

Health Affairs

At the Intersection of Health, Health Care and Policy

Cite this article as:
Jingping Xing, Candace Goehring and David Mancuso
Care Coordination Program For Washington State Medicaid Enrollees Reduced
Inpatient Hospital Costs
Health Affairs, 34, no.4 (2015):653-661

doi: 10.1377/hlthaff.2014.0655

The online version of this article, along with updated information and services, is available at:

<http://content.healthaffairs.org/content/34/4/653.full.html>

For Reprints, Links & Permissions:

http://healthaffairs.org/1340_reprints.php

E-mail Alerts : <http://content.healthaffairs.org/subscriptions/etoc.dtl>

To Subscribe: <http://content.healthaffairs.org/subscriptions/online.shtml>

Health Affairs is published monthly by Project HOPE at 7500 Old Georgetown Road, Suite 600, Bethesda, MD 20814-6133. Copyright © 2015 by Project HOPE - The People-to-People Health Foundation. As provided by United States copyright law (Title 17, U.S. Code), no part of *Health Affairs* may be reproduced, displayed, or transmitted in any form or by any means, electronic or mechanical, including photocopying or by information storage or retrieval systems, without prior written permission from the Publisher. All rights reserved.

Copyrighted and published by Project HOPE/Health Affairs as:

Jingping Xing, Candace Goehring, David Mancuso

"Care Coordination Program For Washington State Medicaid Enrollees Reduced Inpatient Hospital Costs"
Health Aff (Millwood). 2015, *Health Affairs*, 34, no.4 (2015):653-661. The published article is archived and available online at www.healthaffairs.org."

Not for commercial use or unauthorized distribution

By Jingping Xing, Candace Goehring, and David Mancuso

Care Coordination Program For Washington State Medicaid Enrollees Reduced Inpatient Hospital Costs

DOI: 10.1377/hlthaff.2014.0655
HEALTH AFFAIRS 34,
NO. 4 (2015): 653–661
©2015 Project HOPE—
The People-to-People Health
Foundation, Inc.

ABSTRACT Managing clinically complex populations poses a major challenge for state agencies trying to control health care costs and improve quality of care for Medicaid beneficiaries. In Washington State a care coordination intervention, the Chronic Care Management program, was implemented for clinically complex Medicaid beneficiaries who met risk criteria defined by a predictive modeling algorithm. We used propensity score matching to evaluate the program's impact on health care spending and utilization and mortality. We found large and significant reductions in inpatient hospital costs (\$318 per member per month) among patients who used the program. The estimated reduction in overall medical costs of \$248 per member per month exceeded the cost of the intervention but did not reach statistical significance. These results suggest that well-designed targeted care coordination services could reduce health care spending for Medicaid beneficiaries with complex health care needs.

Jingping Xing is a research investigator in the Research and Data Analysis Division, Washington State Department of Social and Health Services, in Olympia.

Candace Goehring is chief of the Office of Service Integration, Behavioral Health and Service Integration Administration, in the Washington State Department of Social and Health Services.

David Mancuso (David.Mancuso@dshs.wa.gov) is director of the Research and Data Analysis Division, Washington State Department of Social and Health Services.

The Medicaid program is the largest publicly funded health insurance program for low-income adults and children in the United States. In 2013 it provided coverage for over sixty-two million people.¹ Many Medicaid beneficiaries have health care needs comparable to those of people enrolled in employer-based or privately purchased coverage. However, Medicaid also serves people who have complex medical, behavioral health, and long-term care needs.

A disproportionately large share of Medicaid expenditures is associated with this relatively small subset of the Medicaid population. The elderly and people with disabilities constitute one-quarter of Medicaid enrollees but account for about two-thirds of the program's spending.² Managing clinically complex populations poses a major challenge for state agencies trying to improve health outcomes for Medicaid beneficiaries while controlling growth in health care costs.

Factors driving high health care costs in complex populations include fragmented systems of care and poor access to coordinated care.^{3,4} Care coordination is an intuitively appealing approach to increasing the quality of care and reducing health care spending because it aims to effectively manage chronic conditions, thereby reducing the need for costly hospital stays, improving communication among patients and providers, and better addressing the patient's diverse and complex needs.⁵

However, empirical evidence to support the effectiveness of care coordination has been lacking.^{6,7} Over the past decade the Centers for Medicare and Medicaid Services (CMS) conducted six major demonstrations (involving thirty-four programs) of disease management and care coordination for fee-for-service Medicare beneficiaries. The demonstrations had a variety of interventions and target populations. These programs showed no effect on hospital admissions or Medicare expenditures.⁸

