *Circulation*. 2009; 119(14): 1977-2016. <http://dx.doi.org/10.1161/CIRCULATIONAHA.109.192064>
- [5] Ky, B., French, B., McCloskey, K., Rame, J. E., McIntosh, E., Shahi, P., *et al.* High-sensitivity ST2 for prediction of adverse outcomes in chronic heart failure / clinical perspective. *Circulation: Heart Failure*. 2011; 4(2): 180-187. <http://dx.doi.org/10.1161/CIRCHEARTFAILURE.110.958223>
- [6] Ky, B., French, B., Levy, W. C., Sweitzer, N. K., Fang, J. C., Wu, A. H. B., *et al.* Multiple biomarkers for risk prediction in chronic heart failure / clinical perspective. *Circulation: Heart Failure*. 2012; 5(2), 183-190. <http://dx.doi.org/10.1161/CIRCHEARTFAILURE.111.965020>
- [7] Bakhshi, S., Xin Li, Semenov, N., Apodaca-Madrid, J., Mahoor, M. H., Newman, K. E., *et al.* Congestive heart failure home monitoring pilot study in urban denver. Paper presented at the Engineering in Medicine and Biology Society, EMBC. 2011 Annual International Conference of the IEEE, 3150-3153.
- [8] Maglaveras, N., Reiter, H. Towards closed-loop personal health systems in cardiology: The HeartCycle approach. Paper presented at the Engineering in Medicine and Biology Society, EMBC, 2011 Annual International Conference of the IEEE, 892-895.
- [9] Van Veldhuisen, D. J., Maass, A. H. Telemonitoring of outpatients with heart failure: A search for the holy grail? *Circulation*. 2012. <http://dx.doi.org/10.1161/CIRCULATIONAHA.112.118141>
- [10] Van Veldhuisen, D. J., Braunschweig, F., Conraads, V., Ford, I., Cowie, M. R., Jondeau, G. For the DOT-HF Investigators. Intrathoracic impedance monitoring, audible patient alerts, and outcome in patients with heart failure / clinical perspective. *Circulation*. 2011; 124(16): 1719-1726. <http://dx.doi.org/10.1161/CIRCULATIONAHA.111.043042>
- [11] Abraham, W. T., Adamson, P. B., Bourge, R. C., Aaron, M. F., Costanzo, M. R., Stevenson, L. W., *et al.* Wireless pulmonary artery haemodynamic monitoring in chronic heart failure: A randomised controlled trial. *The Lancet*. 2011; 377(9766): 658-666. [http://dx.doi.org/10.1016/S0140-6736\(11\)60101-3](http://dx.doi.org/10.1016/S0140-6736(11)60101-3)
- [12] Ritzema, J., Troughton, R., Melton, I., Crozier, I., Doughty, R., Krum, H. on Behalf of the Hemodynamically Guided Home Self-Therapy in Severe Heart Failure Patients (HOMEOSTASIS) Study Group. Physician-directed patient self-management of left atrial pressure in advanced chronic heart failure. *Circulation*. 2010; 121(9): 1086-1095. <http://dx.doi.org/10.1161/CIRCULATIONAHA.108.800490>
- [13] Desai, A. S. Home monitoring heart failure care does not improve patient outcomes / response to desai. *Circulation*. 2012; 125(6): 828-836. <http://dx.doi.org/10.1161/CIRCULATIONAHA.111.031179>
- [14] Inglis, S. C., Clark, R. A., McAlister, F. A., Stewart, S., Cleland, J. G. F. Which components of heart failure programmes are effective? A systematic review and meta-analysis of the outcomes of structured telephone support or telemonitoring as the primary component of chronic heart failure management in 8323 patients: Abridged cochrane review. *European Journal of Heart Failure*. 2011; 13(9): 1028-1040. <http://dx.doi.org/10.1093/eurjhf/hfr039>
- [15] Butler, J., Kalogeropoulos, A. Worsening heart failure hospitalization epidemic: We do not know how to prevent and we do not know how to treat! *Journal of the American College of Cardiology*. 2008; 52(6): 435-437. <http://dx.doi.org/10.1016/j.jacc.2008.04.037>