

# Pharmacist Involvement in a Community Paramedicine Team

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## Abstract

**Background:** Hospital readmissions have recently gained scrutiny by health systems as a result of their high costs of care and potential for financial penalty in hospital reimbursement. Mobile-integrated health and community paramedicine (MIH-CP) programs have expanded to serve patients at high risk of hospital readmission. Pharmacists have also improved clinical outcomes for patients during in-home visits. However, pharmacists working with a MIH-CP program have not been previously described. This project utilized a novel multidisciplinary Community Paramedicine Team (CPT) consisting of a pharmacist, paramedic, and social worker to target patients with heart failure at high risk of readmission to assist with coordination of care and education. **Objectives:** This article describes the development of the CPT, delineation of CPT member responsibilities, and outcomes from pilot visits. **Methods:** The CPT visited eligible patients in their homes to provide services. Patients with heart failure who were readmitted within 30 days were eligible for a home visit. **Results:** A total of 6 patients were seen during the pilot, and 2 additional patients were seen after the pilot. **Conclusion:** Imbedding a pharmacist into a CPT provides a unique expansion of pharmacy services and a novel approach to address hospital readmissions.

## Keywords

readmissions, paramedicine, pharmacist services, heart failure

## Introduction

Transitions of care are a known area for improvement within the health-care system, with disparities in the transition from hospital to home, leaving patients at risk of hospital readmission. Factors contributing to the poor transition include suboptimal discharge instructions and prolonged time to follow-up, both of which have been recognized as sources for medication errors.<sup>1</sup> Despite discharge education, patients have difficulty reconciling their new and old medication lists into the correct regimen desired by their provider once they return home from the hospital.<sup>2</sup> A pharmacist can be a key player in bridging this gap. The American College of Clinical Pharmacists (ACCP) identified future opportunities for pharmacist involvement in transitions of care in their 2012 White Paper.<sup>3</sup> ACCP suggested pharmacists should be involved in the transition from hospital to home through the completion of patient discharge interviews and medication counseling, discharge medication reconciliation, ensuring proper follow-up for monitoring, communication with the provider and community pharmacy, and postdischarge follow-up phone calls. Pharmacists offer a unique contribution to this process with the potential to decrease medication errors related to this transition.<sup>1-3</sup>

Many health systems have evaluated various approaches to decreasing readmission rates, since the Centers for Medicare

and Medicaid Services (CMS) has decreased hospital reimbursement for 30-day readmissions for certain disease states, including heart failure. Multiple studies have evaluated the impact of pharmacist interventions on hospital readmissions.<sup>4-7</sup> Pharmacist interventions including identification of early health deterioration and early referral to medical care, monitoring and optimizing medication management, and discharge education have increased medication adherence and decreased hospital readmissions, all-cause mortality, and non-fatal heart failure events.<sup>4</sup> Pharmacists have also decreased hospital readmission rates by 30% when working with other collaborating providers by performing medication reconciliation and providing ongoing support for 30 days

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posthospital discharge.<sup>5</sup> Several studies have investigated the benefit of a pharmacist providing in-home care for patients with heart failure and found lower health-care costs, decreased number and duration of hospitalizations, and decreased mortality.<sup>6,7</sup> An additional measure taken by health systems in the United States has been the implementation of mobile integrated health community paramedicine (MIH-CP) programs. MIH-CP programs were originally developed to serve the health-care needs of rural populations who receive less health-care resources compared to urban populations.<sup>8</sup> Programs have expanded to urban settings to assist with community health initiatives and management of specific chronic diseases. Current evidence suggests that paramedics are able to expand their skill sets for these roles and improve patient outcomes; however, additional research is needed to provide more robust data.<sup>9</sup> While data support pharmacists providing in-home care and efficacy of MIH-CP programs, there have been no published descriptions of a pharmacist working with an MIH-CP program to provide in-home care for patients at high risk of readmission.