Targeting interventions to beneficiaries with high expected health care costs has shown greater promise: Findings suggest that high-risk patients may experience greater benefits from care coordination, compared to the general intervention group.⁹⁻¹² Randall Brown and colleagues found that four of the eleven programs that were part of the Medicare Coordinated Care Demonstration and that were extended by CMS reduced hospitalization by 8–33 percent among beneficiaries who had high-cost chronic conditions and were at high risk of hospitalization.⁹ However, only two of the fifteen programs in the demonstration reduced hospitalizations (by 7–17 percent) for the full sample of enrollees.¹³ After care management costs were accounted for, the programs that targeted high-risk beneficiaries were cost-neutral.⁹

Similar opportunities might exist for state Medicaid programs to improve the coordination of care for complex high-cost populations. Existing research that examined the impact of Medicaid care coordination and integration—with care coordination services mainly implemented in Medicaid managed care programs—has produced mixed evidence.¹⁴⁻¹⁷ Relatively little is known about states' experiences in designing and implementing care coordination services for the high-risk subgroups of patients with disabilities, who historically have been less likely to be enrolled in managed care than nondisabled Medicaid beneficiaries.¹⁸

The objective of this study was to evaluate the impact of a care coordination intervention for Medicaid beneficiaries in Washington State. The Chronic Care Management program used nurse care managers to coordinate the delivery of medical, behavioral health, and long-term care services; to educate patients to better recognize and respond to signs of worsening health; and to support patients' efforts to achieve self-management goals using behavior-changing techniques such as motivational interviewing. Matching-based statistical methods were used to assess whether the Chronic Care Management program led to savings in health care spending and lower mortality for high-risk beneficiaries with disabilities who were enrolled in fee-for-service Medicaid.

The Intervention

The Chronic Care Management program provided intensive care management, care coordination, and patient education and training in self-management skills for high-risk Medicaid beneficiaries with disabilities. Program eligibility was assessed by physicians and nurse care managers and was limited to people with func-

tional limitations who received in-home personal care to assist them with activities of daily living such as bathing, dressing, eating, using the toilet, and transferring into or out of a bed or chair.

Program eligibility was further limited to beneficiaries with prospective cost-based risk scores in approximately the top 20 percent of the risk distribution of Medicaid beneficiaries with disabilities. These scores were developed using a hybrid of the Chronic Illness and Disability Payment System¹⁹ and Medicaid Rx risk models,²⁰ calibrated to the Washington State population of Medicaid beneficiaries with disabilities.

The Chronic Care Management program built on an Area Agency on Aging case management and in-home service delivery infrastructure. It was implemented in seven Area Agency on Aging service areas across Washington State.

The program's nurse care managers provided care for each patient in collaboration with his or her primary care physician and other providers. When a patient enrolled in the program, an initial comprehensive assessment was conducted. This included use of the state's predictive modeling application, which provided information derived from linked claim, encounter, and assessment data from medical, mental health, chemical dependency, and long-term care service delivery systems.

An individualized health action plan was developed for each patient, which included goals and recommendations for managing the patient's health conditions. The nurse care manager met face-to-face with the patient and his or her primary care physician to refine the health action plan. The plan was implemented through face-to-face and telephone contacts with the patient and his or her caregiver, health care professionals, and other care providers. Patients had face-to-face contact with a nurse care manager at least monthly, and health action plans were reviewed and updated every six weeks.

Nurse care managers also reviewed each patient's financial circumstances, transportation needs, cognitive impairments, and psychosocial issues that might have an impact on his or her care. Examples of coordinating health care and social supportive services include consulting with pharmacists regarding medication management, assessing fall risks and developing a fall prevention plan (for example, conducting a bathroom safety evaluation and making an equipment recommendation), promoting access to appropriate health care services, working with the patient and caregivers to better manage chronic medical conditions such as diabetes, and assisting in the placement of personal medical alert service equipment in the homes of patients who lived alone or in remote areas.

Targeting interventions to beneficiaries with high expected health care costs has shown greater promise.

Nurse care managers worked closely with primary care physicians and other health care providers to improve communication and coordination. The managers often accompanied patients to their office visits.

Nurse care managers also educated patients about, and advised them on the management of, their health conditions. The Chronic Care Management program used the Patient Activation Measure²¹—which assesses a patient's knowledge, skills, and confidence in managing his or her health and health care (the patient's level of health activation)—to help the managers identify the type of care management and coordination support needed by each patient. Guidance and educational materials selected according to the patient's level of activation were provided to improve self-management skills and knowledge of one's conditions.

