

Patient-Centered Oncology Care: Impact on Utilization, Patient Experiences, and Quality

Lindsey M. Roth, MPP; Manasi Tirodkar, PhD; Tejal Patel, MPH; Mark Friedberg, MD; Aaron Smith-McLallen, PhD; and Sarah Hudson Scholle, DrPH

Cancer is the second leading cause of death in the United States,^{1,2} and about 14.5 million individuals currently live with cancer.³ There is ample evidence of cancer care quality gaps, including non-evidence-based treatment and poor communication, care planning, and coordination.⁴ Patients with cancer report issues with receiving insufficient or inadequate information.^{5,7} The Institute of Medicine, now the National Academy of Medicine (NAM), noted that communication problems often contribute to poor outcomes, and other studies show that clinicians ask for patient preferences in medical decisions only about half the time.^{4,8-11} Often, patients undergoing treatment for advanced cancer do not understand that treatment is not aimed at curing the disease, do not have discussions about treatment preference, or have delays in palliative care discussions that result in active treatment being prolonged during the last weeks of life, contrary to patient preferences.^{4,10,12-14}

Patients with cancer often see multiple providers and undergo multiple treatment modalities. Although medical oncologists are typically considered the “captains” of the cancer treatment team, initial diagnosis and treatment may be decided during consultations with a primary care provider and surgeon and without the opportunity for a fully informed decision process or development of a comprehensive treatment plan.¹⁰ The lack of clarity in roles continues through treatment and survivorship.¹⁵ Current payment systems exacerbate these integration issues. Oncologists are unable to bill for shared decision-making, services to help patients navigate the health care system, or support for emotional problems.⁴

The National Committee for Quality Assurance (NCQA) defined a new model for patient-centered oncology care based on multiple reports from the NAM⁸ that have called for greater attention to improving delivery of patient-centered care for patients with cancer. The standards for patient-centered oncology care are built on the chassis of NCQA's successful Patient-Centered Medical Home (PCMH) program, in which primary care practices are responsible for coordinating accessible, continuous, and team-based care for patients, and the Patient-Centered Specialty Care program, which promotes interactions between PCMH practices and “neighbor”

ABSTRACT

OBJECTIVES: To determine whether implementation of patient-centered oncology standards in 5 medical oncology practices improved patient experiences and quality and reduced emergency department (ED) and hospital use.

STUDY DESIGN: Retrospective, pre-post study design with a concurrent nonrandomized control group.

METHODS: We used insurance claims to calculate all-cause hospitalizations and ED visits and primary care and specialist office visits (n = 28,826 eligible patients during baseline and 30,843 during follow-up) and identify patients for a care experiences survey (n = 715 preintervention and 437 postintervention respondents). For utilization and patient experience outcomes, we compared pilot practices' performance with 18 comparison practices using difference-in-differences (DID) regression models accounting for practice-level clustering. We assessed pilot practice performance on 31 quality measures from the American Society of Clinical Oncology Quality Oncology Practice Initiative program.

RESULTS: There were no statistically significant differences in hospital, ED, or primary care visits between the pilot and comparison groups over time, but there was a significant increase in specialty visits for the pilot group (adjusted DID of 0.07; 95% CI, 0.01-0.13; *P* = .03). For care experiences, pilot practices improved more on shared decision-making (4.03 DID composite score; *P* = .013), whereas the comparison group improved more on access (−6.36 DID composite score; *P* < .001) and exchanging information (−4.25 DID composite score; *P* = .013). On average, pilot practices improved performance on 65% of core quality measures from baseline to follow-up.

CONCLUSIONS: This pilot of patient-centered oncology care showed improved quality but no impact on hospitalizations/ED use and mixed results for patient experiences. Findings are consistent with early evaluations of primary care patient-centered medical homes.

