



Caring for High-Need, High-Cost Patients: What Makes for a Successful Care Management Program?

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Abstract Provider groups taking on risk for the overall costs of care in accountable care organizations are developing care management programs to improve care and thereby control costs. Many such programs target “high-need, high-cost” patients: those with multiple or complex conditions, often combined with behavioral health problems or socioeconomic challenges. In this study we compared the operational approaches of 18 successful complex care management programs in order to offer guidance to providers, payers, and policymakers on best practices for complex care management. We found that effective programs customize their approach to their local contexts and caseloads; use a combination of qualitative and quantitative methods to identify patients; consider care coordination one of their key roles; focus on building trusting relationships with patients as well as their primary care providers; match team composition and interventions to patient needs; offer specialized training for team members; and use technology to bolster their efforts.

OVERVIEW

As the United States grapples with steeply rising health care costs, payers, providers, and policymakers are seeking ways to improve the efficiency of health care delivery. One strategy pursued by nearly all provider groups participating in accountable care organizations that assume financial risk is to manage the care they provide to “high-need, high-cost” patients—those requiring complex, multifaceted care.¹ While there is growing consensus on the importance of this approach to controlling costs, there is little to guide stakeholders as to the best practices for deploying care management programs.

What Is Complex Care Management?

While there are several types of care management interventions, we focus here on programs in which specially trained, multidisciplinary teams coordinate closely with primary care teams to meet the needs of patients with multiple chronic conditions or advanced illness, many of whom face social or economic barriers in accessing services.²

Primary care–integrated complex care management (CCM) programs perform four essential activities³:

1. Identifying and engaging patients who are at high risk for poor outcomes and unnecessary utilization.
2. Performing comprehensive health assessments to identify problems that, if addressed through effective interventions, will improve care and reduce the need for expensive services.
3. Working closely with patients and their caregivers as well primary care, specialty, behavioral health, and social service providers.
4. Rapidly and effectively responding to changes in patients' conditions to avoid use of unnecessary services, particularly emergency department visits or hospitalizations.

CCM extends beyond medical issues to address, to the extent possible, how patients' psychosocial circumstances affect their ability to follow treatment recommendations and achieve a healthy lifestyle. The goals are to maintain or improve patients' functional status, increase their capacity to self-manage their condition, eliminate unnecessary clinical testing, and reduce the need for acute care services.

To date, there is scant evidence of the effectiveness of primary care–integrated CCM in reducing overall health care costs. Many programs demonstrate improved quality or reduced acute care utilization, but their effects on net costs have been inconsistent across programs.⁴ Poor implementation at any point along this pathway reduces effectiveness and may explain the failure to demonstrate cost savings.

To help guide health care providers, administrators, health system leaders, and payers that are investing in and implementing interventions for complex, high-cost patients, in this brief we describe the models and best practices of 18 successful CCM programs. We identified programs through literature review, recommendations of an expert steering committee, and snowball sampling.⁵ [Appendix Table 1](#) provides an overview of each of the 18 programs, which are located in rural and urban areas in 14 states and focus on high-risk populations across payer types. [Appendix Table 2](#) summarizes the care utilization, cost, and quality outcomes data for each program. Finally, for our inclusion criteria and data collection approach, see the [About This Study](#) box.

WHAT MAKES FOR AN EFFECTIVE CCM PROGRAM?

Following is a summary of key findings based on our investigation of effective CCM programs.

CCM programs must be tailored to their particular context. Contextual factors include practice size, location in an urban or rural area, and program sponsorship and governance.

- Small, independent practices, which are less likely to have a sufficient number of complex patients to justify investment in a CCM team, need to share CCM resources with each other. Regional care management entities that serve multiple practices are particularly well suited for areas where smaller practices predominate—for example, in rural locales.
- CCM programs in rural settings require greater team resources or smaller caseloads to offset the increased travel time and relative scarcity of community resources.
- Larger practices with sufficient numbers of complex patients should have embedded care managers at primary care practices and other key sites. Some CCM team members can be shared across practices.
- Primary care teams familiar with the principles of team-based care and quality improvement processes are likely to be supportive of CCM programs. Conversely, CCM team members may facilitate practice change at primary care sites.

Exhibit 1. Operational Control in CCM Programs: Advantages/Disadvantages of Different Approaches

Operational Control Type	Advantages	Disadvantages
Payer-operated	<ul style="list-style-type: none"> • Greater flexibility • Access to financial resources 	<ul style="list-style-type: none"> • Greater challenges engaging patients and providers • Limit use of CCM resources to their members
Practice-operated	<ul style="list-style-type: none"> • Greater opportunity for primary care integration 	<ul style="list-style-type: none"> • Care managers pulled from care management tasks to cover day-to-day clinic duties
Delivery system-operated	<ul style="list-style-type: none"> • Central oversight of care management activities • Economies of scale—formal training opportunities, peer-learning, improved data integration, and greater connectivity with providers/care managers across the delivery system 	<ul style="list-style-type: none"> • May limit use of CCM resources to specific members for which the delivery system is at risk
Independent Regional Care Management Organization	<ul style="list-style-type: none"> • Allow implementation in places where a small number of complex patients make it difficult to embed CCM teams into practices • Economies of scale—formal training opportunities, peer-learning, improved data integration, and quality improvement capacity 	<ul style="list-style-type: none"> • Greater challenges engaging patients and providers • Limit use of CCM resources to their members

In selecting patients, CCM programs aim to identify individuals who are at the highest risk for poor outcomes and who would benefit from the planned care management interventions. This requires alignment between selected populations, interventions, and desired outcomes, and a combined quantitative and qualitative approach appears to work best.