In addition, nurse care managers were trained in motivational interviewing. This was used to strengthen a patient's motivation for adherence to recommendations related to medication use, behavior, and self-care.

Study Data And Methods

We used a difference-in-differences approach to examine the effect of the Chronic Care Management program on health care costs and utilization, and mortality. Claims data were used to construct measures of health care costs for each beneficiary. Medicaid enrollment status and patient demographic and other characteristics were obtained from integrated client databases maintained by the Washington State Department of Social and Health Services.

STUDY COHORT

► **INTERVENTION GROUP:** The Chronic Care Management program provided services to high-risk Medicaid beneficiaries with disabilities who received in-home personal care through the state's Aging and Long-Term Sup-

port Administration. Treatment group members were enrolled in the program between January 1, 2007, and June 30, 2012. The timing and pattern of enrollment was affected by the timing of development of the program's service delivery capacity during the study period. Eligibility for program participation was determined in multiple waves of risk scoring in the sixty-six-month enrollment period studied here.

In the first three waves of identification of clients eligible for the intervention, which spanned the period from January 2007 to December 2010, 503 clients were identified to program staff as potential enrollees. Of these 503, 175 eventually enrolled in the program's services. Enrollment efforts occurred intermittently as program slots became available. In some cases, enrollment occurred several months after the initial risk scoring identified a person as eligible for the program.

In December 2010 CMS approved an amendment of the state Medicaid plan under Title XIX of the Social Security Act, which allowed Washington State to receive federal funding for clients enrolled in the program. After 2010 two additional regions were added to the project, project staff members were given access to a dynamic risk-scoring application that allowed them to determine program eligibility, and enrollment ramped up more rapidly. As a result, the number of participants in the Chronic Care Management program increased significantly in 2011 and 2012, with the largest wave of enrollment in the last twelve months of the study enrollment period, which ended June 30, 2012. The program ended as the state's Health Home Program (discussed in more detail below) was implemented in July 2013.

Patients' participation in the Chronic Care Management program was voluntary. Before enrolling, each eligible beneficiary was sent information that described the program. The beneficiary's primary care physician was also sent an introductory letter.

In the period 2007–10, when the program enrollment rate could be observed, 35 percent of those eligible chose to participate or could participate, given the program's capacity limits. After this period, program staff were provided with an online risk scoring tool through which they could assess program eligibility for any person served by their agency, as opposed to being provided with a fixed list of eligible beneficiaries to be targeted for enrollment.

Over 95 percent of those enrolled stayed in the program for at least three months. The average duration of enrollment in the program was 10.26 months.

We included beneficiaries ages 18–63 in our

study population. Older beneficiaries, people who were also enrolled in Medicare (“dual eligibles”), and those with third-party coverage whose health care expenditures were not paid exclusively by Medicaid were excluded because of incomplete information about their health care costs. In addition, only beneficiaries who had at least one month of Medicaid eligibility in both the baseline and intervention periods were included in the analyses.

►**PROPENSITY SCORE MATCHING:** We reduced the potential impact of confounding and selection bias by using nearest neighbor propensity score matching (without replacement). We used one-to-one matching between patients in the Chronic Care Management program and comparison patients.

We computed the propensity score using logistic regression with the following covariates: demographic characteristics (age, race/ethnicity, and sex), medical risk score, number of months eligible for Medicaid, substance abuse treatment need, use and costs of health care (total medical costs and costs of in-home services, community residential services, and nursing home services; emergency department [ED] use and costs; and inpatient hospital admission rates and costs), major disease diagnosis groups (cardiovascular, psychiatric, skeletal, central nervous system, pulmonary, gastrointestinal, renal, and metabolic diseases and diabetes), and time period (state fiscal year). See the online Appendix for further details.²²

For key covariates on which a particularly close match was desired—age, medical risk scores, per member per month medical costs, and per member per month total long-term care costs—Mahalanobis distance within propensity score caliper (caliper = 0.05) was used. Substance abuse treatment need was constructed based on the presence of diagnoses of alcohol or drug use disorder, alcohol or drug treatment, or substance-related arrest events.

Interactions and polynomials were considered during variable selection. However, none were of large imbalance in the matched data, and thus they were not included in the final matching process.

For the treatment group, matching variables were based on the twelve-month period before the index month associated with program enrollment. For the comparison group, we created a data set representing the universe of person-months that met eligibility criteria for the program and that were associated with people who did not enroll in it. Matching variables for this group were based on the twelve-month period before the index month associated with each observation.

Poorly coordinated care may lead to confusion about who has primary responsibility for care of the patient.