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specialty practices.¹⁶ While supporting this concept of the neighbor, leading oncology societies have suggested that oncology practices may serve in both roles of the “home” for patients (particularly during active treatment) as well as the “neighbor” during periods of transition and survivorship.^{17,18} To develop the patient-centered oncology model, NCQA first convened a multistakeholder advisory panel to identify the components of the patient-centered specialty practice standards that should be built out for oncology, as well as items from the PCMH program that are relevant, and then reviewed the recommendations with other multistakeholder committees. The most recent version of the oncology medical home standards can be found on NCQA’s website.¹⁹

In this study, we evaluated a pilot of the patient-centered oncology care model in oncology practices in southeastern Pennsylvania to determine whether the patient-centered oncology standards improve patient experiences and quality and reduce emergency department (ED) and hospital utilization.

METHODS

We selected southeastern Pennsylvania as the demonstration location because Independence Blue Cross, an insurer with large market share, was willing to participate in the evaluation. Five practices consisting of 2 large academic medical centers, 2 private physician-owned practices, and 1 hospital-based outpatient department volunteered to pilot patient-centered oncology care. The pilot practices began implementing the standards in January 2014. Practices received implementation support, including monthly webinars and technical assistance, through December 2016.

Our evaluation consisted of a retrospective, pre-post study design with a concurrent nonrandomized control group of 18 local medical oncology practices for the utilization and patient experience outcomes (Table 1). The comparison practices were similar in size and ownership, were located in the same community, and participated in the payer network. Compared with comparison practices, the population served by the pilot practices was younger, was more likely to be male and non-White, had higher average risk scores, was less likely to have common comorbid conditions, and had a somewhat different profile of cancer types (Table 2).

This project was reviewed and approved by the Chesapeake Research Review Inc Institutional Review Board (IRB) and IRBs at 3 of the participating sites.

Measures and Analysis

Utilization. We identified 4 project time periods for the utilization analysis. “Baseline” occurred before the project began, from August 2011 to July 2013; “start-up” occurred from August 2013 to June 2014,

TAKEAWAY POINTS

Practices implementing a patient-centered oncology care pilot demonstrated improvement on patient-centered process measures but no impact on utilization and mixed results for patient experiences relative to comparison practices.

- ▶ The greatest process measure improvements occurred in symptom assessment and care planning.
- ▶ There were no statistically significant differences in hospital, emergency department, and primary care utilization, but there was a significant increase in specialty provider visits for the pilot group.
- ▶ Pilot practices improved in shared decision-making, whereas comparison practices improved in access and exchanging information.
- ▶ Findings are consistent with early evaluations of primary care patient-centered medical homes.

when the pilot practices prepared for and began implementation; “intervention” occurred from July 2014 to December 2015, during which the practices continued implementing change; and “follow-up” occurred post implementation, from January to July 2016. For each of these 4 time periods, we identified a cross-section of patients attributed to a pilot or comparison practice. Specifically, for each time period, we used National Provider Identifiers and Tax Identification Numbers to identify all patients in the payer network who had an evaluation and management (E&M) claim at any medical oncology provider during that time period and then excluded patients without a claim at a pilot or comparison practice. We attributed these patients to a pilot or comparison practice if they had an E&M claim for which the performing provider was in the practice and for whom the practice provided all services, a majority of services, or a plurality of services. Plurality was defined by count of E&M visits, with ties broken by the most recent E&M visit date of service relative to other oncology practices. Most patients were exclusive with the index practice (ie, had no E&M claims with any other oncology practice during the time period).

We calculated unadjusted rates of all-cause hospitalizations, all-cause ED visits, and primary care provider (PCP) and specialist office visits per patient per month in each of the 4 study time periods for the pilot and comparison groups. We used a difference-in-differences (DID) regression model with fixed effects for practices to estimate the effects of exposure to the intervention on utilization. Generalized estimating equations with robust standard errors were used to account for heteroscedasticity, autocorrelation, and clustering of patients within practices.²⁰ The dependent variable in the model was the utilization rate in the time period of interest. Therefore, the effects of the intervention were represented by the coefficient estimates for project time period interacted with status (pilot or comparison). The models also controlled for practice fixed effects and a Cotiviti (formerly Verisk Health) DxCG risk score estimating the cost of underlying illness burden.²¹ We considered 2-tailed *P* values < .05 significant. We conducted sensitivity analyses to assess whether results differed based on the population definition: all continuously enrolled patients, patients with a history of cancer since 2009, and patients in active treatment.

