

Using Clinical Microsystems to Implement Care Coordination in Primary Care

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Abstract

Objective: Care coordination is a core competency for primary care nurses and an essential element of the Patient Centered Medical Home (PCMH) model. Implementing care coordination in primary care is challenging and requires changes in roles, staffing, and culture. Clinical Microsystems are frontline teams of healthcare staff that, when engaged in quality improvement, can make important contributions towards practice redesign. We used a Microsystem team to develop an effective model to integrate nurse care coordinators into a busy primary care center.

Methods: A Clinical Microsystem team, supported by an improvement coach, met weekly for one year to develop and test a new nurse staffing model in a large Federally Qualified Health Center. Intervention uptake and impact on workflow was tracked by direct observation of nurses and by measuring volume of nursing visits and virtual contacts. Nurses in a non-participating site with similar characteristics served as a comparison group.

Results: The Microsystem team developed and implemented a new nurse care coordination model for their site. The intervention emphasized patient self-management, independent nursing visits, and hospital and emergency room transition support. The nurse care coordinator in this new role managed 335 patients over a nine-month study period. The nurse in this new role spent 276 minutes over two days of observation engaged in direct care coordination work while two nurses at the comparison site spent only 94 minutes and 149 minutes, respectively, over the same time period.

Conclusion: Engaging front line staff is an effective way for organizations to make changes in delivery systems, improve quality and spread innovations. In this study, a Microsystem team developed a model to provide key components of care coordination to support PCMH practice redesign at a large community health center.

Keywords Clinical microsystems; Primary care; Quality improvement; Medical home; Care coordination

Background

Primary care is at the forefront of efforts to reform the healthcare system in America, and the Patient-Centered Medical Home (PCMH) model of primary care is a promising example of such reform [1]. One of the objectives of the PCMH is to reduce the potentially negative effects of the fragmentation of the health system on patients and their families, especially for those with chronic or complex health conditions who are at high risk for adverse outcomes associated with complications of their conditions [2-5]. To that end, care coordination is one of the core functions of the PCMH [2]. Care coordination is defined broadly as “the deliberate organization of patient care activities between two or more participants involved in a patient’s care to facilitate the appropriate delivery of health care services” [4]. Care coordination can improve patient health outcomes, reduce hospitalizations and readmissions, and can lower overall costs [5-14].

Providing effective care coordination poses significant challenges. The current healthcare system is disjointed, with multiple sources of care and inadequate exchange of patient information between primary care providers (PCPs) and specialists [15]. A typical PCP may share patient care with over 200 other medical providers with whom care

must be coordinated [16]. Few primary care practices have developed standardized approaches to coordinating care. Recent surveys suggest that fewer than 3% of small to medium sized primary care practices use care managers [17], and only 46% of larger practices coordinate care for patients with chronic illnesses [18]. Part of the challenge has been financial, as most care coordination activities are not reimbursable in traditional fee-for-service models.

Primary care nurses are ideally suited to provide care coordination. The American Nurses Association states that “patient-centered care coordination is a core professional standard and competency for all nursing practice” [19]. Furthermore, the Institute of Medicine, in its report on the future of nursing, noted the need for an effective, well-trained nursing staff that practices to the full extent of their education and training [20]. Unfortunately, the role of the primary care nurse has not been well defined.

Efforts to implement a nurse-driven care coordination model face several challenges. First, care coordination remains a poorly defined concept with few models to guide the integration of these services into the primary care staffing model of most health centers. In addition, adopting elements of the PCMH model such as care coordination requires substantial system redesign work and represents a significant change in workplace culture [21].

Clinical Microsystems is a quality improvement methodology emphasizing the engagement of frontline staff to design, test and implement changes in their work environment [22]. A microsystem is a team of healthcare staff who regularly work together to provide care to patients. Such frontline teams, when supported by a trained improvement coach, can play an important role improving the quality of care [23-26]. The Clinical Microsystem approach has resulted in improvements in a wide range of areas including hypertension control [27], cystic fibrosis [28], and perinatal care. With its emphasis on frontline staff engagement and coaching for effective process improvement, this model may be a useful approach to help practices implement the PCMH [29].