We took advantage of the availability of comprehensive longitudinal administrative data to create a comparison “matching frame” of beneficiaries eligible for the Chronic Care Management program at all points in time when they might closely match the baseline experience of program participants at the point of their enrollment in the program.

Propensity score matching was performed using the MatchIt package in R, version 3.0.2. All data management and regression analyses were carried out using SAS, version 9.2.

OUTCOME VARIABLES We examined the probability of death and differences in health care costs or utilization. Measures of cost and utilization were computed as the per member per month change (difference) from the pre period to the post period. The pre period refers to the twelve months before the index month; the post period refers to the twelve months beginning with the index month.

The main cost outcomes of interest were differences in total medical costs, inpatient hospital admission costs, nursing home costs, and total long-term care costs. Total medical costs were Medicaid expenditures in areas such as inpatient and outpatient hospital services, physician services, diagnostic tests, durable medical equipment, and prescription drugs. Total long-term care costs were calculated based on five major service categories: those provided by in-home personal care, assisted living facilities, adult family homes, adult residential care facilities, and nursing homes.

Costs were measured as the per member per month amount paid by Medicaid. Costs not covered by Medicaid were excluded. The two measures of health care utilization were inpatient admission and outpatient ED visits. Patients were followed for twelve months after the index month to measure mortality.

ANALYSIS After we used matching to create intervention and comparison groups with ade-

High-cost Medicaid beneficiaries are generally those most in need of care coordination.

quate balance, we used multivariate regression models to identify whether people enrolled in the Chronic Care Management program experienced different changes in costs or use of health care relative to people in the comparison group. The key explanatory variable was whether or not a beneficiary was in the intervention group. A negative coefficient indicated a reduction in per member per month health care costs or use that was associated with the intervention.

We also used variables included in the matching algorithm to control for any residual covariate imbalance between groups. Logistic regression was used to compare the odds of death of those beneficiaries who did receive services from the Chronic Care Management program and the odds of death of beneficiaries who did not.

The net financial benefit was estimated to assess the financial impact of the program from the perspective of Medicaid. The program was funded at a ratio of one nurse care manager for every forty-five beneficiaries. Medicaid paid a fixed care management fee (\$180 per member per month) in addition to paying for services the intervention group members received from their usual health care providers.

The estimated direct cost of providing the Chronic Care Management program was determined for each person in the intervention group based on the number of months he or she was enrolled during the twelve-month study period. Total medical cost savings were calculated based on the regression-adjusted difference in changes in per member per month total medical costs and according to an intention-to-treat approach that included all intervention group members for all eligible months, regardless of whether or not they received services from the Chronic Care Management program in the specific month under consideration.

LIMITATIONS The primary threat to the validity of the findings presented here is selection bias. Propensity score methods were used to match treatment and comparison group members with respect to a large set of patient characteristics,

including pretreatment measures of health service utilization and chronic illness risk factors. Matching achieved good balance on observed baseline patient characteristics, with all absolute standardized differences less than or equal to 0.10 after matching. Matching methods controlled for observed differences between treatment and comparison group members. However, residual unobserved differences could remain and may account for the positive findings reported here.

A second limitation is that outcomes were measured only during the first twelve months after a person's enrollment in the intervention. Enrollment was concentrated in the later period of the program enrollment window. Thus, extending the postenrollment outcome measurement period significantly beyond twelve months would have substantially reduced the number of observations available for analysis. For example, extending the postenrollment outcome measurement period to eighteen months would have required excluding beneficiaries who enrolled in the program in the January–June 2012 window.

Given the fundamental challenge of highly variable medical service use in this high-risk population, we chose to focus on the twelve-month follow-up period. Future work may examine longer-term outcome measures.

Study Results

We identified 910 beneficiaries in the study population who received services from the Chronic Care Management program and met study inclusion criteria, and 13,847 people in the candidate comparison group who did not receive the intervention but met study inclusion criteria in at least one month of the study period. Matching was performed against all 321,555 months in which candidate comparison-group members met study inclusion criteria. Before matching, on average, patients who participated in the program were older; were more likely to be women; and had higher medical risk scores, substance abuse treatment need, and total medical costs (Exhibit 1). There was a high degree of similarity in the patient characteristics after matching, with absolute standardized differences generally less than or equal to 0.10. The propensity score matching resulted in 907 intervention-group members and 907 control-group members.

