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REDUCING ER USE THROUGH A TRAINEE-DESIGNED, INTERPROFESSIONAL CARE GROUP FOR HIGH-UTILIZING CHRONICALLY ILL PATIENTS: A PILOT PROGRAM

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Abstract

Background—Healthcare utilization is skewed to a subset of high-need, high-use patients, but optimal models of care are not known.

Purpose—To reduce emergency room (ER) use and hospital readmissions, trainees designed an innovative model of care delivery for chronically ill, high-utilizing adult patients.

Methods—Enrolled patients (N = 65) joined an interprofessional care program (nutrition, behavioral health, pharmacy, and care coordination), located in a single ambulatory clinic with extended hours.

Results—Evaluated by generalized linear mixed-effects models, the primary outcome of all-cause ER visits showed a significant decreasing trend after enrollment, from an increasing odds of ER visits (OR 1.07) in the 12-months prior to the program, compared to a decreasing trend post-enrollment (OR 0.88). Implementation and completion of the program was cost neutral.

Discussion and Conclusions—This pilot supports team-based ambulatory care models that address the diverse needs of chronically ill patients, with a focus on improving select health services utilization.

Introduction

Health systems nationwide are attempting to reduce hospital utilization and non-urgent emergency room (ER) care, largely driven by an aim to improve quality in health care as

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No conflicting interests or financial relationships to disclose. No other part of this article is currently being considered for, nor has been previously published at another journal.

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well as financial incentives from public and private insurance. Resource utilization is skewed towards a small percentage of complex, chronically ill individuals, the so-called “super-utilizer.”^{1,2} These users have diverse but significant drivers of illness, such as multimorbid conditions, complex social contexts, and untreated behavioral health needs.^{3–6} With growth of the patient centered medical home throughout primary care, comprehensive care models targeting high-utilizers have also increased.^{7,8} The impact of these models on utilization has been mixed, and is further affected by variation by setting, organizational components, and target population.^{7,9,10} ‘Freestanding’ models center on physicians or nurse care managers,^{11,12} decreasing cost-effectiveness and programmatic scalability. Alternative ‘practice-based’ models offer supplementary services, while the patient continues with their regular primary care provider.^{11,12} Some, though far from all, programs have demonstrated cost savings for this population.¹³ Despite lack of consensus about best practices, the ubiquity of team-based comprehensive care has brought requests for graduate medical education to emphasize related experiences for trainees.¹⁴

To add to the understanding of ambulatory models of care for high-utilizing patients, this study presents pilot data from a medical student and resident trainee-designed, non-physician centered interprofessional care group, the MyCare Program, offering nutrition, behavioral health, pharmacist review, and care coordination for chronically ill high-utilizers within an extended access practice in an academic health system. The hypothesis of this study was that enrollment in the MyCare Program would decrease rates of ER visits and hospital readmission for all-cause and ambulatory care sensitive conditions, compared to pre-enrollment utilization.

Methods

Program Description

The program was conceptually designed as a joint project between systems of care focused medical students and resident trainees in internal medicine and pediatrics. The intervention (described below) was conducted within a large academic care system within Southern California. Exemption for this quality improvement study was received from the University of California, Los Angeles institutional review board.

Patients were eligible for the care group if they met all inclusion criteria: at least 2 ER visits in the health system within the preceding 12 months; at least 1 chronic medical condition; over 18 years of age at time of enrollment; and established with any primary care provider within the health system. Exclusion criteria were any of the following: non-English speakers; life expectancy less than six months; active substance dependence; dementia or schizophrenia; full-time residence in a nursing facility; or receiving home health services. Initial referral of patients was via staff review of monthly ER-visit lists, or by provider, self, or peer nomination. After referral, study personnel screened patients for eligibility via brief chart review, then telephoned eligible patients to invite participation in the group.

The intervention centered on the creation of an interprofessional team assisted by a program manager, including pharmacy, nutrition, behavioral health, and dedicated care coordination for enrolled patients. All providers (except the program manager) were existing roles within

the health system, who were provided approximately 12 hours of additional training for the program, covering topics such as communication, continuity of relationships, and new program tasks. The program manager was a new addition to the team, and was a lay individual with a bachelor's degree with no previous formal qualifications who received approximately 40 hours of training in basic health system administration and program-specific role requirements. The program manager was responsible for patient referral review and outreach, appointment scheduling, and administrative tasks. The team also included a care coordinator to assist patients with domains such as locating community resources, health system navigation, and problem solving (e.g. transportation). The training and description of the care coordinator role within this health system have been previously published,¹⁵ but briefly these are trained lay individuals supervised by case managers and licensed social workers, acting similarly to patient navigators and using the electronic health record to facilitate patient care. The other team providers (nutrition, behavioral health, and pharmacy) conducted patient visits consistent with their usual scope of practice, such as nutritional counseling, medication review, or cognitive behavioral therapy.