- The most reliable approach combines use of risk prediction software, chronic disease criteria, or utilization thresholds with patient/provider referrals or assessments. In this hybrid approach, providers must clearly understand the program goals and available care management interventions to select the right patients.
- Focusing enrollment around acute care events, such as emergency department (ED) visits and hospitalizations, helps target opportunities to reduce costs and facilitate patient engagement.

Exhibit 2. Patient Selection in CCM Programs: Advantages/Disadvantages of Different Approaches

Patient Selection Approach	Advantage	Disadvantage
Quantitative risk-prediction tools	<ul style="list-style-type: none"> • Well-validated for identifying a subset of high-risk patients • Provides the most complete picture of expenditures 	<ul style="list-style-type: none"> • May not adequately identify psychosocially complex patients, for example, in Medicaid populations) • Depends on completeness of claims data; lack of continuous claims data in Medicaid because of frequent disenrollment may reduce precision of predictive modeling
Acute-care-utilization focused	<ul style="list-style-type: none"> • Identifies a high-risk population at a time of significant need and opportunity for impact 	<ul style="list-style-type: none"> • Misses high-risk patients who do not use acute care services • Does not identify factors that drive admissions to guide intervention
High-risk-condition- or medication-focused	<ul style="list-style-type: none"> • Widely available and easy to implement • More straightforward for providers to address 	<ul style="list-style-type: none"> • May not adequately identify patients at high risk for utilization/costs
Health risk assessment	<ul style="list-style-type: none"> • Combines the strengths of all the quantitative approaches and brings data together from multiple sources (including qualitative assessments) 	<ul style="list-style-type: none"> • Implementation is resource-intensive
Referral by physician or staff, or patient self-referral	<ul style="list-style-type: none"> • Providers prefer to have the ability to refer their patients to CCM programs 	<ul style="list-style-type: none"> • Provider referral identifies patients that are challenging to manage, but not necessarily those at high risk for future utilization/costs • Patient self-referral may identify motivated patients, who afford a greater opportunity for impact, but often have higher self-efficacy and more vulnerable patients are excluded
Hybrid—quantitative and qualitative	<ul style="list-style-type: none"> • May be most reliable approach to selecting high-risk patients that are most likely to respond to CCM • Takes advantage of the strengths of different approaches 	<ul style="list-style-type: none"> • More complex to implement

The composition of the CCM team must be tailored to the target population and constructed to effectively deliver the desired outcomes.

- Programs frequently configure multidisciplinary CCM teams around one or more primary care manager(s). This was typically a nurse, although social workers and community health workers may be a better fit for hard-to-engage patients with major psychosocial barriers to care.
- Other key team roles include: care manager, community resource specialist, behavioral health provider, pharmacist, and health coach/community health worker, other clinician specialists (e.g., geriatrician/psychiatrist), and administrative and analytic support staff.
- Sharing some CCM team members (e.g., behavioral health providers and pharmacists) across multiple CCM teams was an effective strategy to improve efficiency.
- Teamwork is facilitated through face-to-face meetings and use of a shared information technology platform for secure communication.

PATIENT ENGAGEMENT AT CAMDEN COALITION: MAKING THE RIGHT PITCH

The first approach to a patient is important. Camden Coalition, based in Camden, New Jersey, uses a tailored approach to introduce its program to prospective patients. First, a team member tries to approach prospective patients during a hospitalization or emergency department visit—when they are likely to have a number of acute needs and thus be receptive to offers of help. Then, instead of generically presenting Camden Coalition’s services, a team member asks open-ended questions. Armed with an understanding of a patient’s priorities and needs, the team member can then tailor the presentation of Camden’s services to those needs. The coalition reports that few patients decline services when approached in this way.

The needs of the patients being served and the CCM team composition determine the appropriate caseload as well as the frequency and location of interactions.

- Caseloads for the primary care manager or CCM team unit ranged from 25 to 500 patients, although not all patients were active at any given time. Care managers typically interact with their patients weekly to monthly, although crisis can drive daily interactions. Program protocols and the care manager’s clinical judgment dictate frequency of scheduled interactions.
- Most interactions took place by telephone. In-person visits typically occurred at primary care practices, but also occurred in hospitals, emergency departments, and patients’ homes.
- Adding additional team members, optimizing team function, effectively prioritizing patients by levels of risk, and selective use of remote monitoring make CCM teams more efficient and able to carry larger caseloads or have more time for face-to-face interactions.

The key task for the CCM team is to build trusting relationships with patients/families as well as with primary care providers and their staff.

- Upon meeting patients, care managers find it effective to have direct recommendations or “warm handoffs” from their primary care physicians. Some care managers accompany patients to their primary care visits.
- Approaching patients during times of high need (e.g., during hospitalization) and addressing language and cultural barriers with concordant and approachable staff are also important.

