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Innovative Approach to Patient-Centered Care Coordination in Primary Care Practices

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ABSTRACT

Objectives: Although care coordination is an essential component of the patient-centered medical home structure, current case manager models have limited usefulness to population health because they typically serve a small group of patients defined based on disease or utilization. Our objective was to support our health system's population health by implementing and evaluating a program that embedded nonlicensed coordinators within our primary care practices to support physicians in executing care plans and communicating with patients.

Study Design: Matched case-control differences-in-differences.

Methods: Comprehensive care coordinators (CCC) were introduced into 14 of the system's 28 practice sites in 2 waves. After a structured training program, CCCs identified, engaged, and intervened among patients within the practice in conjunction with practice primary care providers. We counted and broadly coded CCC activities that were documented in the intervention database. We examined the impact of CCC intervention on emergency department (ED) utilization at the practice level using a negative binomial multivariate regression model controlling for age, gender, and medical complexity.

Results: CCCs touched 10,500 unique patients over a 1-year period. CCC interventions included execution of care (38%), coordination of transitions (32%), self-management support/link to community resources (15%), monitor and follow-up (10%), and patient assessment (1%). The CCC intervention group had a 20% greater reduction in its prepost ED visit rate compared with the control group (P <.0001).

Conclusions: Our CCC intervention demonstrated a significant reduction in ED visits by focusing on the centrality of the primary care provider and practice. Our model may serve as a cost-effective and scalable alternative for care coordination in primary care.

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The passage of the Affordable Care Act (ACA) reinforced primary care practice redesign as the main element for providing optimal population health.[1] This redesign takes many forms, but the term "patient-centered medical home" (PCMH) has come to describe the ideal practice.[2-4] The PCMH is central to healthcare reform, with national organizations (eg, National Committee for Quality Assurance, URAC) having certified thousands of practices as PCMHs and some state programs providing financial rewards for acquiring certifications.[5-7] However, the last decade of experience demonstrates that PCMH transformation is difficult, disruptive, and expensive.[6,8] Although PCMH demonstrations have shown improved outcomes, real-world applications of PCMH practice redesign have inconsistently improved quality and utilization metrics.[9-12] Our University of California at Los Angeles health system (UCLA Health), consisting of over 28 primary care practice sites, developed a transformation model to implement practice redesign swiftly and broadly across our network. Our approach included aspects from many PCMH domains, centering on an innovative approach for coordinating patient care.

Care coordination is a core component of the PCMH model[13] and was one of the "7 Joint Principles" promulgated by the primary care societies.[14] Most of the literature on PCMH care coordination describes programs oriented around patients who are high-risk utilizers, have specific medical conditions, or are discharged from the hospital.[15-19] These programs are frequently delivered from an external administrative unit separated from the primary care ambulatory practice, such as by the patient's health plan, a health maintenance organization (HMO), or an intensive ambulatory practice.[20,21] Care coordination models without a tight linkage to primary care did not meet our health system's priorities of providing population-based care management that strengthens the patient–primary care physician (PCP) relationship.

Take-Away Points

We implemented and evaluated a program that augmented the primary care practice's role as the medical home by embedding nonlicensed personnel to coordinate care. Our comprehensive care coordinators (CCCs) were trained within our system, were co-located with the primary care physicians, served patients from all payers, and received support from centrally based licensed personnel.

- In 1 year, CCCs touched nearly 14,000 unique patients, primarily executing the physician's plan of care or coordinating transitions.
- We found a 20% year-over-year greater reduction in emergency department visits among the patient population attributed to the 14 practices with CCCs compared with 14 practices without.

In our PCMH model, a comprehensive care coordinator (CCC) is embedded in each practice with the flexible job role of providing additional support to any patient who needs it within the practice's panel. Some have proposed this role as part of the PCMH model, and we innovatively filled this role with nonlicensed staff instead of case managers, social workers, or counselors.[22] These CCCs extend PCPs' reach by addressing barriers to coordinated care through short- and long-term relationships with patients. Our CCCs act more as patient navigators than health coaches, as the emerging literature differentiates the roles of nonlicensed personnel.[23,24] In contrast to typical navigators, CCCs perform this function as part of the care team by reviewing the electronic medical record (EMR) system and executing care plans. Our care coordination model prioritizes higher-need patients with unmet medical or social needs, but moves away from empaneling patients solely by disease or risk of future utilization. Whereas UCLA Health has population-based capitation and risk-sharing contracts, many patients are in traditional fee-for-service plans and the CCCs support patients irrespective of insurance type.