Eskenazi Health (EH), a safety-net health system in Indianapolis, Indiana, consists of Sidney and Lois Eskenazi Hospital and 11 community health centers that provide both primary and specialty care to patients throughout Marion County, Indiana. The health system utilizes a shared electronic medical record (EMR) accessible by both inpatient and outpatient providers. Indianapolis Emergency Medical Services (IEMS) is the largest provider of emergency prehospital medical care in Indianapolis. Both EH and IEMS are divisions within the Health & Hospital Corporation of Marion County. The 2 divisions partnered to pilot a new strategy to decrease hospital readmissions in patients with heart failure by developing a MIH-CP program that utilizes a combination of providers previously not described in the literature. Details of the development of this multidisciplinary team, pilot program description, results of patient characteristics, and description of pharmacist interventions are discussed in this article.

## Methods

### *Corporate Partnership Creates Community Paramedicine Team*

EH and IEMS partnered to develop a program aimed at creating a community-based multidisciplinary care team in an attempt to decrease hospital readmissions and increase medication adherence. The Community Paramedicine Team (CPT) utilizes a paramedic, pharmacist, and social worker to provide home-based care after hospital discharge for patients with heart failure and at high risk of readmission. Paramedics were identified as key members of the team because they are well practiced in examining patients in their homes. Additional training on the disease state, nonpharmacologic and pharmacologic management, and patient education pearls was provided for the paramedics by members of the pharmacy team. Clinical pharmacists were added to assess the appropriateness of heart

failure medication management and provide thorough medication education. Unlike the paramedic and pharmacist, social workers did not attend every home visit but were consulted as needed to assist with a variety of socioeconomic and transitions of care issues. If patients had a lack of funding, difficulty with transportation, or needed assistance obtaining a physician appointment, the paramedic would then consult the social worker.

### *Defining the Pharmacist's Role*

IEMS was initially interested in building a pharmacist into the CPT for their expertise in drug therapy management; however, the pharmacist's roles were expanded as the program developed. Prior to initiation of the home visits, the pharmacists created and presented education to paramedics on heart failure medications. Medication adherence and health literacy tools were chosen by the pharmacists for use during the home visits. The pharmacists assisted with developing the process for home visits including creating a chart documentation tool to document the visit in the EMR. Pharmacists attended the home visits and provided the services outlined subsequently. Pharmacists also applied for various grants throughout the pilot in an attempt to gain sustainable funding. Two grant applications were submitted; one was accepted as a top grant application to receive a full review, but neither grant was awarded. Institutional Review Board (IRB) approval was obtained for the project.

### *Patient Eligibility*

Patients were eligible for a home visit if they had been admitted to EH for heart failure and had a 30-day readmission or emergency department visit due to heart failure as identified by an internally generated quarterly report from EH. The pharmacist manually reviewed patient charts to validate patients had heart failure with reduced ejection fraction before enrolling patients for a home visit. Patients were scheduled for home visits which, based on the quarterly reporting list, may have been up to 3 months after the hospital encounter.

### *Responsibilities of CPT Members*

The responsibilities of each CPT member were specifically assigned to utilize the unique expertise of each individual. All members of the CPT have access to the EMR utilized for patients at EH. The paramedic and pharmacist review the patient's EMR prior to the home visit. The pharmacist clarifies any discrepancies related to medications identified in the medical record prior to the home visit. At the visit, the paramedic completes a history including current lifestyle, dietary, and sleeping habits; subjective symptoms of heart failure; and a physical examination. The pharmacist conducts a medication history with the patient and reconciles the actual medications the patient has in their home with the active medication list from the patient's health record. The pharmacist assesses

**Table 1.** Baseline Characteristics of Patients From Initial Pilot Visits.

Patient	Age, years	Sex	Comorbidities present	Number of medications	Barriers to adherence identified at home visit
1	54	Male	Diabetes mellitus, CAD, hypertension, PVD, anemia, history of mural thrombus	14	None identified
2	66	Male	CAD, hypertension, hyperlipidemia, diabetes mellitus, PVD, history of apical thrombus	9	Physical barrier: requires walker
3	49	Female	Renal failure, hypertension, asthma, hyperlipidemia, history of deep vein thrombosis, anemia	7	Lack in insight into disease
4	74	Female	Hypothyroidism, hypertension, seizure disorder, coronary artery disease, nonischemic cardiomyopathy, glaucoma	14	Physical barrier: limited mobility, reliant on home health care
5	59	Male	Chronic kidney disease, diabetes mellitus, cirrhosis, hepatitis C, history of duodenal ulcer, iron deficiency, anemia, depression, COPD	22	Socioeconomic barrier: limited transportation access
6	55	Female	Myasthenia gravis, seizure disorder, history of traumatic brain injury, hyperthyroidism, osteoporosis, hyperlipidemia, anxiety	22	None identified