The regression analysis showed a significant difference of \$318 in per member per month inpatient hospital admission costs associated with enrollment in the Chronic Care Management program (Exhibit 2). The point estimate of the effect on total medical costs was a reduc-

EXHIBIT 1

Selected Patient Characteristics In The Twelve-Month Baseline Period According To Participation In The Washington State Chronic Care Management (CCM) Program

Characteristic	Before propensity score matching			After propensity score matching		
	Received CCM		Difference	Received CCM		Difference
	Yes (n = 910)	No (n = 13,847) ^a		Yes (n = 907)	No (n = 907)	
Age (years)	52.41	50.03	0.27	52.40	52.61	0.02
Female	77.03%	67.62%	0.22	76.96%	76.41%	0.01
Hispanic	8.35%	6.31%	0.07	8.38%	6.95%	0.05
Race ^b						
African American	5.49%	13.94%	0.37	5.51%	6.06%	0.02
American Indian	12.53	9.56	0.09	12.57	11.36	0.04
Asian/Pacific Islander	3.19	10.83	0.44	3.20	4.08	0.05
Other racial/ethnic minority	12.53	16.48	0.12	12.57	11.91	0.02
White	91.76	79.12	0.46	91.73	88.87	0.10
Needed substance abuse treatment	24.51%	16.14%	0.19	24.37%	24.37%	0.00
Medical risk score	3.32	2.00	0.55	3.30	3.22	0.03
PMPM total medical cost	\$2,778.75	\$1,942.97	0.25	\$2,771.70	\$2,632.83	0.04
PMPM long-term care cost	\$1,202.34	\$1,288.94	0.10	\$1,201.86	\$1,194.99	0.01
No. of Medicaid-eligible months	11.65	11.44	0.14	11.65	11.62	0.02
PMPM in-home service cost	\$1,092.95	\$1,222.92	0.16	\$1,092.10	\$1,091.61	0.00
PMPM community residential services cost	\$7.70	\$16.73	0.10	\$7.72	\$5.35	0.03
PMPM nursing home services cost	\$101.70	\$49.29	0.12	\$102.04	\$98.03	0.01
PMPM ED cost	\$100.63	\$58.62	0.22	\$100.37	\$97.00	0.02
No. of PMPM ED visits	0.23	0.14	0.22	0.23	0.22	0.01
PMPM inpatient hospital admission cost	\$1,135.64	\$746.22	0.15	\$1,132.53	\$1,039.09	0.04
No. of PMPM inpatient hospital admissions	0.09	0.05	0.21	0.09	0.08	0.03
State fiscal year						
2007	4.95%	7.75%	0.13	4.96%	6.17%	0.06
2008	5.38	16.44	0.49	5.40	4.85	0.02
2009	4.18	17.83	0.68	4.19	4.52	0.02
2010	8.35	19.10	0.39	8.38	7.06	0.05
2011	11.98	19.17	0.22	12.02	13.12	0.03
2012	65.16	19.69	0.95	65.05	64.28	0.02

SOURCE Authors' analysis of data from the integrated client database maintained by the Washington State Department of Social and Health Services. **NOTES** "Difference" is the absolute standardized difference, or the absolute value of difference in means divided by the standard deviation in the full treated group. CCM is chronic care management. PMPM is per member per month. ED is emergency department. ^aRepresents the average characteristics of 13,847 individuals over the 321,555 person-months during which they met study inclusion criteria. ^bPercentages may not sum to 100 because people could identify themselves as belonging to more than one race.

EXHIBIT 2

Adjusted Difference-in-Differences Estimates Of The Effect Of The Washington State Chronic Care Management Program On Health Care Costs And Mortality

	Coefficient	p value
Per member per month health care costs		
All medical	-\$248	0.09
Inpatient hospital admission	-318	0.01
All long-term care	23	0.43
Nursing home	-18	0.30
Health care use per 1,000 member months		
Inpatient admissions	-9.64	0.13
ED visits	10.81	0.33
	Odds ratio	p value
12-month all-cause mortality	0.82	0.39

SOURCE Authors' analysis of data from the integrated client database maintained by the Washington State Department of Social and Health Services. **NOTE** ED is emergency department.

tion of \$248 per member per month, but this was not significant. The changes in per member per month total long-term care costs after the implementation of the Chronic Care Management program also did not differ significantly between intervention and comparison groups.

In addition, the program did not have a significant impact on per member per month nursing home costs and was not independently associated with a reduction in twelve-month all-cause mortality (Exhibit 2). The point estimate of the effect of participation in the program on inpatient admissions was a reduction of 9.64 admissions per 1,000 member-months, but this effect was not significant. People enrolled in the program did not experience a significant difference in outpatient ED use, relative to people in the comparison group. Detailed regression results are presented in the Appendix.²²

In the current budget climate, it can be challenging to invest additional state dollars in optional Medicaid health services.