In this paper, we describe the structure of our care coordination program, including the CCC's training, typical work flow, and number and types of interventions delivered over 1 year. We hypothesized that providing care coordination through embedded, nonlicensed personnel to a broad and heterogeneous group of patients would allow our practices to deliver more complete primary care. We tested this hypothesis by examining emergency department (ED) utilization between practices with and without a CCC.

METHODS

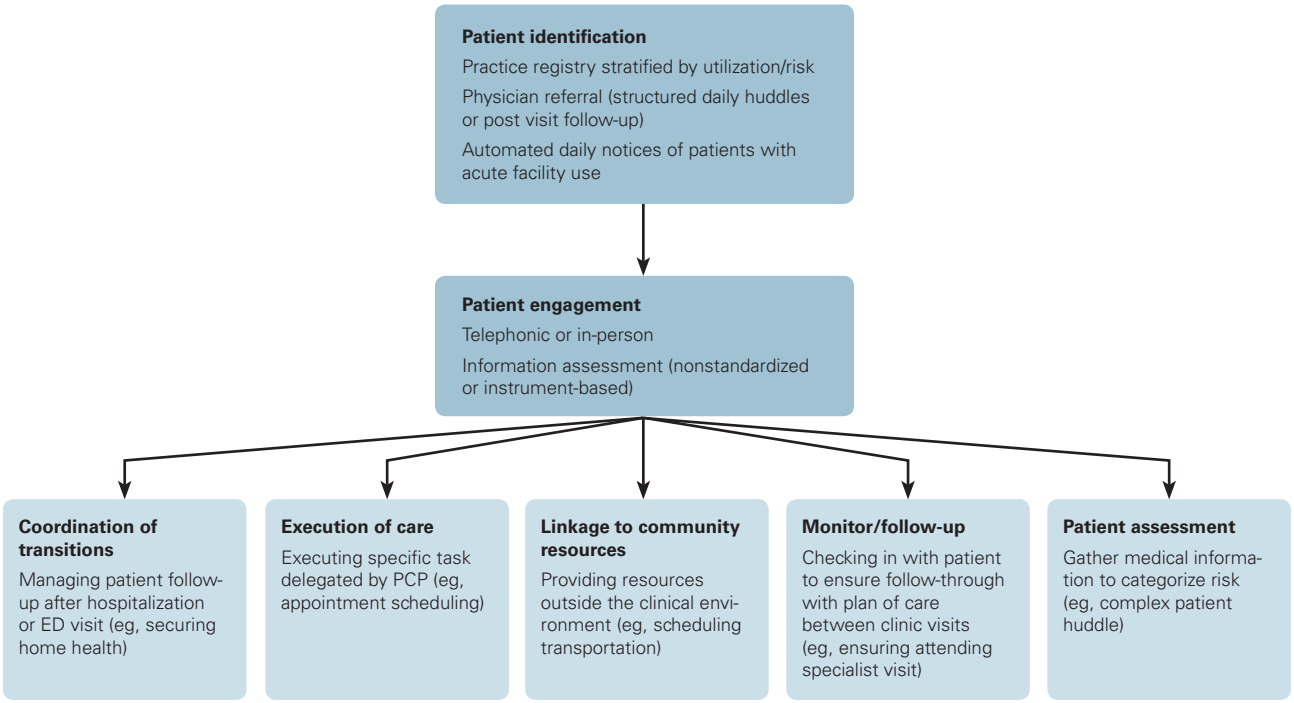
Program Description

We embedded 1 CCC per practice in 14 of the 28 primary care sites within UCLA Health. CCCs were not required to have specific healthcare training or licensure; instead, we sought prior experience functioning in complex organizations, acting independently to solve problems, and participating within busy teams. Many had been medical assistants, military medic or corpsman, emergency medical technicians, or community health workers.