Abbreviations: COPD, chronic obstructive pulmonary disease; CAD, coronary heart disease; PVD, peripheral vascular disease.

medication adherence and health literacy using pharmacy fill records, the Morisky Adherence Questionnaire, and the Newest Vital Sign, respectively. The Morisky Adherence Questionnaire and the Newest Vital Sign are research-validated tools to assess medication adherence and health literacy.<sup>10,11</sup> The pharmacist provides heart failure education to the patient with consideration of his health literacy and initial disease state management knowledge. At the time of the pilot visits, education varied based on pharmacist's discretion with the goal to develop educational materials according to health literacy levels. Heart failure education during the visits includes proper diet, signs and symptoms of exacerbation, importance of daily weights, medication counseling, and appointment reminders. Dietary education focuses on nutrition label education to ensure patients can understand and monitor their daily sodium intake. The pharmacist facilitates access to medications by evaluating any barriers to adherence such as financial hardship, transportation issues, or lack of follow-up appointments and refers these to the social worker. Upon referral, the social worker visits the patient within a week of the first home visit. A progress note from the visit is documented by the pharmacist in the EMR.

### Postvisit Follow-up

The pharmacist performs a follow-up phone call within 2 weeks of the home visit. This phone call evaluates current symptoms of heart failure and addresses any specific issues identified at the home visit. Any remaining issues identified at this time are referred to the appropriate individual (social worker, primary care provider, or cardiologist) as deemed clinically appropriate for follow-up. Medication adherence is reassessed during the follow-up phone call. The pharmacist again completes documentation in the EMR.

### Outcomes

The pilot lasted from June 2013 through June 2014. A total of 6 patients were seen by the CPT (Table 1). Patients had a mean

**Table 2.** Home Visit Results From Initial Pilot.

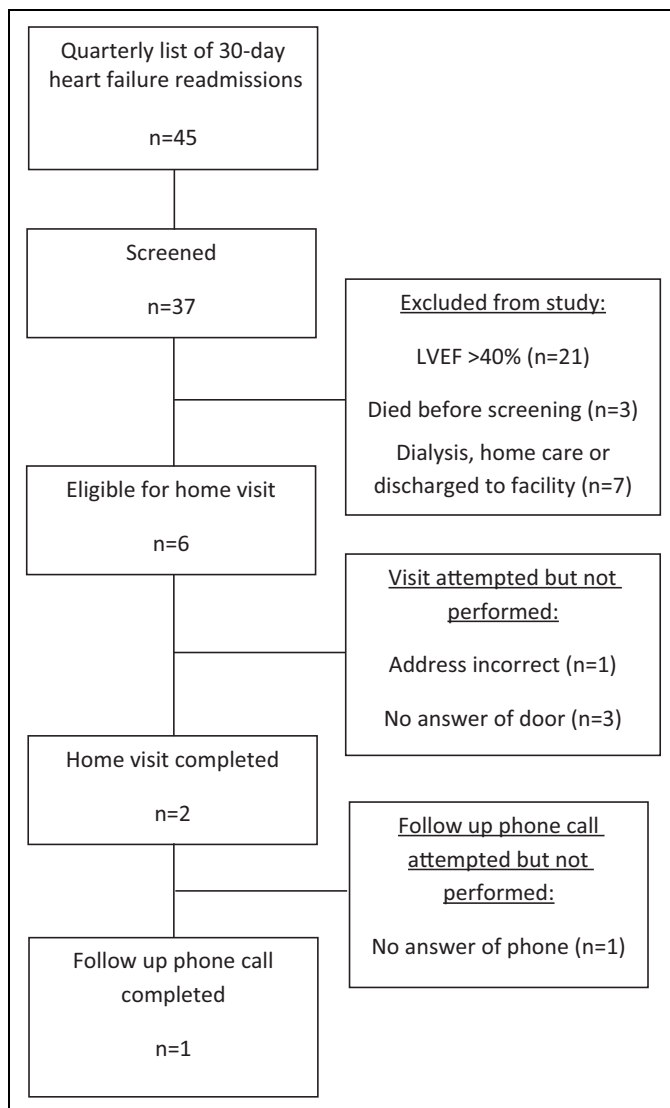
Home visits	N = 6
Length of visit, hours	1
Mean number of drug-related problems per patient (SD)	2 (2.8)
Mean number of interventions per patient (SD)	3 (2.8)
Total drug-related problems	15

Abbreviation: SD, standard deviation.