TABLE 1. Summary of Outcomes, Measures, and Data Sources

Outcome	Measures	Data sources	Time period	Groups	Analysis
Utilization	<ul style="list-style-type: none"> Rates of all-cause hospitalizations PMPM Rates of all-cause ED visits PMPM Rates of office visits PMPM 	Claims	<ul style="list-style-type: none"> Baseline (August 1, 2011- July 31, 2013) Start-up (August 1, 2013- June 30, 2014) Intervention (July 1, 2014- December 31, 2015) Follow-up (January 1, 2016- June 30, 2016) 	<ul style="list-style-type: none"> 5 pilot practices 18 comparison practices 	<ul style="list-style-type: none"> Difference-in-differences regression model with fixed effects for practices to estimate the effects of exposure to the intervention on utilization measures
Patient experience	<p>CAHPS Cancer Care Survey Version 2.0 composites:</p> <ul style="list-style-type: none"> Shared decision-making composite score (3 items) Affective communication composite score (7 items) Access composite score (8 items) Exchanging information composite score (4 items) Enabling patient self-management composite score (4 items) Overall rating of treatment team (1 item): asks patients to rate their treatment team on a scale of 0 (worst team possible) to 10 (best team possible) 	Patient survey	<ul style="list-style-type: none"> Preintervention survey: administered September-December 2014 to patients who received chemotherapy from January 1, 2014, to July 31, 2014 Postintervention survey: administered August-November 2016 to patients who received chemotherapy from January 1, 2016, to July 31, 2016, or were eligible for preintervention survey 	<ul style="list-style-type: none"> 5 pilot practices 18 comparison practices 	<ul style="list-style-type: none"> Difference-in-differences regression model with fixed effects for practices to estimate the effects of exposure to the intervention on patient experience measures
Quality	<p>Core measures: patients with new invasive malignancy receiving chemotherapy:</p> <ul style="list-style-type: none"> Pain and emotional well-being assessment and management (6 measures) Antiemetic medication prescribed (4 measures) Chemotherapy planning (5 measures) Chemotherapy treatment summary (4 measures) Tobacco and infertility risk assessment (6 measures) <p>Palliative care measures: patients with new stage IV or newly developed metastases:</p> <ul style="list-style-type: none"> Pain, dyspnea, nausea/vomiting, performance status assessed at every visit (4 measures) Substance abuse history documented (1 measure) Advance directives documented within first 3 visits (1 measure) 	Chart reviews	<ul style="list-style-type: none"> Baseline: August 1, 2011- August 31, 2013 Follow-up: July 1, 2015- June 30, 2016 	<ul style="list-style-type: none"> 5 pilot practices National and regional benchmarks 	<ul style="list-style-type: none"> Calculation of the percentage-point difference in average pilot practice performance rates between baseline and follow-up Comparison of average pilot practice performance rates with national and regional benchmark data (core measures only)

CAHPS, Consumer Assessment of Healthcare Providers and Systems; ED, emergency department; PMPM, per member per month.

Patient experience. We surveyed patients pre- and post intervention who had recently received chemotherapy using version 2.0 of the Consumer Assessment of Healthcare Providers and Systems (CAHPS) Cancer Care Survey; it had 5 composites and an overall rating of drug therapy treatment team.^{22,23} For the preintervention survey sample, we attributed patients who had a claim for chemotherapy at pilot and comparison practices from January through June 2014 for the early intervention and for the postintervention time period of January

through June 2016. We also added patients who were eligible for the preintervention survey to the postintervention survey sample.

Both surveys were in the field for 10 weeks, starting with an initial mailing, followed by reminder telephone calls and then a subsequent round of mailing and reminder phone calls. We removed ineligible patients from the sample frame after the mailing, including patients who were deceased, had an undeliverable address, or were no longer insured at the time the survey was administered

TABLE 2. Characteristics of Pilot and Comparison Practice Patients in Utilization and Survey Samples

