ED-Based Care Coordination Reduces Costs for Frequent ED Users

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Frequent emergency department (ED) users often have complex medical, social, and behavioral health needs. They are more likely to have chronic illness, report lower socioeconomic status, and utilize all healthcare services at higher rates, despite often having health insurance and identifying a usual source of care.1-5 As ED visits continue to increase and payment models shift toward alternative payments, with an emphasis on population health, it is critical for ED providers to become engaged in care coordination, particularly because the ED is the primary source of care for many frequent users.6-8

Programs to reduce ED utilization among frequent ED users have employed intensive case management, care coordination and navigation, information sharing, disease management, and education.9-18 Community health worker (CHW) programs differ from traditional case management programs by employing community members, instead of licensed case managers or social workers, to assist with patient navigation. CHWs employed in ambulatory care settings have been shown to reduce ED visits and healthcare utilization among patients with chronic illness and recent hospitalizations; however, there are no peer-reviewed randomized controlled studies of the effects of CHW programs on ED visits among frequent ED users.19-22 Prior study results showing an association between ED-based CHW programs and decreased ED use among frequent ED users have been observational in design, and a recent systemic review of ED visit reduction programs concluded that high-quality, peer-reviewed evaluations of such programs are lacking.23,24 Furthermore, a minority of existing studies on ED visit reduction programs have included information on program costs and cost savings.25 We conducted a randomized controlled trial of a pilot ED-based care coordination and CHW program in order to reduce ED visits, hospitalizations, and associated costs among frequent ED users at Brigham and Women’s Hospital, a large urban academic medical center.

**ABSTRACT**

**OBJECTIVES:** We evaluated a pilot quality improvement intervention implemented in an urban academic medical center emergency department (ED) to improve care coordination and reduce ED visits and hospitalizations among frequent ED users.

**STUDY DESIGN:** Randomized controlled trial.

**METHODS:** We identified the most frequent ED users in both the 30 days prior to the intervention and the 12 months prior to the intervention. We randomized the top 72 patients to receive either our pilot intervention or usual care. The intervention consisted of a community health worker who assisted patients with navigating care and identifying unmet social needs and an ED-based clinical team that developed interdisciplinary acute care plans for eligible patients. After 7 months, we analyzed ED visits, hospitalizations, and costs for the intervention and control groups.

**RESULTS:** We randomized 72 patients to the intervention (n = 36) and control (n = 36) groups. Patients randomized to the intervention group had 35% fewer ED visits (P = .10) and 31% fewer admissions from the ED (P = .20) compared with the control group. Average ED direct costs per patient were 15% lower and average inpatient direct costs per patient were 8% lower for intervention patients compared with control patients.

**CONCLUSIONS:** ED-based care coordination is a promising approach to reduce ED use and hospitalizations among frequent ED users. Our program also demonstrated a decrease in costs per patient. Future efforts to promote population health and control costs may benefit from incorporating similar programs into acute care delivery systems.

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METHODS

Study Design and Population

A multidisciplinary team of providers led by ED physicians and nurse care coordinators developed, implemented, and evaluated a pilot program to reduce ED visits and subsequent hospitalizations and improve quality of care for frequent ED users. In order to identify chronic frequent users, rather than those with an isolated health event requiring multiple visits, we identified patients with the most ED visits during both the 30-day period and the 12-month period preceding the introduction of the program. We randomly assigned the top 72 patients (36 per group) to the intervention and usual care (control) groups. We analyzed utilization and costs during the first 7 months of the pilot program, from October 1, 2014, through April 30, 2015.

The intervention consisted of 2 key elements: 1) interdisciplinary development of acute care plans to guide ED care and 2) the assignment of an ED-based CHW who assisted with care coordination and addressed social issues contributing to unmet health needs of frequent users. First, trained ED physicians and physician assistants performed a detailed chart review for all patients randomized to the intervention to identify medical and social issues driving frequent ED visits. Then, an acute care plan was developed to improve the quality, efficiency, and coordination of ED care. The plan was developed in conjunction with the patient’s longitudinal providers (including primary care providers, medical specialists, and social workers at our institution) to reduce variation in acute care services. The plan was then uploaded to the electronic health record (EHR) and electronically “flagged” in a location visible to clinicians during ED encounters.