( $\pm$  standard deviation [SD]) age of 61 ( $\pm$ 9) years. The patients seen during visits were composed of an equal number of male and female patients. All patients in the pilot had at least 6 other comorbid disease states. The number of prescriptions averaged 16 ( $\pm$ 7) per patient.

Pilot visits lasted an hour in duration. The mean number of drug-related problems per patient was 2 (SD  $\pm$  2.8). Examples of drug-related problems included patients taking a different dose or frequency of a medication than what was prescribed, not having all of the prescribed medications, or needing additional refills. Barriers to adherence included physical barriers, lack of insight into disease status, and socioeconomic barriers. Three consults were placed to the social worker during the pilot visits. See Table 2 for additional results.

After the first 6 patients were seen in the pilot, several changes occurred to revise the program. These changes refined the targeted patient population, so that the CPT visited patients who would benefit most from their services. The exclusion criteria were revised to exclude patients with cognitive impairment, those receiving hemodialysis, and those with home health or hospice care as the CPT did not have additional recommendations for the patients who were interacting with the health system on a frequent, regular basis. Due to low numbers of patients volunteering for home visits at hospital discharge, patient visits were changed from announced to unannounced visits. The Morisky Adherence Questionnaire and Newest Vital Sign previously described were added to the pharmacist assessment. These changes were implemented in February 2015.



**Figure 1.** Patient screening and inclusion.

A total of 45 patients have been screened for home visits since the pilot and 2 visits have been completed (Figure 1). See Table 3 for the baseline characteristics of the patients who received postpilot home visits. Patient 1 was taking 13 medications and had many comorbid disease states, which included hypertension, opioid addiction, diabetes mellitus, anxiety, and hepatitis C. She had significant socioeconomic barriers to health care, including poor access to transportation. Patient 2 was taking 25 medications and had comorbid conditions including hypertension, coronary artery disease, chronic obstructive pulmonary disease (COPD), and asthma. Home visits continued to last 1 hour. Drug-related problems identified during these visits included an incorrect dose of a medication being taken when compared to what the provider prescribed and a missing maintenance medication due to lack of refills. There were 2 total hospital readmissions among the 2 patients in the 12 months prior to the home visits and there have been zero readmissions in the 3 months postvisit. The Morisky

Adherence Questionnaire scores at the home visit were 0 and 1, signifying high and medium medication adherence, respectively. The Newest Vital Sign health literacy score was only able to be calculated on 1 patient who scored a 5, signifying adequate literacy. One of the 2 patients required a social worker consult. Additional results are found in Table 4.

### Pharmacist Interventions

The pharmacist provided education of varying degrees to each of the patients. Three calendars were provided during the first 6 visits. One patient requested and received assistance in filling her pill box. Examples of medication recommendations that were sent from the pharmacist to the primary care provider included addition of medications to assist with smoking cessation, changes in medication doses based on current physical examination status, and changing or addition of a medication to best reflect current heart failure guidelines. Any barriers that prevented appropriate filling of the patients' medications were identified and potential solutions proposed or referred to social work.

### Limitations of the CPT

A major limitation to this initiative was the significant time spent screening patients for inclusion. The list of patients having heart failure with 30-day readmissions was generated using specific *International Classification of Diseases, Ninth Revision (ICD-9)* codes tracked in the analytics department. Chart review was still required to determine eligibility according to the CPT inclusion and exclusion criteria. The *ICD-9* codes were not always indicative of the patient having reduced ejection fraction heart failure. For example, some patients were readmitted with an admitting diagnosis of fluid overload, but when an echocardiogram was evaluated, the patient's left ventricular ejection fraction was greater than 40%. This led to many patients on the list being excluded from home visit eligibility.