The cost of the intervention in the twelve-month follow-up period was \$1,680,480 for the 910 patients who enrolled in the Chronic Care Management program. The 95 percent confidence interval for the estimated impact of the program on total medical costs ranged from savings of \$5,474,150 to an increase of \$437,525 over the follow-up period. Including costs associated with the state Medicaid agency's administration of the program would result in a somewhat lower range of the net savings from the perspective of the agency.

Discussion

Medicaid beneficiaries with disabilities are a heterogeneous population, with a wide range of physical and behavioral health conditions.²³ Beneficiaries rely on the Medicaid program for a broad array of services, including primary and acute medical, behavioral health, and long-term care. Because of their complex and extensive care needs, the 15 percent of Medicaid beneficiaries with disabilities account for 42 percent of total Medicaid expenditures.²

However, Medicaid beneficiaries with disabilities are more likely than other Medicaid beneficiaries to receive their care in a fee-for-service environment²⁴ that incentivizes the provision of high-cost services such as ED visits or hospital admissions, but not care coordination between providers or discharge planning that improves the transition between hospital and home.²⁵ Poorly coordinated care may lead to confusion about who has primary responsibility for care of the patient,²⁶ poor communication among providers, preventable hospitalizations resulting from poor adherence to recommended care, and inappropriate care or gaps in care. High-cost Medicaid beneficiaries are generally those most in need of care coordination. Consequently,

Medicaid beneficiaries with disabilities are increasingly an important focus of state efforts to improve quality of care and address ongoing budget pressures.

We investigated the effect of a care coordination program on health care costs and utilization and mortality for high-risk fee-for-service Medicaid beneficiaries with disabilities. We found significant inpatient hospital admission cost savings among patients who enrolled in the Chronic Care Management program.

Our findings are consistent with those of several previous studies of care coordination interventions that showed impacts concentrated among high-risk patient subgroups.^{9,10} For example, a geriatric care management program for low-income seniors resulted in reduced hospital admissions within a high-risk subgroup, but no significant differences in hospital admission rates between the overall intervention and control groups.¹⁰ The Chronic Care Management program may have been effective in reducing hospital costs in part because it targeted high-risk patients who may present more actionable opportunities to reduce health service use and costs.

The estimated reduction in overall medical costs of \$248 per member per month exceeded the cost of the intervention but did not reach statistical significance. Some of the features of the program that might account for its success include frequent face-to-face contact with patients, facilitating the exchange of patient-related information among health care providers, and use of patient education and behavior-changing techniques such as motivational interviewing.⁹

The program required at least monthly face-to-face contact between patients and nurse care managers, which would allow for closer monitoring of changes in health care needs and provide more opportunities to ensure that the patients received appropriate services. Care managers also made frequent contacts with health care providers to keep them informed of changes in patients' health conditions between office visits. Studies have found that timely sharing of patient information can better inform medical decision making, help avoid readmissions and medication errors, and improve diagnoses of health conditions.²⁷

Health education materials were provided on a wide range of topics, including diet and exercise, chronic disease self-management, medication management, and smoking cessation. A Patient Activation Measure assessment tool was used to measure and monitor the patient's engagement in health management. Research has suggested that higher levels of patient activation are asso-

ciated with greater likelihood of engaging in healthy behaviors that may lead to better health outcomes.²⁸⁻³⁰ In addition, motivational interview training was provided for nurse care managers as a tool to strengthen patient engagement in health management.

All enrollees in the Chronic Care Management program had significant functional limitations for which they received in-home personal care to assist them with activities of daily living. A wide range of interventions were provided to promote the patients' ability to continue to reside safely in their homes. For example, nurse care managers helped assess fall risks and develop fall prevention plans. The managers also facilitated requests for ancillary services such as physical therapy, occupational therapy assessments, and chiropractic services. We note that our results did not show a significant impact of the Chronic Care Management program on the use of in-home personal care or institutional nursing facility care.

Conclusion

In the current budget climate, it can be challenging to invest additional state dollars in optional Medicaid health services. This study provides information about the potential impact on medical service use of a well-designed care management program aimed at high-risk Medicaid beneficiaries. We found evidence that providing care coordination to high-risk Medicaid beneficiaries with disabilities can reduce inpatient hospital costs. Some previous studies have suggested that there are beneficial effects of care coordination and integration.¹⁶ However, the findings from these studies may not be generalizable to high-risk Medicaid beneficiaries with disabilities, whose health care costs are important drivers

of state and federal Medicaid spending.