As part of an effort to improve the coordination of care and overall health outcomes for complex patients in a large, multi-site Federally Qualified Health Center (FQHC) we conducted a collaborative quality improvement initiative using Clinical Microsystems to design and implement a nurse-led care coordination model. In a previous study, we demonstrated that despite a well-functioning team of PCPs, nurses, and medical assistants, primary care nurses were only able to devote a small amount of each day (15%) to engage in care coordination work. Most of their time was spent on other nursing tasks such as vaccination and medication administration, triage, and paperwork [30]. The goal of this project was to develop a new model that would allow nurses to devote more time and effort to coordination care and improving outcomes for the most complex patients in the practice. In this paper, we describe the quality improvement approach and the care coordination model that was developed.

Methods

Setting

Community Health Center, Inc. (CHCI) is a multi-site FQHC located in Connecticut. CHCI provides comprehensive primary care services in 12 primary care health centers across the state and over 200 additional sites of care including school-based clinics, homeless shelters, and mobile outreach sites. CHCI cares for over 140,000 medically underserved patients. Over 68% are racial/ethnic minorities; over 90% are below 200% of the federal poverty level; 70% have state Medicaid insurance, and 22% are uninsured. Primary care at CHCI is provided by a team of healthcare professionals that includes PCPs, medical assistants (MAs), registered nurses (RNs) and behavioral health providers. PCPs include family practice, pediatric or internal medicine physicians, adult, pediatric or family nurse practitioners, and physician assistants. This study was reviewed and approved by the Institution Review Board of the Community Health Center, Inc.

Clinical microsystems

In 2011 CHCI began using the Clinical Microsystems quality improvement methodology [22,24-26,31-34] as part of an agency-wide effort to improve the quality of patient care and empower frontline staff to play an active role in systems redesign. A Clinical Microsystem is a team whose members work together on a regular basis providing clinical care or other services and have been provided with appropriate training, support, and guidance to work together to improve performance. Microsystems generate new ideas and serve as early adopters of new processes and approaches to patient care. Microsystems provide front line staff opportunities to take ownership of process changes and improvement work at their individual practice location. As part of this initiative, Microsystem teams were recruited

and trained across the agency and provided with an improvement coach and a regular time to meet. Each team was expected to identify areas for improvement in their local site, conduct tests of change, and report regularly on their progress to members of the senior leadership team.

Microsystem teams follow the Clinical Microsystems Improvement Ramp for all improvement projects (Figure 1). The Improvement Ramp provides a structured approach that emphasizes careful review and evaluation of data, global and specific goal setting, measurement of outcomes, and the use of rapid cycle tests of change, Plan Do Study Act (PDSA) cycles, to test and refine new ideas for improvement. All teams start at the bottom of the ramp with a comprehensive analysis of their site's performance and characteristics, which is referred to as the 5P's. The 5P's stand for Purpose, Providers, Patients, Patterns and Processes. The 5P analysis provides teams a structure to use to help identify themes and establish global and specific aims to address areas in need of improvement. Teams can establish a wide range of aims focused on improving care for a specific condition, addressing areas of dissatisfaction for patients and staff, improving a specific performance measure, or improving the efficiency of a specific process. Once the aims and measures have been established, teams conduct flow mapping and brainstorming activities to fully evaluate a process and develop a specific intervention to test. PDSA cycles are rapid tests of change that allow teams to implement new, testable ideas on a small scale and learn from the test before implementing a new process on a larger scale. Teams conduct successive PDSA cycles, refining and making modifications until a new process is developed with demonstrable improved results. Use of this schematic helps teams focus and separate larger issues into well-scoped projects that can be effectively measured and managed.