The additional time spent on preparing for and performing a home visit was another challenge with this project. Many of the CPT members were balancing multiple job responsibilities throughout this project, and coordinating schedules to complete home visits proved difficult. The team has since created dedicated full-time paramedicine providers and is coordinating visits with the pharmacist.

The targeted patient population serviced by EH, IEMS, and the CPT can be difficult to contact. Many patients have frequent changes in addresses and phone numbers. Given the unannounced nature of the home visits, it is not known whether a patient will be home when the team arrives. Several visits were not completed due to patients not being home or not answering the door when the team arrived (Figure 1).

Funding continues to be problematic, as it relates to the sustainability of the project. Although the pharmacy team has residents and students dedicated to the project, the funding to support a full-time pharmacist dedicated to this service has yet

**Table 3.** Baseline Characteristics of Patients From Postpilot Phase 2.

Patient	Age, years	Sex	Comorbidities present	Number of medications	Barriers to adherence identified at home visit
1	60	Female	History of colon cancer, hypertension, opioid/benzodiazepine addiction with history of heroin abuse, anxiety, diabetes mellitus, tinnitus, chronic liver failure, anemia of chronic disease, hepatitis C	13	Socioeconomic barrier: limited transportation access
2	73	Female	Chronic kidney disease, hypertension, coronary artery disease, COPD, colitis, diverticulitis, hyperlipidemia, asthma	25	None identified

Abbreviation: COPD, chronic obstructive pulmonary disease.

**Table 4.** Home Visit Results From Postpilot Phase 2.

Home visits	N = 2
Length of visit, hours	1
Mean number of drug-related problems per patient (SD)	1 (0)
Number of hospital admissions 12 months before visit	2 (0)
Number of hospital admissions in 3 months since visit	0
Morisky Adherence Questionnaire scores at home visit <sup>a</sup>	0, 1
Mean Morisky Adherence Questionnaire scores at 2-week follow-up <sup>a</sup>	-, 4 <sup>b</sup>
Newest vital sign scores <sup>c</sup>	-, 5 <sup>d</sup>

Abbreviation: SD, standard deviation.

<sup>a</sup>Morisky Adherence Questionnaire score ranges from 0 to 8. A score of 0 indicates high adherence. A score of 1 to 2 indicates medium adherence. A score of >2 indicates low adherence.<sup>8</sup>

<sup>b</sup>One patient lost to follow-up because phone number was no longer in use.

<sup>c</sup>Newest vital sign score ranges from 0 to 6. A score of 0 to 1 suggests high likelihood (50% or more) of limited literacy. A score of 2 to 3 indicates the possibility of limited literacy. A score of 4 to 6 almost always indicates adequate literacy.<sup>9</sup>

<sup>d</sup>Patient was not willing to complete.

to be procured. To address this limitation, the team has applied for multiple grants, which have not received funding, but continues to search for additional opportunities.

## Conclusion

As national efforts are taking place to refocus health care on patient-centered care and cost containment, the CPT allows a unique opportunity for pharmacists to address these issues as a member of an innovative multidisciplinary team. Due to a small sample size, definitive conclusions cannot be determined as to the benefit of the team as a whole or a pharmacist as a member of that team. However, the pharmacist is able to reconcile medication lists in the patient's home and ensure discrepancies from prescribed medication lists or from clinical guidelines are rectified. The pharmacist serves as the patient advocate for medication-related issues such as ensuring adequate medication refills or filling of medication boxes. Being in a home, the pharmacist can provide more personalized education tailored to the patient's specific medications as well as using their current food supply to demonstrate sodium restriction. Ongoing research should address the specific benefit of a pharmacist on the CPT as well as patient and caregiver perceptions of this service. This expansion of pharmacy

practice allows the pharmacist to use clinical knowledge and problem-solving skills to empower patients to ensure successful disease state management.

This novel, team-based approach to transitions of care serves to close the gap in access to care seen in many patients by bringing health-care providers to the patient's home. Additional data are necessary to validate the success of this program. Further quantification of the benefit of these services will determine whether this is a viable method to reduce readmissions and increase patient medication adherence for patients with reduced ejection fraction heart failure.

## Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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