Because they did not have formal licensure and training, 2 types of support were provided to promote effective and high-quality patient care. First, the CCCs completed approximately 40 hours of initial training under a case manager and licensed social workers. The curriculum included topics on problem solving, patient engagement, post acute–care planning, socio-behavioral risk assessment, physician communication, community resources, and health plan navigation. This introduction was reinforced through new CCCs shadowing a veteran for 2 weeks and then through case-based problem solving at biweekly, 2-hour CCC conferences. The second source of support for CCCs was a centralized team of more highly trained personnel that consisted of an RN program director, a nurse case manager and a licensed clinical social worker. These individuals were available telephonically to answer complex questions, provide consultation for complex case management needs, or to perform medical interventions, such as home visits, that require licensure and training. We had a ratio of approximately 1 licensed personnel to 7 CCCs.

CCCs identified patients in need of coordination (patient identification), engaged in outreach to patients (patient engagement), and performed 1 or more interventions usually during a time frame of the next several days to weeks depending on the need (**Figure 1**). While all patients within the practice's panel qualified for a CCC intervention, 3 categories of patients were identified to receive targeted efforts: patients recently in an acute care setting (ED or hospital), patients with high utilization rates or high-risk scores, and patients directly referred by the primary care provider. CCCs identified patients in these categories through regular automated reports and registries, structured huddles with the care team, or informal communication with PCPs. Each practice integrated its CCC into the PCMH team in different ways, but at minimum, the main touch point was a CCC–PCP daily huddle with CCCs followed by coordination with the practice's front- and back-office staff (electronically or in-person) to define each patient's needs. CCCs reached out to patients directly, either by phone or in person, reviewed the patient's medical record, and per-

Figure 1. CCC Work Flow and Interventions



CCC indicates comprehensive care coordinator; ED, emergency department; PCP, primary care physician.

formed an informal assessment of barriers to care. Based on this assessment, CCCs performed 1 or more interventions in the following categories: coordination of transitions, execution of care plan, monitoring and follow-up between visits, linkage to community resources, and/or patient assessment. The decision to "discharge" a patient from the CCC's list was made by the PCP–CCC dyad, not by centrally defined criteria. CCCs documented in an internally developed online Patient Care Coordination System (PCCS); initially, PCCS was not linked to UCLA's EMR, but subsequently, copies of PCCS documents were automatically ported over.

Setting and Implementation

Among the primary care practices within UCLA Health, most are traditional community-based practices with full-time clinicians; only 3 are academic with trainees. These practices include family medicine, internal medicine, internal medicine-pediatric, and geriatric physicians. The number of PCPs in these practices ranged from 3 to 11; however, to ensure co-location, 1 CCC was embedded in each practice. CCCs were introduced into the intervention sites in 2 waves: wave 1 consisted of 5 practices starting in May 2012 and wave 2 consisted of 9 practices starting in November 2012. The first wave was considered a 6-month pilot phase that helped shape the implementation process and the CCC work flow for the second wave. The control sites were the remaining 14 practices, which did not receive a CCC.

Program Evaluation and Analysis

We tabulated the total number of CCC "touches" and unique patients touched in the PCCS documentation system from May 2012 to July 2013. A CCC touch was defined as an encounter that a) contributed to the development and/or implementation of a plan of care for a patient or family and b) was documented in PCCS. A coding system to categorize CCC touches was adapted from a systematic review of care coordination published by the Agency for Healthcare Research & Quality,[25] literature on case management, discussions with CCCs, and an exploratory review of the PCCS database. Touches were then classified into 5 broad categories based on manual review of the first full year of PCCS records for the wave-1 practices. Five coders, in total, coded all touches with a high inter-rater reliability ($\kappa = 0.89$).