- Patient assessments should take into account gaps in care as well as functional status, patient activation, behavioral health and social service needs, and barriers to care. It is then important to negotiate a care plan that reflects the priorities and preferences of patients and their families.
- Use of motivational interviewing is an important way to encourage patient activation and self-management.
- Educating providers about the roles and responsibilities of care managers and providing complementary services that fill patient care gaps help generate trust and support.
- Frequent interactions between the CCM and primary care teams improve communication and build trust.

To perform their key role of coordinating patients' care, CCM teams must ensure all providers share information, secure smooth referrals, and help patients find needed resources in health systems and in communities.

- Programs focus on ensuring safe care transitions through tools such as medication reconciliation and by developing action plans when certain trigger events occur.
- CCM teams that receive timely notifications of their patients' emergency department visits may be able to intervene to avoid hospitalization.
- CCM teams need to develop protocols for end-of-life services, such as completion of advanced directives. A few programs expanded access to palliative care for patients expected to live longer than six months.
- Care coordination requires CCM teams to assess existing services and develop strategies to fill any gaps. They also must develop effective working relationships with hospitals, skilled nursing facilities, and other clinical providers, as well as with community service providers.

Care coordination is a specialized field like any other: team members require customized training, including both didactic experiences and mentoring/shadowing.

- It is important to seek out care managers and other members of the team who are able to build trust with patients and primary care team members.

Health information technology can be a powerful enabler of effective care management, though there are significant gaps in functionality among existing tools.

- Priorities for use of health information technology include: accessing real-time data (e.g., on hospital discharges); facilitating documentation, communication, decision support, and automated reminders; and remote patient monitoring and engagement. Remote monitoring allows the CCM team to track stable patients and alerts the CCM team to declines in patient health. To address communication barriers in high-risk patients, one CCM program even provides free mobile phone services.

GRACE CARE PLANNING PROCESS

The Geriatric Resources for Assessment and Care of Elders (GRACE) program, developed at the Indianapolis-based Wishard Health Services, was created to manage the care of vulnerable elderly patients by an interdisciplinary geriatrics team. To develop care plans, team members consider: dementia, depression, ambulation, urinary continence, nutrition, pain, vision, hearing, medications, health maintenance, advance care planning, and caregiver burden.

A nurse practitioner and social worker assess patients in their homes and then follow standard protocols to develop plans based on their findings. Plans are then presented to the full care management team, whose members prioritize interventions and generate reports for patients' primary care physicians, who review them and provide feedback. The nurse practitioner and social worker then review each plan with patients to ensure they are consistent with their preferences before implementing them. The assessment and care plan are maintained in a central information technology system, enabling the care manager to update and review it as needed.

CONCLUSION

The science of complex care management is still in its infancy. Nonetheless, we encountered many similarities in the design and operations of a diverse group of successful programs. While the evolving nature of CCM made identifying best practices difficult, program leaders and team members endorsed several operational approaches. Perhaps most important, they thought that they had not exhausted the opportunities to improve care and reduce cost for these complex patients. Both the emergence of key operational characteristics of successful programs and the apparent opportunity for continued improvement of these programs should spur policymakers to reduce barriers to more widespread adoption of primary care–integrated, complex care management programs.

AVERTING UNNECESSARY UTILIZATION: CAREOREGON

CareOregon care managers engage patients in the emergency department (ED) with the goal of connecting high utilizers with patient-centered medical homes. Previously developed ED treatment plans are faxed to the ED at the time of the patient visit. The treatment plan includes reminders to call the CCM program outreach workers and direct the patient back to the primary care practice.

A plan might include language such as, “*Working on pain management plan, please do not give the patient opiate,*” or “*Patient has a history of coronary artery disease, but repeated negative work ups for recurrent chest pain suggest chest pain is related to anxiety.*”

Appendix Table 1. Summary of Primary Care–Integrated, Complex Care Management Programs

Program	Rural/ Urban	State/ National	Predominant Payer Type(s)	Definition of Complex Patient	Operational Control	Part of Primary Care Enhancement (PCMH) or High-Risk Strategy?	Level of Primary Care Integration	Funding
Aetna's Medicare Advantage Provider Collaboration Program	Both	National	Medicare	<ul style="list-style-type: none"> • Risk score* • Frequent admission/ED visits • Predictive algorithm for readmission • High-risk diagnoses • Advanced illness predictive algorithm (risk of death in 12 months) 	Payer	High risk	Off-site with frequent interaction; embedded (when >1,000 Aetna patients)	Payer
AtlantiCare Special Care Center	Urban	New Jersey	Commercial	Health risk assessment based on diagnoses, medication counts, acute care utilization, psychosocial issues	Delivery system	High risk	Integrated part of primary care team	Payer/ employer
Camden Coalition	Urban	New Jersey	Medicaid	Two or more chronic disease–related admissions in six months	Regional CM organization	High risk	Off-site with frequent interaction	Grant
Care Management Plus	Urban	Oregon/National	Medicare	<ul style="list-style-type: none"> • Risk score* • Frequent admissions • Specific high risk medication changes • Confirmation by primary care team review 	Delivery system	High risk	Embedded but not fully integrated	Grant/ health system
CareOregon Health Resilience Program (working on behalf of Health Share of Oregon)	Urban	Oregon	Medicaid	<ul style="list-style-type: none"> • Referral • Utilization threshold – >1 non-obstetrics admission or 6+ ED visits in 12 months 	Payer and coordinated care organization	PCMH	Embedded, but not fully integrated	Payer
Community Care of North Carolina (Community Care of the Sandhills)	Rural	North Carolina	Medicaid	<ul style="list-style-type: none"> • Frequent admissions—greater than anticipated for disease “burden” • Multiple chronic conditions (3M Clinical Risk Groups) • Referral from primary care 	Regional CM organization	PCMH	Off-site with frequent interaction	Payer
The Everett Clinic	Urban	Washington	Commercial/ Medicare	<ul style="list-style-type: none"> • High cost • High utilizers 	Delivery system	High risk	Embedded	Payer/ employer/ health system
Fletcher Allen Health Care–Vermont Blueprint Community Health Team (CHT)–Burlington	Both	Vermont	All Payer	<ul style="list-style-type: none"> • Frequent inappropriate utilization • Poorly controlled chronic conditions • Referral 	Delivery system	PCMH	Off-site with frequent interaction	Payer/ health system
Geisinger ProvenHealth Navigator	Rural	Pennsylvania	All Payer	<ul style="list-style-type: none"> • Risk score* • Referral 	Payer/delivery system	PCMH	Integrated part of primary care team/off-site with frequent interaction	Payer/ health system
Genesys HealthWorks Health Navigator	Urban	Michigan	County Health Plan/Uninsured	<ul style="list-style-type: none"> • Poorly control chronic conditions • Acute medical or social care need • Intermediate (not the highest) cost 	Payer/delivery system	PCMH	Off-site with frequent interaction/integrated part of primary care team (1 practice)	Payer/ health system

