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# Patient-Reported Care Coordination is Associated with Better Performance on Clinical Care Measures



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**BACKGROUND:** Prior studies using aggregated data suggest that better care coordination is associated with higher performance on measures of clinical care process; it is unclear whether this relationship reflects care coordination activities of health plans or physician practices.

**OBJECTIVE:** Estimate within-plan relationships between beneficiary-reported care coordination measures and HEDIS measures of clinical process for the same individuals.

**DESIGN:** Mixed-effect regression models in cross-sectional data.

**PARTICIPANTS:** 2013 Medicare Advantage CAHPS respondents ( $n=152,069$ ) with care coordination items linked to independently collected HEDIS data on clinical processes.

**MAIN MEASURES:** Care coordination measures assessed follow-up, whether doctors had medical records during visits, whether doctors discussed medicines being taken, how informed doctors seemed about specialist care, and help received with managing care among different providers. HEDIS measures included mammography, colorectal cancer screening, cardiovascular LDL-C screening, controlling blood pressure, 5 diabetes care measures (LDL-C screening, retinal eye exam, nephropathy, blood sugar/HbA1c  $<9\%$ , LCL-C $<100$  mg/dL), glaucoma screening in older adults, BMI assessment, osteoporosis management for women with a fracture, and rheumatoid arthritis therapy.

**KEY RESULTS:** For 9 of the 13 HEDIS measures, within health plans, beneficiaries who reported better care coordination also received better clinical care ( $p<0.05$ ) and none of the associations went in the opposite direction; HEDIS differences between those with excellent and poor coordination exceeded 5 percentage points for 7 measures. Nine measures had positive associations (breast cancer screening, colorectal cancer screening, cardiovascular care LDL-C screening, 4 of 5 diabetes care

measures, osteoporosis management, and rheumatoid arthritis therapy).

**CONCLUSIONS:** Within health plans, beneficiaries who report better care coordination also received higher-quality clinical care, particularly for care processes that entail organizing patient care activities and sharing information among different healthcare providers. These results extend prior research showing that health plans with better beneficiary-reported care coordination achieved higher HEDIS performance scores.

**KEY WORDS:** patient experience; quality of ambulatory care; Medicare Advantage CAHPS; care continuity.

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## INTRODUCTION

Care coordination—the deliberate effort by two or more healthcare professionals to facilitate and coordinate proper delivery of care to a patient<sup>1</sup>—is critical to delivering high-quality care<sup>2</sup> and optimizing patient experiences.<sup>3,4</sup> Care coordination is typically evaluated using a set of patient-reported experience measures (PREMs), which are increasingly included in value-based payment programs<sup>5,6</sup> and used to guide care improvement activities in hospitals and clinics.<sup>7</sup> Nevertheless, some clinicians remain skeptical of PREMs.<sup>7</sup> For patient-reported care coordination measures to be valid, one would expect them to be associated with the quality of clinical care.

Prior evidence suggests that using aggregated data, hospitals with better patient-reported care experiences (including coordination) tend to have significantly better clinical processes and outcomes.<sup>8–17</sup> But at the aggregate level, associations between patient-reported coordination and other dimensions like clinical processes and outcomes could be due to other unmeasured hospital-level factors that raise patient experience scores but are independent of clinical care. For instance, a strong health information technology (HIT) system could make a hospital have both better patient experiences of care

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coordination and better clinical care on average than a hospital with a weaker HIT system; higher patient activation might improve both patient experience and clinical care. The inference that patient-reported care coordination leads to improved clinical care may be strengthened if patient-reported care coordination is positively associated at the individual patient level with measures of the quality of clinical care. In the hospital example, this would tell us that within the hospital, those patients experiencing better care coordination were also the ones receiving better clinical care, and vice versa—further suggesting that the care coordination may be causing the improved clinical care rather than both being due to an unmeasured factor at the hospital level.

In the outpatient setting, there is mixed evidence of an association between patient-reported coordination of care with clinical quality. Some studies find better patient-reported coordination of care to be positively associated with more effective delivery of preventive care in the same clinical practice<sup>18</sup> and with a lower probability of hospitalization following receipt of coordination of care services.<sup>19</sup> Others find no effect of better care coordination on patients' outpatient visits, hospital admissions, or emergency department use<sup>20</sup> or with patients' health-related functioning.<sup>21</sup> Inconsistent findings may be related to limited overlap between the providers assessed in the patient survey and those included in the measured care process in some studies.<sup>22</sup>

In this paper, we create a novel linkage between Medicare beneficiaries' reports on care coordination and clinical quality of care data at the individual beneficiary level to analyze the relationship between a patient-reported care coordination measure composite and clinical quality of care measures. We use this linked data and beneficiary-level analysis to overcome the limitations of prior studies that analyze only aggregate associations. We assess these relationships within Medicare plans to determine whether individual beneficiaries reporting better care coordination also receive better clinical care than other beneficiaries who report poorer care coordination within the same health plan.