The Affordable Care Act offers federal support through the Health Homes option for improving the integration and coordination of health care services for Medicaid beneficiaries with complex health care needs. Washington State's Health Home service model incorporates several main components of the Chronic Care Management program: use of predictive risk modeling to define program eligibility;³¹ development of health action plans informed by care manager access to integrated claims, encounter, and assessment data; use of the Patient Activation Measure to promote self-management skills; frequent (at least monthly) contacts between the care manager and the patient;³² and provision of health education materials to help patients improve self-management skills.

One of the major differences between the state's Health Home model and the Chronic Care Management program is that the Health Home model is available to a far broader population of high-risk Medicaid enrollees, including people dually eligible for Medicare and Medicaid and those served outside of the Medicaid in-home personal care delivery system. With this expanded target population, the Health Home program will serve many additional high-risk enrollees with serious mental illness or substance use disorders, as well as elderly people and those with disabilities who are enrolled in Medicare.

It remains to be seen whether the results presented here can be achieved in the broader Health Home target population. For example, engaging people with serious mental illness or substance use disorders may be more challenging than engaging people who are already receiving home-based personal care support, given the higher rates of housing instability for those with significant behavioral health risk factors. ■

NOTES

- 1 Kaiser Commission on Medicaid and the Uninsured. Medicaid: a primer—key information on the nation's health coverage program for low-income people [Internet]. Washington (DC): The Commission; 2013 Mar 1 [cited 2015 Feb 5]. Available from: <http://kff.org/medicaid/issue-brief/medicaid-a-primer/2013>
- 2 Kaiser Commission on Medicaid and the Uninsured. Medicaid enrollees and expenditures, FFY 2009 [Internet]. Washington (DC): The Commission; 2013 Mar 14 [cited 2015 Feb 5]. Available from: <http://kff.org/medicaid/slide/medicaid-enrollees-and-expenditures-ffy-2009/>
- 3 Elhauge E. The fragmentation of U.S. health care: causes and solutions. New York (NY): Oxford University Press; 2010.
- 4 Adams K, Corrigan J, editors. Priority areas for national action: transforming health care quality. Washington (DC): National Academies Press; 2003.
- 5 Mongan JJ, Ferris TG, Lee TH. Options for slowing the growth of health care costs. *N Engl J Med*. 2008;358(14):1509-14.
- 6 Peikes D, Zutshi A, Genevro JL, Parchman ML, Meyers DS. Early evaluations of the medical home: building on a promising start. *Am J Manag Care*. 2012;18(2):105-16.
- 7 Mays GP, Au M, Claxton G. Convergence and dissonance: evolution in private-sector approaches to disease management and care coordination. *Health Aff (Millwood)*. 2007;26(6):1683-91.
- 8 Nelson L. Lessons from Medicare's demonstration projects on disease management and care coordination [Internet]. Washington (DC): Congressional Budget Office; 2012 Jan [cited 2015 Feb 5]. (Working Paper No. 2012-01). Available from: http://www.cbo.gov/sites/default/files/WP2012-01_Nelson_Medicare_DMCC_Demonstrations.pdf
- 9 Brown RS, Peikes D, Peterson G, Schore J, Razafindrakoto CM. Six features of Medicare coordinated care demonstration programs that cut hospital admissions of high-risk patients. *Health Aff (Millwood)*. 2012;31(6):1156-66.
- 10 Counsell SR, Callahan CM, Clark