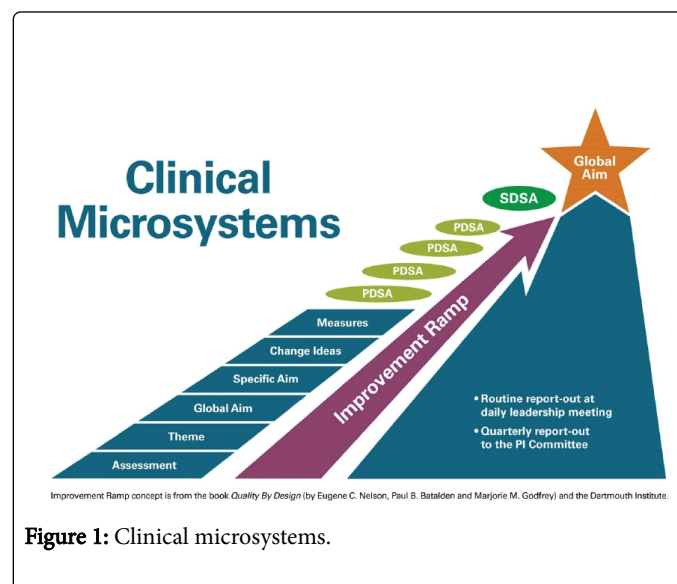


Figure 1: Clinical microsystems.

For this project, a Microsystem team based in one of CHCI's largest sites, serving approximately 21,000 patients, analyzed its 5Ps and identified hospital transitions and poorly controlled chronic illnesses as areas in need of improvement. They chose to design a more effective model to allow nurses to devote time to care coordination and improving outcomes for patients with complex medical needs, particularly those transitioning from hospital to home and those with poorly controlled hypertension. The team was granted dedicated time each week during the workday to meet and conduct improvement

work under supervision and guidance of a trained improvement coach. The project lasted approximately 12 months.

Outcome measures

To assess the workload of care coordination and understand the potential patient impact, we tracked the number of patients who had face-to-face visits with the designated nurse care coordinator (RNCC) and the number of patient and patient-related phone calls made by the RNCC. The RNCC documented telephone and non-face-to-face encounters using a “virtual visit” feature in the electronic health record (EHR). “Virtual visits” and face-to-face contact volume was determined through queries of the EHR. Lastly, we directly observed and recorded all activities carried out by nurses following the implementation, noting the total amount of time each nurse dedicated to care coordination tasks versus other types of work. Nurses working in another practice site with similar staff composition, size, and patient demographics that did not implement the new care coordination

model were used as a comparison group. Using a standardized data collection tool and a stopwatch, the evaluator identified each task completed by the nurse; the time spent completing the task, and the type or category of each task. Five broad categories were defined: 1) Team interaction (discussions with on-site care team members); 2) Patient interaction (direct nurse contact with patient in person or by phone); 3) Outside interaction (discussing patient with non-CHCI personnel such as specialists, visiting nurses, or hospitals); 4) Computer/paperwork (documenting patient encounters, form completion, etc.) and 5) Other. Each category contained multiple subcategories to give as much specificity to the task as possible (Table 1). Tasks that could not be classified by the observer were recorded as “other” and reviewed and classified by the research team using a consensus process during the analysis. In total, the research observer shadowed five nurses for two full eight-hour workdays each. All nurses involved in the study signed informed consent to participate.

Team Interaction	
Pre-Huddle prep work*	
Morning Huddle*	
Discuss patient with primary care physician*	
Discuss patient with another nurse*	
Discuss patient with medical assistant	
Discuss patient with pharmacist*	
Discuss schedule with front desk	
Meeting/committee work	
Discuss patient with behavioral health clinician/licensed clinical social worker*	
Other interpersonal interaction (non-patient related)	
Patient Contact	
Vaccines	Spirometry
Patient triage at CHC	Suboxone follow up
Medical emergency (“Code Blue”)	Tobacco cessation counseling*
Associated or Independent nurse visit	Tuberculin skin test plant or read
Blood pressure check*	Urine toxicology screen
Depo-Provera injection	Urinary tract infection
Diabetic foot exam	Unstable patient
Ear lavage	Women, Infants and Children (WIC) support
Electrocardiogram	Wound care
Home blood pressure monitoring*	Other
International normalized ratio (INR) check	Patient phone call
Insulin titration*	Complaint
Lab results review*	Initial visit prep