Program	Rural/ Urban	State/ National	Predominant Payer Type(s)	Definition of Complex Patient	Operational Control	Part of Primary Care Enhancement (PCMH) or High-Risk Strategy?	Level of Primary Care Integration	Funding
Geriatric Resources for Assessment and Care of Elders (GRACE)	Urban	Indiana	Medicare/ Medicaid	<ul style="list-style-type: none"> Risk score*: high risk of hospitalization based on probability of repeated admissions (PRA)—score >0.4/hour 	Delivery system	High risk	Off-site with frequent interaction	Grant/ health system
Guided Care	Urban	Maryland	Medicare	<ul style="list-style-type: none"> Risk score* (original study) Physician referral (current) 	Delivery system	High risk	Embedded but not fully integrated	Grant/ health system
Health Quality Partners	Rural/ Suburban	Pennsylvania	Medicare/ Medicare Advantage	<ul style="list-style-type: none"> Medicare: One or more high-risk chronic conditions (CHF, CAD, diabetes, and COPD) combined with one or more hospitalizations in prior year Aetna Medicare Advantage Risk score plus one or more high-risk chronic conditions Sutter Health Questionnaire 	Regional CM organization	High risk	Off-site with frequent interaction	Payer
King County Care Partners	Urban	Washington	Medicaid	Risk score*	Regional CM organization	High risk	Off-site with frequent interaction**	Payer
Massachusetts General Hospital Care Management Program	Urban	Massachusetts	Medicare	Risk score* combined with annual cost of care	Delivery system	High risk	Embedded, but not fully integrated	Payer/ health system
New York City Health and Hospitals Chronic Illness Demonstration Project: Hospital to Home	Urban	New York	Fee-for-service Medicaid	Risk score*	Delivery system	High risk	Embedded/integrated part of primary care team	Grant/ health system
Oklahoma SoonerCare Health Management Program	Both	Oklahoma	Medicaid	<ul style="list-style-type: none"> Risk score* One or more chronic conditions 	Payer	PCMH	Off-site with frequent (urban) and occasional (rural) interaction	Payer
Sutter Care Coordination Program	Urban	California	Commercial/ Medicare	<ul style="list-style-type: none"> Referral Any one of the following: <ul style="list-style-type: none"> Unplanned readmission within 30 days Two or more admissions in past year Two or more ED visits in past year Seven or more medications Diagnosis of CHF, COPD, or pneumonia Three or more chronic conditions 	Payer/ Delivery system	High risk	Embedded/off-site with regular interaction	Payer/ health system

* A risk score is a product of predictive modeling that generally takes into account age, gender, medical diagnoses and procedures, prescription use, and/or prior utilization or health expenditure.

** King County Care Partners has a “champion” embedded at each primary care site.

Key to Abbreviations

CAD: coronary artery disease

CHF: congestive heart failure

COPD: chronic obstructive pulmonary disease

ED: emergency department

PCMH: patient-centered medical home

Appendix Table 2. Outcomes from 18 Primary Care–Integrated Complex Care Management Programs