Table 1. Characteristics of Patients Touched by CCCs From May 2012 to July 2013

Patients eligible for CCC touch	
Number of unique patients in intervention practices	105,840
CCC touches	
Number of unique patients	10,522
Number of unique patients with complex touches[a]	316
Median touches per patient (IQR)[b]	3 (2-9)
Median length of patient engagement, days (IQR)[b]	85 (12-261)
Characteristics of patients touched by CCC	
Mean age (SD)	59.3 (21.7)
Female	61%
RAF score[c]	0.99 (1.1)
% with ED visit in prior 12 months	21.3%

CCC indicates comprehensive care coordinator; ED, emergency department; IQR, interquartile range; RAF, risk adjustment factor.
[a]Complex touch defined by a patient intervention from a licensed (MSW or RN case manager) support staff on the centralized team.
[b]Restricted to patients with 2 or more touches.
[c]RAF score is used by CMS to adjust payments. The average RAF score for Medicare patients is 1.0.

We evaluated the impact of the CCC intervention on ED utilization at the practice level. Although CCCs were available to all patients, we restricted the population used for the evaluation to patients for whom we had full data capture of ED visits: patients in the HMO insurance plan delegated to our medical group. ED visits were identified through encounters at our hospitals' EDs or through paid claims for visits at external facilities. A visit-based attribution rule was used to assign a patient to a PCP, so only patients with at least 1 PCP visit during either the pre- or post time periods were included.

We limited our evaluation to wave-2 practices compared with the 14 control practices that did not have a CCC. The wave-1 practices were not included on account of several differences from the other practices: wave 1's mean age was statistically higher as it included our only geriatrics practice, the time period for wave 1 was different, and wave 1 was seen as a pilot. ED visit rates were calculated for the intervention and control sites based on the 12 months prior to and after the introduction of CCCs into the practices. A negative binomial multivariate regression model was used to test the effect of being in a CCC practice on ED utilization. The models controlled for baseline ED visit rate, age, gender, and risk adjustment factor score (RAF)—a payment modifier used by CMS and a marker of medical complexity. Significance was based on $P < .05$. We also calculated the cost savings for payers accounted by any averted ED visits.

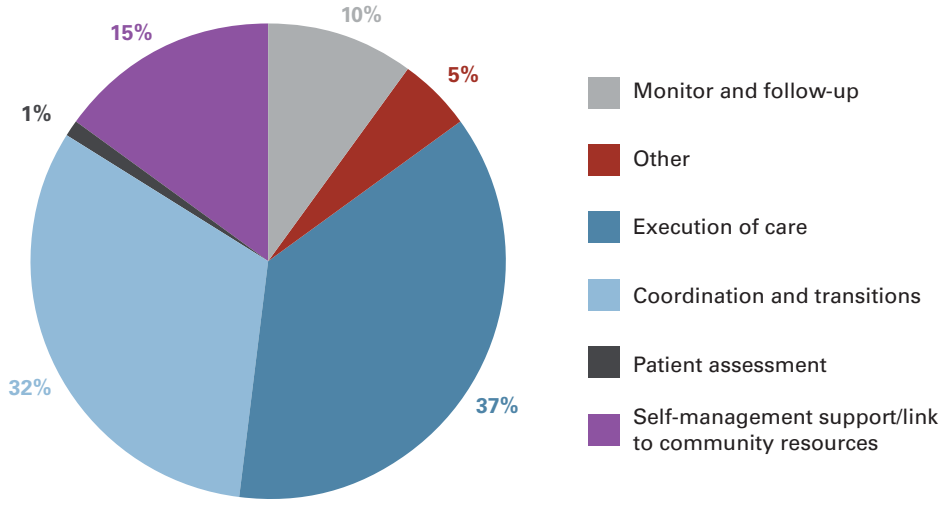
We received UCLA Institutional Review Board exemption for this quality improvement study.