## METHODS

### Measures and Data

**The Care Coordination Composite Measure.** The Care Coordination Composite Measure is composed of 6 items; previous studies describe the development of the measure and establish its validity and reliability.<sup>23,24</sup> Two of the items about follow-up on test results (how often the doctor's office followed up with results and how often results were received as soon as needed) were averaged to create a single indicator, taking on the lowest value if there was no follow-up. The other 4 items asked beneficiaries how often their doctor had medical records during visits, how often their doctor talked about all the medicines being taken, whether the doctor seemed informed about care that had been received by

specialists, and whether help had been received with managing care among different providers. Thus, we had 5 indicators (4 individual items and 1 indicator combining 2 items) of care coordination for the analyses. To facilitate interpretation, each indicator was linearly transformed to a 0–100 scale before analysis. The transformed score,  $y$ , is equal to 100 times  $(x-a)/(b-a)$ , where the original response scale ranges from  $a$  to  $b$  and the original (untransformed) score is equal to  $x$ . For example, if response options are Never, Sometimes, Usually, and Always, then  $a=1$  and  $b=4$ , and the four scores on a 0 to 100 scale score are 0,  $33\frac{1}{3}$ ,  $66\frac{2}{3}$ , and 100. These 5 transformed indicators were case-mix adjusted, mean-centered, and averaged to produce a person-level composite score, as described below.

Data on care coordination came from the 2013 Medicare Advantage Consumer Assessment of Healthcare Providers and Systems (MA CAHPS) survey (46% response rate, collected March–June 2013), a nationally representative stratified random sample of Medicare beneficiaries, with contracts (informally “plans”) serving as strata. Surveys are distributed by mail, with telephone follow-up of nonrespondents. Community-dwelling beneficiaries enrolled in the same plan with at least 600 beneficiaries for at least six consecutive months were eligible for the survey.

**Clinical Quality of Care.** Data on clinical quality of care came from the Medicare HEDIS data on individual beneficiaries for 13 HEDIS measures included in 2013 MA Star Ratings.<sup>25</sup> They were constructed by using claims data or chart review to identify the subset of enrollees for whom a treatment or screening was clinically recommended. Each dichotomous measure indicated whether the beneficiary received the recommended care in accordance with the measure definition. The measures included 2 cancer screening measures (mammography and colorectal cancer screening), 1 cardiovascular care measure (LDL-C screening), 1 controlling blood pressure measure, 5 diabetes care measures (LDL-C screening, retinal eye exam, nephropathy, blood sugar/HbA1c <9%, LCL-C<100 mg/dL), 2 screening measures (glaucoma screening in older adults, adult body mass index (BMI) assessment), osteoporosis management for women with a fracture, and rheumatoid arthritis therapy.

### Analysis

We linked beneficiary-level care coordination reports from the CAHPS survey to beneficiary-level HEDIS data. We calculated the care coordination composite measure, applying standard Medicare CAHPS case-mix adjustment for age, education, self-reported general and mental health, Medicaid eligibility, Chinese language,<sup>26</sup> and proxy assistance. To examine the beneficiary-level, within-plan association of care coordination with HEDIS performance, we estimated a series of mixed logistic regressions with each HEDIS measure as the dependent variable, the care coordination measure as the

independent variable, and health plan as a random effect (Appendix Table 1). The random effect controls for plan-to-plan variation, as well as the clustering of beneficiaries within plans, enabling a focus on the within-plan associations between care coordination and quality of care. To illustrate the magnitude of the association between care coordination and quality of care, covariate-adjusted predicted probabilities of passing HEDIS measures were calculated for hypothetical beneficiaries at the 5th and 95th percentiles of the care coordination score distribution. Scores on HEDIS measures<sup>27</sup> and the CAHPS care coordination measure<sup>24</sup> may be related to number of visits. While our primary models do not adjust for this potentially endogenous factor, we conducted a sensitivity analysis that controlled for number of visits. Even though analyses are within plan, we repeated the analyses after removing plans from a parent organization with especially high HEDIS and care coordination scores as an extra sensitivity test. A second sensitivity analysis assessed the plan-level correlation of mean case-mix adjusted care coordination scores and plan-level scores for each of the 13 HEDIS measures to help rule out the possible role of unmeasured person-level characteristics associated with better coordination and better clinical care.