Program/Population	Utilization/Cost			Quality		
	Admission/ Readmission	Emergency Department Utilization	Cost of Care	Quality of Care	Provider Experience	Quality of Life/ Patient Experience
Aetna's Medicare Advantage Provider Collaboration Program Medicare	Decreased admissions by 38% (year 1), 35% (year 2), 30% (year 3) vs. controls; 30-day all-cause hospital readmission rates were 5% (year 1); 11% (year 2), and 9% (year 3) ⁶ [Evidence Level 2]	Decreased ED visits by 28% (year 1), 28% (year 2), and increase by 12% (year 3) vs. controls ¹ [Evidence Level 2]	Decreased total cost by 19% (year 1), 26% (year 2), 33% (year 3) vs. controls ¹ [Evidence Level 2]	In year 3, 99% of patients had an annual office visit, 98% of patients with CHF, diabetes, or COPD had semiannual visits; 99% of patients with diabetes received HbA1c test; 95% of patients discharged from hospital or skilled nursing facility had a follow-up visit within 30 days ¹ [Evidence Level 3]	Physicians reported that the program saves time, they have greater certainty that recommendation will be followed, they appreciate patient updates ¹ [Evidence Level 3]	No data
AtlantiCare Special Care Center All Payers	Decreased admissions by >20% for SCC enrollees vs. propensity matched controls ⁷ [Evidence Level 2]	Decreased ED visits by >20% for SCC enrollees vs. propensity matched controls ² [Evidence Level 2]	Decreased cost of care trend from 25% to 4% annual rise post-enrollment ² [Evidence Level 3]	Increased proportion of patients with LDL<100 from 55% to 65%; increased medication adherence rate; decreased smoking rate compared to national average ² [Evidence Level 3]	Clinic staff reported increased job satisfaction; health coaches were interested in their roles and took initiative to learn more ² [Evidence Level 3]	Increased proportion of patients who reported their PCP seemed informed and up-to-date about care received from specialists (51% to 93%) and knowledgeable about their medical history (56% to 93%) ⁴ [Evidence Level 3]
Camden Coalition (Link2Care–Camden Care Management Program) Medicaid and Medicare	Decreased admissions by 57% per month among “super-users” ⁸ [Evidence Level 3]	Decreased ED visits by 33% among “super-users” ³ [Evidence Level 3]	Decreased costs of care (charges incurred) by 56% among “super-users” ⁹ [Evidence Level 3]			Decreased patient-perceived mean number of unhealthy days (e.g., activities disrupted because of physical or mental health issues) [Evidence Level 3]
Care Management Plus Medicare/Mixed	Decreased admissions by 1% (year 1) and 3% (year 2); decreased admissions in diabetes patients by 5% (year 1) and 9% (year 2) ¹⁰ [Evidence Level 2]	Increased ED visits by 1% (year 1) and 6%* (year 2); decreased ED visits by 3% (year 1) and increased ED visits in diabetes patients by 3% (year 2) ⁵ [Evidence Level 2]	Mean reduction of \$200K per primary care practice because of avoidance of unnecessary services ¹¹ [Evidence Level 2]	Decreased mortality by 3% (year 1 and 2) vs. control; decreased mortality in diabetes patients by 4% (year 1) and 5% (year 2) vs. control in diabetes patients; HbA1c levels decreased 300% greater than control group ⁶ [Evidence Level 2]	Providers report time-savings, better patient engagement and understanding, and more efficient team performance [Evidence Level 3]	
CareOregon Health Resilience Program (working on behalf of Health Share of Oregon) Medicaid	Decreased non-obstetric hospital admissions by 34% ⁷ [Evidence Level 3]	Decreased ED visits by 33% ⁷ [Evidence Level 3]			Clinic staff reported deep connection with patients, decreased burden, and increased satisfaction ¹² [Evidence Level 3]	Patients reported strong bond with HRP staff ⁷ [Evidence Level 3]

Program/Population	Utilization/Cost			Quality		
	Admission/Readmission	Emergency Department Utilization	Cost of Care	Quality of Care	Provider Experience	Quality of Life/Patient Experience
Community Care of North Carolina (Community Care of the Sandhills) Medicaid	Decreased admissions by 7% (adjusting for clinical severity): 67 PKPY in 2009 to 64 PKPY in 2012 ¹³ [Evidence Level 3]	Decreased ED visits by 4% (adjusting for clinical severity): 807 PKPY in 2009 to 774 PKPY in 2011 ⁷ [Evidence Level 3]	Decreased total cost of care by 3% (adjusting for clinical severity): \$352 PMPM in 2009 to \$332 PMPM in 2011 ⁷ [Evidence Level 3]	Improved outcomes on 17 quality measures (including nine HEDIS measures) in 2012 compared with 2009, and performed better than HEDIS benchmarks for eight of the nine HEDIS measures [Evidence Level 3]		
The Everett Clinic Medicare/Mixed	Decreased 30-day readmissions by 15% ¹⁴ [Evidence Level 2]		Decreased annual per capita spending 20% ⁹ [Evidence Level 2]			SF12 physical functioning and mental functioning increased by 15% and 16%, respectively; 18% more patients reported that they “received care as soon as needed” ⁹ [Evidence Level 3]
Fletcher Allen Health Care–Vermont Blueprint Community Health Team (CHT)–Burlington All Patients (Payer-Blind)	Decreased admission rates by 21% (from 2006-2011)*; decreased admission rate by 6% (over three years) vs. <1% in controls*** ¹⁵ [Evidence Level 2]	Decreased ED visit rates by 32.8% (from 2006-2011)* ¹¹ ; decreased ED visit rates by <1% (over 3 years) vs. an increase in controls by 10%*** ⁹ [Evidence Level 2]	Increased in annual per capita expenditures by 22% vs. 25% in controls ¹⁰ [Evidence Level 2]	Decreased body-mass index by 59.1%, improved HbA1c 66.7% with an average decrease of >1% and improved in LDL by 31.6% with an average decreased of 24mg/dl; CHT patients six months after graduation had an average weight loss of 14lbs ¹⁶ [Evidence Level 2]		Patient experience across all domains was higher in the CHT group compared with the non-CHT group ¹⁰ [Evidence Level 2]
Geisinger ProvenHealth Navigator All Patients (Payer-Blind)	Decreased admission rates by 18% (over four years); decreased 30-day readmission rates by 24% (over four years) ¹⁷ [Evidence Level 2]	No change in ED visit rates per 1,000 (over four years) vs. an increase in controls ¹³ [Evidence Level 2]	Decreased total expenditures by 8% (over four years) ¹³ [Evidence Level 2]	Improved HEDIS measures (LDL control, blood pressure control, HbA1c testing, diabetic eye exam, microalbuminuria, therapy for rheumatoid arthritis, and imaging for low back) ¹³ [Evidence Level 2]	86% of PCPs reported the program allowed them to provide more comprehensive care; 93% of PCPs agree/agree strongly that they would recommend the program to others ¹³ [Evidence Level 3]	72% of patients believed quality of care was better ¹³ [Evidence Level 3]
Genesys HealthWorks Health Navigator All Patients (Payer-Blind)	Decreased admission rates by 70% (2008), 25% (2009), and 32% (2010) ¹⁸ [Evidence Level 3]	Decreased ED visits by 58% (2008), 47% (2009), and 47% (2010) ¹⁴ [Evidence Level 3]		Increased in HbA1c checks and annual eye exam rates; patients reported increased healthy behaviors (increased fruits/vegetables/exercise, decreased smoking, increased medication adherence) ¹⁴ [Evidence Level 3]		Overall patient satisfaction was >98% in all years surveyed ¹⁴ [Evidence Level 3]