RESULTS

Overall, 105,840 patients from all payers were attributed to the wave-1 and wave-2 practices and were therefore eligible to receive interventions from the CCCs. At the time of the analysis (18 months and 12 months, respectively, after wave 1 and wave 2 were implemented), the 14 CCCs had touched 10,522 unique patients (approximately 10% of those eligible). Therefore, each CCC was, on average, intervening on 53 new patients per month. For approximately one-third of patients, the CCC completed the intervention in a single day by assisting with a care transition or a PCP's plan. For patients engaged by the CCC for 2 or more days, the median number of days touched per patient was 3 (interquartile range [IQR] = 2-9). These engagements lasted for a median of 85 days (IQR = 12-261). The vast majority of identified issues were handled within the office by the nonlicensed CCC, the PCP, and practice staff; only 316 patients (3% of the total) received higher-level care from the centralized nurse case manager or licensed clinical social worker (Table 1). The mean age of patients touched by CCCs was 59 years, and 61% were female. The mean RAF for these patients was 0.99, which is very similar to the average of 1.0 that CMS sets for the full Medicare population. This indicates that those touched were more medically complex than expected for a population of mixed Medicare and commercial insurance. Twenty-one percent had an ED visit in the prior 12 months.

We manually reviewed the 8036 CCC encounter records PCCS database contained over a 1-year period

Figure 2. Distribution of CCC Touches



CCC indicates comprehensive care coordinator.
Categorization is based on case review of 8036 records from the first 5 redesign practices (inter-rater reliability, κ = 0.89).

among the 5 primary care practices in wave 1. The coders categorized these CCC interventions with the following breakdown: 37% execution of care, 32% coordination of transitions, 15% self-management support/link to community resources, 10% monitor and follow-up, 5% unclassified, and 1% patient assessment (**Figure 2**).

For the evaluation, 25,356 unique patients met the inclusion criteria for the wave 2 intervention cohort practices and 18,077 did in the control practices (**Table 2**). The patient characteristics in the intervention and control cohorts were similar ($P > .05$). The preintervention ED visit rate was 131 per 1000 patient-years for the intervention group and 148 per 1000 patient-years in the control group. Post intervention ED visit rates over the 12 months after introduction of the CCC was 118 per 1000 patient-years in the intervention group and 139 per 1000 patient-years in the control group. The negative binomial regression coefficient for the intervention (with the control as the reference) was –0.22 ($P < .0001$). This indicates that after adjusting for age, gender, and medical complexity, the intervention group had a 20% greater reduction in its prepost ED visit rate compared with the control group. We excluded wave 1 in this regression analysis, but in a sensitivity analysis where we combined wave 1 with wave 2, we found a lower but still significant 12% decrease in ED utilization ($\beta = –0.13$; $P < .001$) compared with the control practices.

In absolute terms, this 20% reduction across the 25,356 patients in wave 2 meant a reduction of 646 ED visits over 12 months compared with usual care (ie, that delivered by the controls). At an estimated cost to payers of $2000 per ED visit, in isolation, this is an estimated reduction in total cost of care of $1.4 million. The costs of those personnel dedicated to the program, including salary and benefits for the 14 CCCs and the 2 clinical advisors (but not inclusive of the time from medical directors and other support staff), was approximately $950,000 over that same 12-month period.

DISCUSSION

Our health system implemented primary care practice redesign as part of a comprehensive transition to providing population healthcare. In order to be successful, the redesign needed to touch many patients across the system, could not be disruptive to ongoing practice operations, and had to be affordable during a time when advanced primary care is not fully reimbursed.

To achieve these goals, we designed a PCMH model that enhanced the PCP–patient relationship by extending each practice's ability to support patients leading up to, following up from, and between physician visits. The activities of the CCCs catalogue the core patient- and

Table 2. Intervention-Control Characteristics, ED Visit Rate, and Regression Output

Patient Characteristic	Intervention (wave 1)	Intervention (wave 2)	Controls (wave 3)
N	13,137	25,356	18,077
Mean age, years (SD)	50.6 (20.0)	45.5 (20.0)	46.6 (19.1)
Female, %	55.4%	59.8%	60.7%
Mean RAF score[a] (SD)	0.57 (0.75)	0.47 (0.64)	0.47 (0.60)
ED visits/1000 patient-years:			
Pre 1-year		131 (62)	148 (54)
Post 1-year		118 (51)	139 (53)
Regression coefficient (*P* value)		–0.22 (<.0001)	reference

ED indicates emergency department; RAF, risk adjustment factor.
[a]RAF score is used by CMS to adjust payments. The average RAF score for Medicare patients is 1.0.