All analyses employed person-level post-stratification weights<sup>28,29</sup> that address sample design and nonresponse by matching weighted sample and enrolled populations in each plan by county combination on sex, age, race/ethnicity, Medicaid eligibility/low-income subsidy enrollment status, Special Needs Plan enrollment, and zip-code level distributions of income, education, and race/ethnicity.

## RESULTS

### Study Sample

The final linked sample included 152,069 Medicare beneficiaries enrolled in 463 MA plans who responded to the 2013 Medicare CAHPS survey, answered the CAHPS care coordination items, and also had beneficiary-level data on 2013 Healthcare Effectiveness Data and Information Set (HEDIS) process measure indicators.

The mean care coordination score for this sample was 85.3 (standard deviation 19.0). The means for individual items ranged from a low of 78.5 for doctor seemed informed about care from specialists to a high of 95.2 for doctor had medical records during visits. The sample was predominantly female (58%) and White (70%), had median age 70–74 years, and 71% reported good to excellent overall health (Table 1). Sample sizes for each HEDIS measure vary according to specific clinical eligibility criteria (i.e., gender and age for mammography screening); for the measures in this analysis, analysis sample sizes ranged from 1,953 to 113,818 (Table 2).

**Table 1 Respondent Characteristics and Responses to Care Coordination Items (N=152,069)**

	Gender and case-mix adjusters	%
Female		58.3
Age	18–64	13.8
	65–69	22.5
	70–74	23.9
	75–79	17.9
	80–84	12.4
	85+	9.5
Self-reported race/ethnicity	Asian/Pacific Islander	3.7
	Black	9.9
	Hispanic	10.9
	Multiracial	1.9
	Native American	0.4
	Unknown	3.1
	White	70.0
Education	Less than 8th grade	8.8
	Some high school	12.0
	High school graduate/GED	34.4
	Less than bachelor's degree	25.4
	Bachelor's degree	9.1
	More than bachelor's degree	10.3
General health	Excellent	7.4
	Very good	26.8
	Good	37.0
	Fair	23.1
	Poor	5.7
General mental health	Excellent	24.0
	Very good	31.9
	Good	28.4
	Fair	13.0
	Poor	2.6
Proxy used	Proxy answered questions	3.4
	Proxy assisted (other than answered questions)	8.7
	Dually eligible	20.7
Low income subsidy, not dually eligible		4.0

### Association Between Care Coordination and Clinical Quality of Care Measures

Care coordination scores are significantly and positively related to clinical performance on 9 of 13 HEDIS measures (breast cancer screening, colorectal cancer screening, cardiovascular care LDL-C screening, 4 of 5 diabetes care measures, osteoporosis management, and rheumatoid arthritis therapy; Table 2). The non-significant exceptions are for the measures of controlling high blood pressure, glaucoma screening in older adults, adult BMI assessment, and nephropathy for diabetics.

For 7 measures, beneficiaries at the 95th percentile for the care coordination measure were estimated to have clinical performance scores at least 5 percentage points higher than those at the 5th percentile. The association of care coordination was particularly strong (differences in performance scores greater than 10 percentage points) for 4 HEDIS measures: rheumatoid arthritis therapy, osteoporosis management, and HbA1c and LDL-C control for diabetics.

Because scores on HEDIS measures<sup>27</sup> and the CAHPS care coordination measure<sup>24</sup> may be related to the number of visits

Table 2 Adjusted Associations of Case-Mix Adjusted Care Coordination with HEDIS Measures