Program/Population	Utilization/Cost			Quality		
	Admission/ Readmission	Emergency Department Utilization	Cost of Care	Quality of Care	Provider Experience	Quality of Life/ Patient Experience
Geriatric Resources for Assessment and Care of Elders (GRACE) Medicare/Dual Eligible	Decreased admission rates by 12% (year 1), 44% (year 2) ^S , and 40% (year 3, post-intervention) ^{S,4,2} and decreased readmission rates by 74% (7-day) ^S , 45% (30-day), and 40% (90-day) ^{S,19} for those at highest risk of hospitalization [Evidence Level 1]	Decreased ED utilization rates by 5% (year 1), 35% (year 2) ^S , and 21% (year 3, post-intervention) ^{S,4,2,20} for those at highest risk of hospitalization [Evidence Level 1]	Average total cost of care was \$10.7K vs. \$10.5K in controls (year 1), \$7.5K vs. 9K (year 2), \$5.1K vs. 6.6K (year 3, post-intervention) ^S ; ED expenditure for those at highest risk of hospitalization was \$5.77 vs. \$7.33 in controls (year 2) ²¹ [Evidence Level 1]	Mortality rate was 7.0% vs 7.8% in controls (year 2); “dramatic improvements” in ACOVE quality indicators—general health care (immunizations, continuity) and geriatric conditions (falls, depression) ¹⁵ [Evidence Level 1]	Physicians were much more satisfied with the resources available to treat patients in the GRACE program vs. usual care ^{S,15} [Evidence Level 1]	SF-36 scores improved in four of eight scales: general health, vitality, social function, and mental health ^{S,15} [Evidence Level 1]
Guided Care Medicare	Decreased admission rates by 6% vs. controls; decreased 30-day readmissions by 13% vs. controls ²² [Evidence Level 1]	Increased ED visits by 2% vs. controls ¹⁸ [Evidence Level 1]	Average net savings of \$75,000 per Guided Care nurse per year ²³ [Evidence Level 1]	Mortality was not different in intervention group vs. controls; “aggregate quality of chronic care” was higher vs. controls (at 32 months) ¹⁸ [Evidence Level 1]	Physician satisfaction higher with patient/family communication and knowledge of their patients’ clinical characteristics (at 1 year) ^{S,24} [Evidence Level 1]	Increased odds (OR 1.66 ^S) of “excellent or very good” access to telephone advice vs. controls ¹⁸ [Evidence Level 1]
Health Quality Partners (HQP) Medicare	Decreased admissions among higher-risk subgroups by 25%–39% ²⁵ ; decreased same-hospital 30-day readmissions by 26% ²⁶ among higher-risk subgroups [Evidence Level 1]	Decreased ED visits for higher-risk patients by 37% ^S in high-risk subgroups ²⁷ [Evidence Level 1]	Decreased net expenditures among higher-risk subgroups by 10%–28% ²⁸ ; decreased skilled nursing facility costs by 64% ²⁹ [Evidence Level 1]	Mortality among intervention participants was 9.9% vs. 12.9% in controls (over 4.2 years)—a 25% lower relative risk of death [Evidence Level 1]	67% of physicians, on average, felt that the program increased patients’ overall quality of care; 80% said they would recommend the program to patients and colleagues; “physicians widely agreed that the programs made things easier for the physicians’ office staff and did a good job of monitoring and follow-up” ⁸ [Evidence Level 3]	Patient reported improved ability to get answers from physicians, explain medical terms, and explain warning signs; Health Quality Partners received consistently higher ratings from their patients than did the other programs ³⁰ [Evidence Level 3]
King County Care Partners Medicaid	Decreased admission per 1,000 members by 1.8 vs. controls ²⁵ [Evidence Level 1]	No difference in ED visits vs. control ²⁵ [Evidence Level 1]	Decreased mean total cost of care by \$321 PMPM vs. controls; no differences in total Medicaid medical costs, inpatient costs, ED costs, long-term costs, in-home services costs, and prescription costs ³¹ [Evidence Level 1]	Mortality was 63% lower in the intervention group vs. controls; no difference in time to death ²⁵ [Evidence Level 1]		95% indicated they would recommend program to a friend; 83% indicated that services helped them deal more effectively with their problems ²⁵ [Evidence Level 3]