Lead check	Review Lab results*
Medication administration	Medication question
Medication reconciliation*	Medication refill needed
New-born screening visit	Symptoms
Patient education and self-management*	Needs paperwork
Peg-Interferon Hepatitis C treatment	Needs appointment
Phlebotomy	Pain-related complaint
Pregnancy test	Referral question
Prescription pick up	Other
Retinopathy screening	
Outside Interaction	
Make visiting nurse referral	
Discuss patient with visiting nurse*	
Make specialty referral	
Discuss patient with specialist*	
Discuss patient with hospital*	
Discuss patient with emergency department*	
Discuss patient with school nurse*	
Discuss patient with Department of Children and Families*	
Pharmacy call	
Prior authorization for insurance	
Other (patient related)	
Other (non-patient related)	
Computer/Paperwork	
Web INR online tracking system	
Pediatric lead screening log	
Addressing EHR internal messages from other staff	
Charting patients' encounters	
Pharmacy patient assistance forms	
Reportable communicable disease forms	
Other patient form completion	
Joint Commission work	
Department of Children and Families work	
Adolescent chart audit	
Email/faxing/scanning/letter writing (patient related)	
Personal organization (i.e., Human Resource forms, time cards, etc.)	

Restock/ organize dispensary

Table 1: Nursing activities.

Using a well-established framework for care coordination [35] we classified the following tasks as representing care coordination work: communication amongst care team members or with outside specialists, nurses, and hospitals that related to coordinating a specific patient's care, and direct patient contact via phone or in-person that focused on disease management, self-management, or follow up after a hospitalization or visit to another care provider. Examples of tasks that did not represent a care coordination activity included completing forms and other paperwork, administering vaccinations and medications, and conducting triage.

Analysis

We used simple statistics to tally and average the time spent completing various tasks by the RNCC, other nurses at the same site, and nurses at the comparison site. Given the small sample size, statistical tests for significance were not performed.

Results

Clinical microsystems

The Microsystem team met weekly for the duration of the study. Based on their analysis of baseline data they chose to develop a team based approach focused on coordinating care more efficiently. With the assistance of a coach they developed and refined a new nursing care coordination model by conducting approximately 10 PDSA cycles focused on areas such as workflow, developing a new vaccine administration process, devising a new clerical assistant role, testing a new patient intake process, developing a nursing visit focused on patient self-management, and designing a new process to improve follow-up of patients with recent hospital discharges. The final model divided the nursing staff into two discreet roles RNCC, and a primary care nurse (PCRN).

Care coordinator role

The job of care coordination was assigned to one designated nurse, the RNCC, who supported eight primary care clinicians. This nurse was given dedicated time each day to coordinate care for specific patients assigned to her. All other routine daily tasks requiring a nursing license, such as administering immunizations and other injections, medications and nebulizer treatments, as well as point of care testing, triage, basic patient education, medical care under standing orders, and telephone follow up, were provided by the PCRN.

Specific functions of the RNCC included: Using data from the EHR to identify complex patients (those with uncontrolled diabetes, hypertension, recent hospital discharge, and frequent emergency rooms visits) who needed additional support, conducting weekly "panel management" team meetings with providers to review and

discuss care plans, contacting patients within 48 hours from a hospital discharge to provide transition care support, contacting patients recently discharged from an emergency room, coordinating office follow-up care for complex patients, managing abnormal cancer screening follow up, coordinating care with home health care agencies/ social services, hospital discharge planners, hospitalists and emergency room staff, conducting nursing visits with patients for chronic disease support, medication adherence, medication reconciliation, self-management training and education, supporting group medical visits, and assisting patients to attend scheduled medical visits.