Measure	N	Performance	Odds ratio*	p	Predicted performance for care coordination score at...		
					5th percentile	95th percentile	Difference
Breast cancer screening	32,789	79.8%	<b>1.21</b>	<b>&lt;.001</b>	74.1	83.9	<b>9.8</b>
Colorectal cancer screening	12,578	70.2%	<b>1.09</b>	<b>&lt;.001</b>	67.2	72.9	<b>5.7</b>
Cardiovascular care: LDL-C screening	6,467	89.9%	<b>1.11</b>	<b>.03</b>	88.7	91.7	<b>3.0</b>
Controlling high blood pressure	9,479	62.4%	1.03	.33	61.5	63.5	2.0
Diabetes care: LDL-C screening	8,088	89.9%	<b>1.14</b>	<b>.003</b>	88.2	91.8	<b>3.6</b>
Diabetes care: retinal eye exam	8,323	72.9%	<b>1.13</b>	<b>&lt;.001</b>	69.5	76.7	<b>7.2</b>
Diabetes care: kidney disease/nephropathy	9,051	91.6%	0.99	.78	92.0	91.7	-0.3
Diabetes care: HbA1c control <9%	8,140	76.4%	<b>1.29</b>	<b>&lt;.001</b>	69.4	82.8	<b>13.4</b>
Diabetes care: LDL-C <100mg/dL	8,088	55.4%	<b>1.18</b>	<b>&lt;.001</b>	49.0	61.4	<b>12.4</b>
Glaucoma screening in older adults	113,818	77.9%	0.99	.13	78.5	77.6	-0.9
Adult BMI assessment	10,844	90.2%	0.96	.35	91.0	90.0	-1.0
Osteoporosis management for women w/a fracture	1,953	30.7%	<b>1.20</b>	<b>.009</b>	24.0	35.2	<b>11.2</b>
Rheumatoid arthritis therapy	2,242	78.1%	<b>1.41</b>	<b>&lt;.001</b>	67.8	86.4	<b>18.6</b>

\*Per standard deviation of care coordination

Results from mixed-effect logistic regression models with each HEDIS measure as the dependent variable, the case-mix adjusted care coordination score as the independent variable, and health plan (contract) as a random effect

in a year or affected by outliers, separate sensitivity analyses controlled for number of visits, excluded data from a parent organization with especially high HEDIS and care coordination scores, and assessed plan-level correlations between HEDIS and mean case-mix adjusted care coordination scores; each produced similar results to those presented (data shown in Appendix Tables 1–3).

## DISCUSSION

In a national sample of Medicare beneficiaries enrolled in MA, within health plans better care coordination was associated with better clinical quality scores for 9 of 13 measures and worse clinical quality scores for none. A unique contribution of this study is its use of patient-level experience with care coordination linked to HEDIS measures of quality of care provided to that same patient. Notably, the pattern of association across measures supports the inference that coordination makes a difference. Of the 4 measures that are unrelated to care coordination, 2 (adult BMI assessment and controlling high blood pressure) involve monitoring and recording that can be completed during a single office visit, and 2 involve lab tests that can be completed in the clinic and do not require coordination actions such as follow-up visits, reminders, or referral to other facilities or specialists.

Our results extend the findings of prior research, which used data aggregated data in other settings to show that better care coordination is associated with greater receipt of preventive services, lower risk-adjusted mortality rates,<sup>10</sup> other patient assessments of healthcare, receipt of recommended preventive screening, more effective disease management, fewer hospital admissions and emergency department visits, lower expenditures, and better patient and provider experiences.<sup>18,30–34</sup> At the health plan level, a prior study demonstrated positive associations between multiple aspects of communication (an

important component of care coordination) and health plan access.<sup>35</sup> Our results are also consistent with prior work that patient-reported experiences of care, when appropriately measured, are robust measures of quality.<sup>7</sup>

The positive association of patient-reported care coordination and clinical process and outcome measures at the individual level and within health plan complements and strengthens evidence based on aggregate analyses. While unmeasured confounders cannot be ruled out at either an aggregate or the individual level, these individual-level findings strengthen the inference that care coordination supports better clinical care by showing that beneficiaries who report their care is better coordinated receive better clinical care than other beneficiaries within the same health plan. These findings also suggest that at least some care coordination activities are being carried out at the physician group, clinic, or individual medical practitioner level rather than at the health plan level as the individual-level associations estimated here are all within health plan.

Patient-level and aggregate-level observational studies of the same topic have complementary strengths. The prior aggregate-level findings complement these finding by making it less likely that the findings of the present study are explained by unmeasured beneficiary-level factors, rather than care coordination. The impact of care coordination on clinical quality is difficult to study because effective care coordination can require efforts by multiple different organizations and individuals, including clinicians, patients, clinics, hospitals, and health plans, making it challenging to measure directly. This study provides additional evidence that patient-reported experience with care coordination is a valid measure in that it is associated with better clinical care at the patient level.