The program intervention reorganized availability and relocated providers to create dedicated comprehensive patient intake and follow-up visits in a single location, where previously providers had been located at separate physical practice. A weekly team huddle was added to review care goals and discuss changes in patient status, such as ER visits. The intake process included standardized clinical screening questionnaires to assess patient needs (e.g. PHQ-9), followed by a 30' face-to-face visit with each provider, and allowed input from patient-directed goal setting (e.g. if a patient requested nutritional counseling). The initial visit generated an electronic care plan that was reviewed by the care coordinator with the patient at the end of the visit, and sent to the patient's primary care provider after the visit. If treatment goals required physician oversight, such as a medication adjustment, recommendations were sent to the primary care provider to implement. Further visits with each provider were according to individualized patient needs and goals (generally weekly), with updates to the care plan made accordingly. After enrollment, an electronic banner was also placed prominently in the opening page of the patient's electronic medical record, listing the contact information for the care coordinator to facilitate team notification and aid transitions of care for ER visits or admissions. Standardized outreach by the care coordinator to patients was done on a quarterly basis and after any ER visit or hospital discharge, to continue to assess patient needs and adjust services. Patients who had behavioral health needs anticipated to be longer than 12 weeks were referred to their insurance-contracted provider. Intake and follow-up visits were housed in a single practice that offered same-day urgent care appointments with extended access hours (evenings, weekends, holidays) and treatment options (infusions, medication administration), though these services were not specifically included as a part of the intervention. At the conclusion of the pilot, no further new enrollments were accepted and the enhanced program services (such as the duties and role of the program manager, the co-location, team huddles, and intake plans) were phased out over the next month, though patients could continue follow-up with individual providers as usually available to primary care patients within the health system. The program began provider training in November 2013, patient intake began in December 2013, and the pilot concluded in September 2015.

Program Evaluation and Data Analysis

Pre-intervention data were extracted for 12 months prior to rolling date of patient enrollment. The first intake visit for the program began on December 7, 2013 and on a rolling basis weekly thereafter, with the final data freeze date for all patients of September 15, 2015. For inclusion in data analysis, all patients had at least 30 days of post-intervention follow-up time. Data were extracted from the health record via chart review.

The primary outcome was total ER utilization. Secondary outcomes included ER utilization for ambulatory care-sensitive conditions (ACSC, CMS defined), all-cause and ACSC urgent (non-elective) hospital admissions, 30-day all-cause and ACSC hospital readmissions, primary care visits, and specialty care visits. Patient data were grouped into months after program enrollment to calculate incidence.

Utilization patterns for the primary and secondary outcomes were plotted to visualize trends over time. Statistical evaluation of changes in trends was performed using generalized linear mixed-effects models with patient random effects. Time was modeled as a piecewise linear term, to compare pre-enrollment and post-enrollment rates of change. Models were adjusted for gender, race (Caucasian/Asian/Other and African-American/Latino), age, and number of CMS-defined chronic conditions. The 12-month average incidence rate for the primary outcome for pre- versus post-enrollment periods were estimated by the same model, but with only one binary covariate representing pre- or post-enrollment. Significance was based on $p < 0.05$. Data analysis was performed using R v. 3.3.2 (<http://www.r-project.org>).

Cost savings were calculated by ER visits averted from change in average incidence rates per month in the pre- versus post-program enrollment period. Costs for program, inclusive of the time for training and weekly program activities, were calculated as the salary and benefits for the addition of a 0.35 full-time-equivalent (FTE) program manager and redistribution of 3 hours per week of the other team providers (average contribution of 0.08 of FTE). Time for staff training and implementation was accounted for as an extra month added to the 21 months of operation. For all patients who receive primary care in this health system (regardless of program enrollment), ambulatory visits with pharmacy, short-term behavioral health, nutrition, and care coordination occur outside of insurance reimbursement and do not require additional patient fees.