Program/Population	Utilization/Cost			Quality		
	Admission/Readmission	Emergency Department Utilization	Cost of Care	Quality of Care	Provider Experience	Quality of Life/Patient Experience
Massachusetts General Hospital Care Management Program Medicare	Decreased admission rates by 20%; no change in 90-day readmissions ²⁶ [Evidence Level 2]	Decreased ED visit rates by 13% ²⁶ [Evidence Level 2]	There was a 7% annual net savings; Medicare return on investment was \$2.65 (original intervention group) and \$3.35 (refresh intervention group) ³² [Evidence Level 2]	Decreased mortality for intervention group (16% vs. 20%) (at 36 months) ²⁶ [Evidence Level 2]	67% of the PCPs agreed that the program improved their quality of practice; 73% of the PCPs agreed the CM improved the quality of care ²⁶ [Evidence Level 3]	Patients reported improvements in discussion of treatment choices and communication with health providers ^{5,26} [Evidence Level 3]
New York City Health and Hospitals Chronic Illness Demonstration Project: Hospital to Home Medicaid	Decreased admission rates by 16% (non-homeless), 47% (homeless and housed), and 11% (homeless, not housed) (year 1) and inpatient days by 26% (non-homeless), 75% (homeless and housed), and 3% (homeless, not housed) (year 1) ³³ [Evidence Level 3]	Decreased ED visit rates by 22% (non-homeless), 17% (homeless and housed), and 4% (homeless, not housed) (year 1) ³³ [Evidence Level 3]	Decreased total PMPM costs by 6% (non-homeless), 12% (homeless and housed), and increased total PMPM costs by 11% (homeless, not housed) (year 1) ³³ [Evidence Level 3]			
Oklahoma SoonerCare Health Management Program Medicaid	Decreased inpatient days by 65% (Tier 1) and 56% (Tier 2) vs. MEDai forecast (year 1) ³⁴ [Evidence Level 2]	Decreased ED visit rates per 1,000 patients by 5% (Tier 1) and 18% (Tier 2) vs. MEDai forecast (year 1) ²⁸ [Evidence Level 2]	Increased total PMPM costs by 3% (Tier 1) and decreased by 1% (Tier 2) vs. MEDai forecast (year 1) and decreased by 5% (Tier 1) and 10% (Tier 2) vs. MEDai forecast (year 2) ²⁸ [Evidence Level 2]	Participant completion rate for 17 of the 21 diagnosis-specific measures increased vs. controls; significant for certain asthma, heart failure, CAD, diabetes, and hypertension measures ²⁸ [Evidence Level 2]	87% of practices surveyed reported improved chronic disease care; 68% reported being very satisfied with the program ²⁸ [Evidence Level 3]	86% (Tier 1) and 84% (Tier 2) of patients reported being very satisfied with the program ²⁸ [Evidence Level 3]
Sutter Health Care Coordination Program Medicare	Decreased 30-day readmission rate by 5.7% (year 1), 6% (year 2), and 6% (year 3) vs. control ³⁵ [Evidence Level 3]	Decreased ED visits per 1,000 patients by 699 visits vs. baseline ²⁹ [Evidence Level 3]	Decreased PCP costs by 20%, decreased specialist costs by 48%, decreased acute care costs by 48%, and decreased ED visit costs by 38% ²⁹ [Evidence Level 2]	Decreased HbA1c by 1.5% ^S and decreased LDL by 40mg/dl in patients with diabetes vs. controls ²⁹ [Evidence Level 2]		

^S = statistically significant.

* Data represent finding from the entire enrolled population at Community Care of the Sandhills, and not specifically the high-risk subset. Other Community Care of North Carolina sites may have had different outcomes.

** Within the Chittenden County Program.

*** Overall.

Key to Abbreviations

ACOVE: [Assessing Care of Vulnerable Elders](#)

CAD: coronary artery disease

CHF: congestive heart failure

COPD: chronic obstructive pulmonary disease

ED: emergency department

HbA1c: Hemoglobin A1c

HEDIS: Healthcare Effectiveness Data and Information Set

LDL: Low-density lipoprotein (LDL cholesterol)