The CHW’s goals were to better engage patients with their longitudinal providers and to help address unmet social and behavioral needs that contributed to ED utilization. At the start of the intervention, the CHW reviewed each patient’s chart and called patients to conduct a standardized intake assessment to determine unmet needs. The CHW then communicated with patients by phone or in person, including during scheduled home visits, to address the identified needs. During working hours (Monday through Friday, 9 am to 5 pm), the CHW was automatically paged when intervention patients were registered on arrival to the ED to connect patients with follow-up care and community-based resources. During ED visits, the CHW enrolled patients into the intervention if it was their first contact or continued to work with the patient to advance the acute care plan if they had previously been enrolled. The CHW assisted with specific tasks tailored to each patient’s needs, such as coordinating transportation to clinic visits, providing information on local food banks, and establishing linkage to a primary care provider for patients without one. An interdisciplinary team consisting of the CHW, a physician, and a nurse care coordinator met weekly to discuss the needs of enrolled patients, assess progress of enrolled patients, and assign tasks for future encounters.

The evaluation of this quality improvement intervention was approved by our institutional review board. Randomization was deemed ethical, as we had limited resources and more patients than could be engaged in the intervention.

Data Analysis

The primary aim of our analysis was to assess the program’s impact on ED visits and subsequent hospitalizations. A secondary aim was to assess the financial impact of the program on the direct costs of care per patient.

We retrospectively analyzed all ED visits, hospitalizations, and average direct costs per patient for the intervention and control groups. Statistical comparisons of demographic characteristics, ED utilization, hospitalizations (inpatient or observation), and average direct costs were based on 2-tailed t tests (for continuous variables) and χ² tests (for categorical variables). All patients were included in the analysis based on randomization status, regardless of actual enrollment or services received.

Utilization, demographic, and patient-level financial data were obtained from the healthcare system’s enterprise data warehouse, which includes EHR and cost accounting data. Program costs were identified through the hospital accounting system and cost center reports.

RESULTS

Baseline characteristics for the 72 randomized patients in the intervention (n = 36) and control (n = 36) groups are presented in the Table. Of note, the majority of patients in both groups had primary care providers at our hospital (61% intervention, 53% control) and identified a public payer (Medicare or Medicaid) as their primary insurance (91% intervention, 83% control). All analyses were intention-to-treat.

During the 7-month pilot period, intervention patients had 35% fewer ED visits (P = .10) and 31% fewer hospitalizations after ED visits (P = .20) compared with patients in the control group (Figure). Average ED direct costs per patient were 15% lower and average

TAKEAWAY POINTS

› Results from a pilot randomized controlled intervention involving emergency department (ED)-based care coordination and community health workers demonstrated a trend toward reduced ED visits, hospitalizations, and costs among intervention patients.

› Compared with control patients, patients enrolled in the program had 35% fewer ED visits and 31% fewer ED admissions, which were associated with a 15% reduction in ED costs and an 8% reduction in inpatient costs during the 7-month pilot period.

› Future efforts to reduce acute care utilization and costs in high-cost patient populations may benefit from engaging ED providers in identifying high-risk patients and coordinating care.
inpatient direct costs per patient were 8% lower for intervention patients (Figure). A greater reduction in costs was attributable to reduced ED visits ($2247 per patient) than hospitalizations ($802 per patient).

DISCUSSION

Our pilot program to improve care coordination and reduce costs associated with ED visits and hospitalizations among frequent ED users demonstrated promising results among enrolled patients in the intervention period. Although our findings are not statistically significant, our randomized controlled intervention trended toward decreased utilization and improved financial margins for the hospital.

Our program differs from prior ED-based case management programs by using a CHW, instead of a nurse case manager or other trained healthcare professional, and by utilizing a randomized controlled design. CHWs are public health workers, often trained laypersons, who are “trusted members of and/or have an unusually close understanding of the community served” and have the potential to provide higher quality, more culturally competent care. Another feature of our program was the flexibility in the range and intensity of services we offered to patients. Some patients required infrequent contact to assist with scheduling and attending primary care appointments. Other patients benefited from more intensive contact, including multiple accompanied clinic visits or home visits.