Care coordinator workload

The RNCC at the intervention site accepted referrals from the patient panels of eight PCPs and over nine months provided care coordination for 335 patients. During this period the RNCC created or responded to 675 virtual visit encounters. Of these patients, 74 had one documented virtual encounter each, 100 patients had 2 to 5 each, 30 patients with 6 to 10 each, 6 patients had greater than 11 encounters and 125 patients did not have virtual visit encounters recorded in the EHR. These virtual visits included patient-related contact with CHCI providers, outside providers, pharmacies, and other supportive services and represent a broad measure of workload for the RNCC. In addition, the RNCC conducted 198 independent nurse visits for 99 unique patients, ranging from one to eleven visits per patient.

Workflow observation

To gain a better understanding of how much time nurses in different roles devoted to different tasks we observed five nurses, including the RNCC from the intervention site, PCRN from the intervention site, and two nurses from a matched comparison for site two full workdays each to determine the amount of time they each devoted to care coordination activities. The RNCC at the intervention site spent 276 minutes over two days of observation engaged in direct care coordination work (Table 2), while two nurses at the comparison site spent only 94 minutes and 149 minutes, respectively, over the same time period, engaged in care coordination work. Two PCRN at the intervention site assigned to routine primary care (non-care coordination) work spent only 87 and 85 minutes over two days engaged in activity classified as care coordination. The increase in care coordination work by the RNCC was largely accounted for by more time spent more time on hospital transition care coordination, medication reconciliation, blood pressure follow up, communication with visiting nurses (VNA), and self-management support. Little or no time was devoted to these activities in the comparison site, despite there being a similar population of patients with high hospitalization rates and high rates of poorly controlled chronic illness.

		Comparison RN 1 (min)	Comparison RN 2 (min)	PCRN 1 (min)	PCRN 2 (min)	RNCC (min)
Team Communication	Morning huddle	-	17	7	9	22
	Discuss patient with Primary Care Provider	6	14	1	9	10
	Discuss patient nurse	-	13	1	1	2
Direct Patient Care	Patient education/self-management	17	-	-	4	-
	Blood pressure check	32	34	-	20	78
	Home blood pressure monitoring	-	-	4	-	-
	Insulin Titration	16	48	-	-	-
	Lab results review	-	-	23	19	-
	Medication Reconciliation	-	-	29	-	14
Patient Communication (Telephone)	Self-Management goal follow up (diabetes)	-	-	-	-	11
	Hospital discharge follow up	4	-	-	-	44
	Lab results	6	11	23	19	10
	Medication Reconciliation	-	-	-	-	12
External Communication	Discuss patient with Visiting Nurses Association	11	13	-	-	50
	Discuss patient with specialist	2	-	-	-	5
	Discuss patient with hospital	-	-	-	3	4
	Discuss patient with emergency department	-	-	-	-	-
	Discuss patient with school nurse	-	-	-	-	-
	Discuss patient with Dept. of Children and Families	-	-	-	-	15
Total minutes on CC over two days		94	149	87	85	276

Table 2: Time engaged by nurses in care coordination work.

Discussion

In this study, we used a formal quality improvement process, Clinical Microsystems, to engage front line healthcare staff to redesign their staff roles to improve the coordination of care for complex patients. By following a structured improvement method the team was able to address critical issues and determine how best to integrate care coordination activities into its clinic workflow. The team developed a new allocation of work and task assignments for the nursing team, with a designated nurse to focus on care coordination tasks, and routine nursing tasks assigned to other nurses. The resulting model did not require any additional staff time, funding, or external support.