Appendix 3. List of Interviewees

Michelle M. Crook, R.N., B.S.N., C.C.M. Randy Krakauer, M.D. Cathy Spencer, R.N.	Aetna's Medicare Advantage Provider Collaboration Program
Sandy Festa, L.C.S.W., C.A.D.C. Maudis Parks Jennifer Puziffero, R.N., M.S.N. Katherine Schneider, M.D.	AtlantiCare Special Care Center
Kelly Craig, M.S.W., L.S.W. Sue Liu, M.P.A. Jason Turi, R.N., M.P.H.	Camden Coalition
David Dorr, M.D., M.S. Kerri Frazier Ann Larsen, R.N., C.D.E. Kelli Radican Liza Widmeir, B.S.N.	Care Management Plus
Laurie Lockert, M.S., L.P.C. Rebecca Ramsay, B.S.N., M.P.H. Amy Vance, M.S.W.	CareOregon Health Resilience Program (working on behalf of Health Share of Oregon)
Brenda Sedberry, R.N. Vivian C. McInnis, R.N. Tammie K. McClean, R.N., B.S.N.	Community Care of North Carolina (Community Care of the Sandhills)
Brenda Rogers, R.N., M.S.N. Kristi Stevens Jennifer Wilson-Norton, R.Ph., M.B.A.	The Everett Clinic
John Brumsted, M.D. Pam Farnham, R.N. Kerry Sullivan, M.S.W.	Fletcher Allen Health Care-Vermont Blueprint Community Health Team (CHT)-Burlington
Diana Jackson Diane Littlewood, R.N., B.S.N., C.D.E. Janet Tomcavage, R.N., M.S.N.	Geisinger ProvenHealth Navigator
Erin Conklin Lisa Horne, M.S.W. Trissa Torres, M.D., M.S.P.H., F.A.C.P.M.	Genesys HealthWorks Health Navigator
Carrie Bone, M.S.N., G.N.P. Jenny Grover, M.S.W. Steven Counsel, M.D. Lois Cross, R.N., B.S.N., A.C.M. Kathy Frank, R.N., Ph.D.	Geriatric Resources for Assessment and Care of Elders (GRACE)
Kathleen Grieve, R.N., B.S.N., M.H.A. Gary Noronha, M.D., F.A.C.P. Lora Rosenthal, R.N., B.A.	Guided Care
Ken Coburn, M.D., M.P.H. Maryellen Keller, R.N., B.S.N. Sherry Marcantonio, M.S.W.	Health Quality Partners
Tia Hallberg, R.N. Daniel Lessler, M.D., M.H.A. Mary Pat O'Reilly	King County Care Partners
Eileen Fagan, R.N., B.S.N. Robin Grossman, R.N. Joanne Kaufman, R.N., M.S.N. Eric Weil, M.D.	Massachusetts General Hospital Care Management Program
Rachel Davis, M.P.A. Ruth Freeman, M.D. Ross Wilson, M.D.	New York City Health and Hospitals Chronic Illness Demonstration Project: Hospital to Home
Tirzha Buczek, R.N. Bobbie Jo McKenzie, R.N. Carolyn Reconnu, R.N., B.S.N. Ronda Scruggs	Oklahoma SoonerCare Health Management Program
Lois Cross, R.N., B.S.N., A.C.M. Michaela Robertson, R.N. Jan Van Der Mei, R.N., S.M., A.C.M.	Sutter Care Coordination Program

ABOUT THIS STUDY

The aim of our study was to identify key operational attributes and best practices of successful primary care-integrated complex care management (PC-CCM) programs. We posed the following primary research questions: 1) What are the core operational attributes and best practices of successful programs? and 2) How are successful programs customized for specific populations or contexts?

We selected sites for potential inclusion in the study based on review of the peer-reviewed and grey literature and snowball sampling, starting with recommendations from an eight-member expert steering committee and involving study participants. Based on inclusion criteria approved by our study steering committee, we selected 20 total sites for inclusion in the study. The criteria were:

1. Focus on complex populations: PC-CCM programs must select a complex population that they deem to be at increased risk for poor health outcomes or high cost (based on any definition).
2. Aligned with primary care: close integration with existing primary care teams.
3. Comprehensive care management focus: focus on the whole person and multimorbidity, rather than a single disease process.
4. Existing data on performance indicating improved outcomes.
5. Currently in operation.

Each site received at least two email invitations to participate in the study. Once sites agreed to participate, they chose a representative site in their system and identified three key informants for interview (see below).

Study Design

We assessed each program using semistructured key-informant interviews and review of published manuscripts and program materials obtained from each of the sites. We performed at least three one-hour, semistructured interviews per site with the following key informants: 1) an executive leader involved in developing or supporting the PC-CCM program, 2) a program director responsible for managing program operation, and 3) a frontline care manager responsible for direct delivery of care to patients. We performed additional interviews, as necessary, to obtain further clarification and detail. We assessed six study domains through these semistructured interviews:

1. Program context and structure
2. Patient selection
3. CCM team structure
4. Scope of work
5. Hiring and training
6. Use of information technology

Program Outcomes

We obtained reports of outcomes from each site. Although some of these programs were evaluated with rigorous methods, not all of these reports were research studies or formal evaluations. As a result, we applied a simplified framework, based on the U.S. Preventive Task Force Methodology, to classify the level of evidence:

- Level I: Evidence obtained from at least one properly designed randomized controlled trial.
- Level II: Evidence obtained from well-designed, cohort case controlled trials, or controlled trials without randomization.
- Level III: Evidence obtained from multiple time series with or without the intervention or dramatic results in uncontrolled trials.

Twenty sites were selected for final inclusion in the study, and 18 sites completed the semistructured interviews. We reviewed program outcomes and ensured that each program met basic criteria for success, defined as positive findings in at least one quality domain and one cost or utilization domain. One site refused to participate and another site did not respond to multiple requests for interviews.

NOTES

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