- DO, Tu W, Buttar AB, Stump TE, et al. Geriatric care management for low-income seniors: a randomized controlled trial. *JAMA*. 2007; 298(22):2623–33.
- 11 Hughes SL, Weaver FM, Giobbie-Hurder A, Manheim L, Henderson W, Kubal JD, et al. Effectiveness of team-managed home-based primary care: a randomized multicenter trial. *JAMA*. 2000;284(22):2877–85.
 - 12 Counsell SR, Callahan CM, Tu W, Stump TE, Arling GW. Cost analysis of the Geriatric Resources for Assessment and Care of Elders care management intervention. *J Am Geriatr Soc*. 2009;57(8):1420–6.
 - 13 Peikes D, Chen A, Schore J, Brown R. Effects of care coordination on hospitalization, quality of care, and health care expenditures among Medicare beneficiaries: 15 randomized trials. *JAMA*. 2009;301(6): 603–18.
 - 14 Burns ME. Medicaid managed care and cost containment in the adult disabled population. *Med Care*. 2009;47(10):1069–76.
 - 15 Palsbo SE, Ho PS. Consumer evaluation of a disability care coordination organization. *J Health Care Poor Underserved*. 2007;18(4): 887–901.
 - 16 Bindman AB, Chattopadhyay A, Osmond D, Huen W, Bacchetti P. Preventing unnecessary hospitalizations in Medi-Cal: comparing fee-for-service with managed care [Internet]. Oakland (CA): California HealthCare Foundation; 2004 Feb [cited 2015 Feb 5]. Available from: <http://www.chcf.org/resources/download.aspx?id=%7b7373AEB8-8962-4858-B4DC-86EAD39D4525%7d>
 - 17 Kim SE, Michalopoulos C, Kwong RM, Warren A, Manno MS. Telephone care management's effectiveness in coordinating care for Medicaid beneficiaries in managed care: a randomized controlled study. *Health Serv Res*. 2013;48(5): 1730–49.
 - 18 Medicaid and CHIP Payment and Access Commission. Report to the Congress: the evolution of managed care in Medicaid [Internet]. Washington (DC): MACPAC; 2011 Jun [cited 2015 Feb 5]. Available from: http://www.mhpa.org/_upload/MACPAC_June2011_web.pdf
 - 19 Kronick R, Gilmer T, Dreyfus T, Lee L. Improving health-based payment for Medicaid beneficiaries: CDPS. *Health Care Financ Rev*. 2000;21(3): 29–64.
 - 20 Gilmer T, Kronick R, Fishman P, Ganiats TG. The Medicaid Rx model: pharmacy-based risk adjustment for public programs. *Med Care*. 2001; 39(11):1188–202.
 - 21 Hibbard JH, Stockard J, Mahoney ER, Tusler M. Development of the Patient Activation Measure (PAM): conceptualizing and measuring activation in patients and consumers. *Health Serv Res*. 2004;39(4 Pt 1): 1005–26.
 - 22 To access the Appendix, click on the Appendix link in the box to the right of the article online.
 - 23 Crowley JS, Elias R. Medicaid's role for people with disabilities [Internet]. Washington (DC): Kaiser Commission on Medicaid and the Uninsured; 2003 Aug [cited 2015 Feb 5]. Available from: <http://kaiserfamilyfoundation.files.wordpress.com/2013/01/medicaid-s-role-for-people-with-disabilities.pdf>
 - 24 Kaiser Commission on Medicare and the Uninsured. Medicaid managed care: key data, trends, and issues [Internet]. Washington (DC): The Commission; 2012 Feb [cited 2015 Feb 5]. (Policy Brief). Available from: <https://kaiserfamilyfoundation.files.wordpress.com/2012/02/8046-02.pdf>
 - 25 Kirschner N, Doherty R. A system in need of change: restructuring payment policies to support patient-centered care [Internet]. Philadelphia (PA): American College of Physicians; 2006 [cited 2015 Feb 6]. Available from: http://www.acponline.org/advocacy/current_policy_papers/assets/change.pdf
 - 26 Bodenheimer T. Coordinating care—a perilous journey through the health care system. *N Engl J Med*. 2008;358(10):1064–71.
 - 27 Kripalani S, Jackson AT, Schnipper JL, Coleman EA. Promoting effective transitions of care at hospital discharge: a review of key issues for hospitalists. *J Hosp Med*. 2007;2(5): 314–23.
 - 28 Mitchell SE, Gardiner PM, Sadikova E, Martin JM, Jack BW, Hibbard JH, et al. Patient activation and 30-day post-discharge hospital utilization. *J Gen Intern Med*. 2014;29(2): 349–55.
 - 29 Parchman ML, Zeber JE, Palmer RF. Participatory decision making, patient activation, medication adherence, and intermediate clinical outcomes in type 2 diabetes: a STARNet study. *Ann Fam Med*. 2010;8(5): 410–7.
 - 30 Hibbard JH, Mahoney ER, Stock R, Tusler M. Do increases in patient activation result in improved self-management behaviors? *Health Serv Res*. 2007;42(4):1443–63.
 - 31 Washington State Health Care Authority. Health Home frequently asked questions [Internet]. Olympia (WA): HCA; 2013 Aug 2 [cited 2015 Feb 6]. Available from: http://www.hca.wa.gov/medicaid/health_homes/Documents/FAQHealthHomes.pdf
 - 32 Washington State Health Care Authority. Health home tiers guidelines [Internet]. Olympia (WA): HCA; 2014 Jul [cited 2015 Feb 6]. Available from: http://www.hca.wa.gov/medicaid/health_homes/Documents/billing_tiers_guidelines.pdf