There are several plausible pathways for better care coordination to produce better clinical care, especially for care processes that involve organizing patient care activities and sharing information among different healthcare providers.<sup>36</sup> For example, beneficiary-reported care coordination scores are



positively associated with higher rates of breast cancer screening, which may require a mammogram order be sent by the primary doctor, scheduling reminders be sent to the patient, and care coordination to ensure test results are sent from the radiology suite to the ordering doctor. Better care coordination is also associated with control of physiologic outcomes such as LDL levels or adherence to therapy, which require disease-oriented assessment and monitoring by different specialists, medication adjustment, and self-care instructions.<sup>37–39</sup> This kind of care coordination is especially important for Medicare beneficiaries, particularly those in fee-for-service, more than half of whom are treated for 5 or more chronic conditions annually and seen by at least 2 primary care physicians and 5 specialists across 4 different practices.<sup>40</sup>

Our study has several limitations. First, the care coordination measure is based on beneficiary reports, although prior work has established that patient reports on care coordination are not general measures of patient experience but yield information distinct from other CAHPS composite measures.<sup>23</sup> Second, response rates for the CAHPS surveys are 46%: a number in line with other patient experience surveys and higher than some.<sup>41,42</sup> In addition, all analyses employed person-level post-stratification weights to account for many potential contributors to non-response bias. Furthermore, response rates have been found to be only weakly associated with non-response bias in similar probability sample surveys adhering to high process standards of survey methodology.<sup>43–47</sup> Third, the extent to which we can generalize our findings to other populations, particularly younger populations, is unknown. Fourth, while we accounted for plan-based differences through our use of plan intercepts, we were unable to account for other influences on care coordination like practice- or provider-level differences. However, emergent literature suggests that care coordination may be guided more at the plan-level than by physician characteristics.<sup>48</sup> Finally, our observational study design demonstrates an association and through the pattern of findings strengthens the inference that care coordination plays a role in improving clinical quality, but the available data do not allow us to establish that better care coordination causes better clinical quality or to exclude entirely the possibility of unmeasured and erroneous confounders of the relationship. While the mechanism that explains this association cannot be determined by this study, there are several actions plans and clinicians may employ to bring about better coordination. To the extent that health systems, regional quality improvement initiatives, or accountable provider groups are involved in managing care by generating reminders, facilitating communication among providers through health data exchange, or stimulating quality improvement activities through campaigns or collaboratives, they may improve care coordination and as a direct result enable better performance for their patients. Alternatively, some medical groups and

clinicians may be both better at care coordination and excel at delivering high-quality clinical care more than others but due to other third factors, such as stronger or weaker health information technology systems. However, our analysis controls for health plan, so unmeasured confounders at the health plan level would not explain the beneficiary-level association we observed. In addition, our results were not driven by any single organization. They were robust to the removal of data from a large organization with especially high HEDIS scores and care coordination. Some unmeasured confounding factors may exist at the individual level; for instance, although our care coordination measure accounts for beneficiary socioeconomic status via education and low-income indicators, beneficiaries with high socioeconomic status may receive care in better-resourced settings with better care coordination while also having the means to attend follow-up visits necessary to achieving high quality clinical care. That said, our results were robust to substituting plan-level analysis to help rule out the role of unmeasured person-level characteristics. Finally, the estimated correlation between HEDIS scores and care coordination may differ in more recent data.

Previous studies find that better care coordination is positively related to patient-reported care experiences at the aggregate level. Our study establishes that within health plans, better patient-reported care coordination is associated with patient receipt of appropriate clinical care for services that require coordination among clinicians or facilities and suggests that improving care coordination may improve the quality of care.

New evidence that better beneficiary-reported care coordination is associated with better clinical care relative to care received by other beneficiaries in the same health plan extends prior evidence from other settings and strengthens the inference that care coordination can promote better clinical care and can be effectively measured by patient report. These results are supportive of efforts to improve the quality of clinical care by enhancing care coordination through actions such as encouraging the use of electronic health records and ensuring that providers are paid for time spent on care coordination. Because payers generally bear the direct cost of poor transitional coordination between different delivery settings,<sup>49</sup> incentives such as MA Quality Bonus Payments that include the care coordination measure described here<sup>50</sup> or the Hospital Value-Based Purchasing<sup>51</sup> system that includes a care transition measure<sup>49</sup> may help align incentives.

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**Supplementary Information** The online version contains supplementary material available at <https://doi.org/10.1007/s11606-021-07122-8>

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