The CHW was able to identify unmet social needs contributing to acute care utilization that may not be apparent to busy clinicians and are not readily addressed during a single ED or clinic visit. For example, one patient with chronic restrictive lung disease who was dependent on home oxygen experienced financial insecurity and anxiety related to his inability to make on-time utility payments. The CHW was able to enroll him in a financial assistance program to prevent utility shutoffs, provide a list of local food pantries, and accompany him to primary care appointments where he was connected with the pulmonology clinic social worker who assisted with ongoing needs.

As a result of decreased utilization, the average direct costs of the patients in the intervention group were lower than the costs of the patients in the control group. Our pilot program resulted in total annualized cost savings of $117,997 to the hospital. Up-front implementation costs are often a barrier to adoption of quality improvement programs, particularly those that involve hiring and training new personnel. For example, our program had an annualized cost of $55,115 to implement and demonstrated a positive return on investment (ROI) during the pilot period. Accounting for additional revenue from increased capacity as a result of fewer ED visits and hospitalizations would result in even higher ROI.

Our project demonstrates the feasibility of an ED-initiated care coordination and CHW program to promote population health and reduce healthcare costs. Care coordination and CHW programs have traditionally been based in primary care settings or patient-centered medical homes to address patients’ chronic health needs. However, ED providers provide a unique perspective on the unmet social and behavioral needs contributing to acute care utilization, particularly among frequent ED users. This perspective can be leveraged to improve care coordination and quality while reducing healthcare expenditures. Prior to the initiative, primary care–based case management existed at our institution for patients with complex care needs and high overall healthcare expenditures enrolled in insurance plans with specific risk-sharing contracts; however, a majority of the patients targeted for our intervention had not previously been enrolled in the existing program due to their insurance status, suggesting an unmet need. As payment and care delivery
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models shift toward value-based payment models prioritizing population health, it is critical to engage acute care providers, in addition to longitudinal providers, in care coordination efforts. Our pilot program can serve as a model for other interdisciplinary collaborations to improve care coordination and reduce costs.

Limitations

Our findings are primarily limited by the sample size, which was due to inadequate resources and prevented us from detecting statistically significant effects. A cohort size of 98 (196 total participants) would have been needed to show statistically significant results ($P = .05$) with 80% power and a 36% reduction in ED visits. Our analysis did not include visits outside our institution; therefore, our patients’ utilization at other hospitals during the intervention period was unknown. However, a majority of patients in both the control and intervention groups had a usual source of care at our hospital, suggesting that these patients would preferentially use our ED for acute care. It is also possible that the results at our urban academic tertiary care hospital may not be generalizable to all institutions. However, the characteristics of our study population (Table) closely mirror those of frequent ED users described in previous studies. We did not assess ED visit acuity or whether a hospitalization was ambulatory care–sensitive, as we were primarily interested in overall utilization and cost to the hospital.

The promising results of our pilot program were a function of the high productivity of our CHW, the low relative cost of a CHW compared with traditional case managers or social workers, and the high rates of ED utilization by study patients, resulting in more frequent contact between the CHW and frequent ED users. ED visits and hospital utilization may have been impacted by seasonality, as the pilot took place during winter months; however, we still observed greater declines in utilization among the intervention group relative to controls after randomizing. Finally, we did not include data on health outcomes, and the pilot program period evaluated lasted 7 months; further research is needed to assess impact on long-term clinical outcomes, quality, utilization, and cost.

CONCLUSIONS

ED-based care coordination incorporating CHWs and acute care plans is a promising approach to reduce ED visits and hospitalizations and associated costs among frequent ED users. Future efforts to improve quality and efficiency of care for high-cost patients may benefit from collaboration with acute care providers.

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FIGURE. ED Visits, Hospitalizations, and Associated Direct Costs for Control (Routine Care) and Intervention Groups During Intervention Period

ED indicates emergency department.
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