physician-centric needs that were not fully met by the traditional primary care practice model within our health system, such as a reliable channel of communication to the PCP, help with navigating the health system or health plan, or assistance with accessing available community resources. Many of these interventions were completed within several days or weeks. In confirmation of how this model differed from prototypical care management programs targeted to certain subsets of higher-need patients, our nonlicensed CCCs touched nearly 1000 patients each—fully 10% of each practices' panels—and only 3% of these patients needed the more complex type of care management offered by licensed personnel. This tiered allocation of personnel types allowed us to meet the needs of our practices and patients with the appropriate person and, in so doing, kept implementation costs low enough to spread the new services broadly across our system. Through this experience, we believe that the optimal ratio is 1 CCC per 4 full-time PCPs (or per approximately 8000 adult patients).

Limitations

Our study had several important limitations. The analysis was conducted at the practice, not patient, level. However, practice-level rates of ED visits are an important indicator of a practice's ability to manage disease progression and provide accessible clinical services. Next, although the intervention applied to all insurance types, in order to meet the imperative of complete data capture, we restricted the analysis to the HMO population delegated to our medical group. Because HMO populations have lower acute facility utilization at baseline, if anything, analyzing this group introduced a conservative bias for detecting a significant effect. Additionally, while the intervention demonstrated significant reduction in ED visits for 1 year, additional analyses are needed to determine whether the intervention has sustained or compounded improvement over time. Lastly, although we found a significant result within 1 institution, this may not be generalizable to other health systems.

Implications

Although our study did not systematically define the possible mechanisms that drove the decrease in ED use, conversation with several CCCs and clinical advisors identified 3 possible explanations that we will examine in future work. First, the CCCs developed relationships with patients and served as a channel of communication to PCPs, which patients used instead of going to the ED. Second, CCCs supported PCPs in delivering complex care (eg, arranging for home intravenous antibiotic medication) to patients who would previously have been sent to the ED. Third, CCCs became skilled in identifying and overcoming the nonmedical obstacles of a large and complex health system, which increased patients' follow-up with services ordered by the PCP.

Our PCMH program was scalable and easily adopted by a large number of practices within a short period. In contrast to other PCMH implementations, little external facilitation was necessary to achieve the successful adoption of the CCC into the care team.[26] The redesign program was led by a centralized team that handled CCC hiring and training, while regular meetings with practice leaders allowed for local adaptation of the model. An internal survey of 52 physicians in the intervention sites (48% response rate) showed positive responses to this approach, with 94% responding that the program was effective and 80% that their patients were overwhelmingly

enthusiastic about the augmented service. As opposed to this practice redesign being disruptive to their care, the PCPs reported that the CCCs saved them an average of 30 minutes per day.[27]

CONCLUSIONS

The ACA rewards health systems for providing comprehensive population management and for reducing the population's total cost of care. Coordinating care is a central competency of organizations that succeed as accountable care organizations.[2] However, many popular care coordination solutions require wholesale change of care delivery processes and can weaken the patient–physician relationship at the heart of patient-centered care.

We developed and tested a care coordination program that enhanced the centrality of the PCP, was implemented widely across a health system and population, and used cost-effective allocation of resources. The program demonstrated a significant reduction in ED utilization, which resulted in a savings just within our HMO population that more than offset the cost of the program over the same time period. When extrapolating the savings to the all-payer population that the program served and to potentially averted hospitalizations, the program is likely highly beneficial to payers—and to our health system for those insurance groups where we have developed shared savings contracts. Given the results of our program, we have expanded CCCs into our remaining primary care practices. We plan future studies including a formal cost-effectiveness analysis and evaluations of effects on other outcomes, including patient experience and acute hospitalizations.

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Authorship Information: Concept and design (RC, NB, PDC, CMM, BM, SAS); acquisition of data (RC, PDC, BM); analysis and interpretation of data (RC, NB, PDC, CHT, CMM, BM); drafting of the manuscript (RC, NB, PDC, CHT, SAS); critical revision of the manuscript for important intellectual content (RC, NB, CMM, BM, SAS); statistical analysis (RC, CHT); obtaining funding (BM, SAS); administrative, technical, or logistic support (RC, SAS); and supervision (RC, BM, SAS).

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