Results

Through ER visit lists or referral, 345 patients were screened by chart review by program staff. Of these, 131 (38.0%) were excluded or did not meet inclusion criteria. Of the 214 (62.0%) eligible, 92 (43.0%) declined to participate, 21 (9.8%) were contacted, but were lost to follow up after the initial phone call without attending an intake visit, and 35 (16.4%) were unable to be reached. A total of 66 patients (19.1% of patients screened) were enrolled and attended the first visit. One patient dropped out of the program after the first visit for unknown reasons and was not included in the analysis. The remaining 65 patients were included in the analysis (Figure 1).

Patients enrolled on a rolling basis throughout the program (Table 1). The average age of a MyCare Program patient was 61 years, over 60% were female, and over half were Caucasian. Almost half (47.8%) had at least one chronic pain diagnosis, and 40.8% had a diagnosis of major depression. There was a high distribution of multiple chronic conditions, as described in Table 1.

Data modeling showed a statistically significant trend of increasing all-cause ER utilization prior to, and decreasing utilization following implementation of the intervention. The overall incidence rates by month for all-cause ER visits are shown in Figure 2. The monthly multiplicative change in odds of all-cause ER visits for the pre-enrollment period was 1.07 (95% CI 1.01–1.13), which declined to an odds ratio of 0.88 (95% CI 0.86–0.90) post-enrollment, with a difference ratio of 0.82 (95% CI 0.74–0.92) significant at $p < 0.001$. This translates to a monthly increase before the intervention in odds of all-cause ER visits of 7%, compared to a monthly decrease of 12% after the intervention. Similar trends changes were also observed in pre- versus post-enrollment for the secondary outcomes of ACSC ER visits, all-cause admissions, ACSC and all-cause readmissions, primary care visits, and specialty care visits. There was no statistically significant trend for ACSC admissions. These data are shown in Table 2.

The 12-month average incidence rate of all-cause ER visits for patients prior to enrollment in the program was 113 visits per 100 patient-years (PY, 95% CI 82–156). This declined post-enrollment to an average incidence rate of 77 visits/100 PY (95% CI 54–111). The 31.9% decline in all-cause ER visits corresponds to an estimated cost-savings to payors of \$2,324 per ER visit averted (system proxy cost estimate). For the pilot 65 patients alone at the pre-enrollment ER rates, this would correspond to 40 visits averted over 21 months of follow-up, a cost savings of \$93,000. Implementation costs of the program and estimated operational costs for the 21-month pilot with 1 month of staff training were \$91,000.

Limitations

There were a number of limitations to this pilot. First, any pre- versus post-comparison has flaws when inferring causality, particularly with a small sample size. However, despite national attention on high-utilizers and multidisciplinary models, no concurrent programs within this health system were initiated at the same time of this intervention that should have confounded results. Moreover, the rolling enrollment by month strengthens the argument that the regression model is identifying the program as a point of change dividing use trends pre- versus post-enrollment for each patient. Unfortunately, due to the foundation of this program as a primarily quality-based intervention, there was no enrolled equivalent control group, thus self-selection bias is likely present. Additionally, with any group of utilization outliers such as patients within this program, there may be regression to the mean across time. This was addressed to the extent possible by evaluating multiple utilization outcomes, as well as ensuring adequate follow-up time. Lastly, the cost-benefit analysis is a simplified approximation of costs within a system that is already resource-rich, underestimating the start-up costs to a smaller health system.

Discussion

Both financial incentives and the growing needs of an increasingly chronically ill population create demand for emerging models of ambulatory care. This small, medical trainee-designed pilot program was intended to target the complex needs of high-utilizing patients, as well as to reduce unnecessary utilization of the ER and hospital. Retention in the program was high once patients attended the first intake visit. Participating patients improved ER utilization rates and use patterns after enrollment and sustained this decreased utilization for over 20 months. Hospitalization admissions, readmissions, primary care and specialty care visit trends also declined after program enrollment.

This study suggests the value of an interprofessional care group on ER use for chronically ill, high-utilizing patients. Illustrating the degree of high utilization represented in this group, the baseline rate of ER visits for the MyCare Program patients was over 10-fold that found in patients enrolled in a care coordinator intervention in the same health system.¹⁵ The reduction in visits post-enrollment was greater than found in that study's care coordinator intervention, or that of another large-scale interdisciplinary team-based program involving physicians.¹⁶ The impact on hospital readmission and admission trends is also notable, particularly combined with the decline in primary care and specialty care visit trends. Optimistically, this could represent improved health outcomes and patient self-management, or a substitution of care providers as patients were seen regularly by program staff. Alternatively, this could represent an overall decline in patronage of the academic health system, which is not unprecedented in high-utilizers.¹⁷ However, in this scenario greater attrition from the program could have been anticipated as patients sought care elsewhere. External changes within the larger health system were less likely responsible; there were no major system alterations during this time, and the system has ongoing average national indices such as unplanned readmissions for Medicare patients.^{17,18} The findings of a cost-neutral program at the conclusion of the pilot are not surprising given the resource investments, and failure to find cost savings is a known possible consequence in similar programs.^{13,19}