This new model was based on the conceptual framework of the Chronic Care Model (CCM) [36]. The CCM proposes that improved patient outcomes can be achieved with a prepared, proactive healthcare team working together with an informed, activated patient. The new nursing intervention heavily emphasized proactive planning and coordination of care to ensure that the care team was optimally prepared to meet the needs of the patients. In addition, self-management support was a key part of the RNCC's new role. This team based intervention focused on coordinating care broadly for a wide

range of patients rather than a more specific case management-type intervention. The team felt that care coordination was a core function that should be embedded in primary care, while case management was often accomplished by specially trained staff working outside the front line team.

The new model had substantial impact on nursing workflow. Prior to implementation of the model, nurses engaged in care coordination work but those tasks accounted for only about 15% of their total workload [30]. Care coordination tasks were often overshadowed by the need to address more immediate tasks such as triage and vaccine administration. After implementation, PCRNs continued to spend about the same amount of time involved with care coordination activity (14%) while RNCC spent nearly half of her time engaged directly in coordinating care and supporting 335 complex patients over the nine month study period. These results suggest that with dedicated time and focus, a primary care team can carry out all needed nursing tasks while still incorporating essential elements of care coordination into its daily work to provide additional support for complex patients. This support includes critical activities such as reconciling medication, teaching self-management skills, and supporting patients transitioning from a recent hospitalization. Based on the work of this microsystem

team, CHCI is now implementing a nursing-based care coordination model across all 12 of its primary care practices.

Improving the ability of primary care practices to meet the needs of complex patients is critical to the success of the PCMH model. The current healthcare system is characterized by disjointed care between primary care, multiple specialists, hospitals, emergency rooms, pharmacies and other sources of care [37]. There are large gaps in the exchange of appropriate patient information between specialists and PCPs [15] and poorly coordinated care amongst multiple care sources leads to inefficiency, reduced quality of care, and errors [38,39].

Healthcare reform efforts are shifting the emphasis to accountable care and value-driven payment models. This shift, combined with incentives to implement the PCMH model, is leading to a growing interest in improving care coordination across the healthcare continuum. However, integrating care coordination into the primary care delivery system is challenging for primary care practices [37] and requires substantial workflow and practice redesign [21]. Many practices struggle to make such significant changes [40]. In this study, we demonstrate how a frontline Microsystem improvement team supported by an improvement coach can tackle these challenges and make fundamental changes in their daily workflow.

Our study has several limitations. The study was observational and not designed to draw statistical comparisons between different nurses with different roles. As a quality improvement project the goal was principally to evaluate the uptake of the intervention and understand how it was impacting nursing work flow. Future studies are underway to capture a wider range of data and longer term patient outcomes to further evaluate the impact of care coordination in primary care.

An additional limitation is the potential inaccuracy in our method for designating specific tasks as representing care coordination. This inaccuracy is partly due to the lack of a formal, widely accepted definition of care coordination. We used a broad definition of the types of tasks that constituted care coordination, based on the framework presented by the Agency for Healthcare Research and Quality [35]. This may have overestimated the amount of time spent truly coordinating care. Additionally, we did not count time spent engaged in documentation and handling messages as part of care coordination. One could argue that such tasks, when related to the care of complex patients; constitute work that should be "counted" as care coordination. Our decision to exclude this work in the definition of care coordination may underestimate the true amount of work spent coordinating care.

Clinical Microsystems represents a powerful tool for practice transformation specifically because it engages frontline staff in the change process. Microsystem teams benefit from the model's formal structure and the support of a trained improvement coach and actively participate in the design, testing, and implementation of new processes. Front line staff provides key insights and take ownership over new processes, and in so doing becoming powerful change agents and ambassadors when spreading these new processes to other locations.

Quality improvement work is often not published in peer-reviewed journals [41]. The quality improvement process is iterative, empiric and often not amenable to controlled designs and structured evaluation. Work such as this however, represents the critical element of practice redesign on the front lines of healthcare reform. Healthcare staff working together to design better ways of caring for patients, following a process such as Clinical Microsystems, is the key to making

meaningful, lasting change that is needed to move healthcare care towards a more effective, efficient, and patient-centered system.

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