Conclusions and Implications

Interventions targeted at high-utilizing patients are diverse, but no consensus exists regarding optimal models. This pilot program reorganized non-physician providers, added program management, and enhanced team-based services to create an interprofessional care group for high-utilizing, chronically ill patients, with an aim of improving ER and other measures of health services use. Among enrolled patients, ER visits showed improvement in utilization in pre- versus post-enrollment. Other utilization trends at the hospital level and at the ambulatory practice level also showed a change from increasing to decreasing use trends. Simplified cost benefit analysis estimated offset implementation and program operation costs through utilization reduction. This pilot shows tentative success for an innovative neutral-cost model of care on healthcare utilization, with specific implications for the organizational strategies of health care systems with similar resources.

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Figure 1.

Patient flow for enrollment in an ambulatory interprofessional care group for high-utilizing adult patients between December 7, 2013 to September 15, 2015. SNF = Skilled nursing facility. HH = Receiving home health services. LE = Life expectancy less than six months. LTFU = Loss to follow up.

Figure 2.

All-cause emergency room (ER) utilization for MyCare Program patients for the 12 months pre- and 21 months post-intervention (intervention at month 0), shown as average incidence rate (visits to ER per patients enrolled per month).

TABLE 1

Baseline characteristics at enrollment and participation by program month for MyCare Program patients from December 7, 2013 – September 15, 2015.

	<i>N</i> = 65	%
Mean Age, Years (SD)	61.4 (16.8)	-
Female sex	41	63.1%
Race ¹		
Caucasian	35	53.8%
African-American	9	13.8%
Latino/a	8	12.3%
Asian	6	9.2%
Diagnoses at enrollment		
Pain disorder ²	31	47.7%
Cancer ³	13	20.0%
Atrial fibrillation	8	12.3%
Congestive heart failure	15	23.1%
Diabetes mellitus	19	29.2%
Chronic kidney disease	23	35.4%
Hypertension	46	70.8%
Depression	33	50.8%
Enrollment by quarter ⁴		
Month 0 – 2	10	15.4%
Month 3 – 5	18	27.7%
Month 6 – 8	12	18.5%
Month 9 – 11	10	15.4%
Month 12 – 14	7	10.8%
Month 15 – 17	8	12.3%
Month 18 – 20	0	-

¹Self-described, not shown if did not answer (n = 7).

²Chronic pain, fibromyalgia, neuropathic pain.

³Breast, prostate, lung, or colorectal cancer.

⁴Ninety-day quarters began December 7, 2013.

TABLE 2

Utilization trends for MyCare Program patients prior to and after intervention. Odds ratios show monthly multiplicative change in odds of ER utilization pre- and post-intervention.

	Pre-enrollment Odds Ratio (95% CI)	Post-enrollment Odds Ratio (95% CI)	Difference Ratio (95% CI)	p value
All-cause ER visits	1.07 (1.01, 1.13)	0.88 (0.86, 0.90)	0.82 (0.74, 0.92)	< 0.001
ACSC ER visits	1.04 (0.95, 1.14)	0.83 (0.81, 0.85)	0.80 (0.65, 0.99)	0.043
All-cause admissions	1.05 (1.01, 1.10)	0.91 (0.89, 0.93)	0.87 (0.80, 0.95)	0.002
ACSC-cause admissions	1.07 (0.97, 1.20)	0.90 (0.87, 0.92)	0.84 (0.69, 1.02)	0.084
All-cause readmissions	1.04 (1.01, 1.06)	0.96 (0.94, 0.98)	0.93 (0.89, 0.97)	< 0.001
ACSC-cause readmissions	1.04 (1.02, 1.06)	0.96 (0.94, 0.98)	0.93 (0.89, 0.97)	< 0.001
Clinic visits, primary care	1.07 (1.04, 1.11)	0.93 (0.91, 0.96)	0.87 (0.81, 0.93)	< 0.001
Clinic visits, specialty care	1.04 (1.03, 1.06)	0.97 (0.94, 0.99)	0.93 (0.90, 0.96)	< 0.001