Utilization sample						
Utilization sample variables	Baseline			Follow-up		
	Pilot n = 9382	Comparison n = 18,994	P	Pilot n = 6451	Comparison n = 24,392	P
Age in years						
18-55	35%	31%	<.0001	35%	38%	<.0001
56-65	30%	27%		32%	33%	
66-75	16%	17%		16%	14%	
> 75	19%	25%		18%	15%	
Sex: female	64%	66%	.0011	65%	67%	.0289
Race: non-White ^a	27%	18%	<.0001	28%	24%	<.0001
Mean DxCG risk score	22.8	21.2	.002	19.8	18.5	.0008
Education: high school or higher ^a	81%	83%	<.0001	81%	81%	.8896
Mean months of medical insurance coverage	20.9	20.7	.0023	6.7	6.7	.5755
Comorbidities						
Chronic obstructive pulmonary disease	22%	26%	<.0001	17%	18%	.2145
Congestive heart failure	20%	22%	<.0001	15%	13%	<.0001
Coronary artery disease	26%	31%	<.0001	21%	20%	.0307
Diabetes	30%	31%	.1974	27%	25%	.0037
Asthma	17%	17%	.7170	17%	17%	.4648
Type of cancer						
Breast	42%	40%	<.0001	43%	42%	<.0001
Lung	17%	15%		20%	16%	
Colon	25%	26%		27%	28%	
Other or unknown	16%	18%		11%	14%	
Survey sample						
Survey sample variables	Early intervention		Post intervention			
	Pilot n = 175	Comparison n = 431	Pilot n = 81	Comparison n = 179		
Age in years						
18-54	16%	19%	12%	15%		
55-64	34%	31%	32%	28%		
65-74	24%	23%	31%	25%		
> 74	26%	27%	25%	31%		
Sex: female	61%	63%	65%	70%		
Race: non-White	18%	10%	17%	12%		
Ethnicity: Hispanic or Latino	1%	1%	4%	1%		
Education						
More than 4-year college degree	22%	22%	40%	41%		
Some college, up to 4-year college degree	35%	37%	42%	37%		
High school graduate/General Educational Development or less	43%	41%	19%	23%		
Self-reported health status						
Excellent	22%	23%	31%	21%		
Very good	41%	37%	31%	43%		
Good	26%	27%	25%	23%		
Fair	10%	12%	12%	12%		
Poor	2%	2%	1%	2%		

^aRace and education were imputed based on Census tract data based on the patient's home zip code.

TABLE 3. Characteristics of Pilot Practice Patients in Quality Measures Sample

Quality measures sample variables	Core measures sample		Palliative care measures sample	
	Baseline n = 308	Follow-up n = 349	Baseline n = 153	Follow-up n = 139
Age in years				
18-54	34%	24%	35%	15%
55-64	29%	26%	34%	30%
65-74	24%	31%	23%	33%
> 74	13%	18%	10%	21%
Gender: female	52%	51%	44%	56%
Race: non-White ^a	16%	14%	12%	15%
Primary site of cancer				
Breast cancer	16%	6%	17%	2%
Colon cancer	12%	6%	14%	3%
Rectal cancer	4%	2%	4%	2%
Lung cancer	10%	7%	13%	11%
Non-Hodgkin lymphoma	7%	7%	7%	3%
Gynecologic cancer	1%	0%	1%	0%
Prostate cancer	4%	4%	9%	7%
Other	46%	68%	37%	72%

^aRace/ethnicity data were unknown for 152 patients at baseline and 12 patients at follow-up.

(preintervention response base, 2304; postintervention response base, 1788). We received 715 preintervention responses and 437 postintervention responses for response rates of 31% and 24%, respectively. We removed patients who had skipped relevant survey items (12 patients each at preintervention and post intervention) and patients who indicated that they did not receive drug therapy for cancer at the attributed pilot or comparison practice during the previous 6 months (97 patients at preintervention and 165 patients at post intervention). After removing ineligible patients from the response base, there were 606 valid preintervention survey responses (175 pilot, 431 comparison) and 260 postintervention survey responses (81 pilot, 179 comparison).

We calculated descriptive data on the CAHPS survey demographic variables (Table 2) and composite scores on a 0 to 100 scale using proportional scoring and the summated rating method based on the CAHPS macro.²⁴ This method calculates the mean responses to each item, after transforming each response to a 0 to 100 scale (100 representing the most positive response on any given item response scale; 0 representing the least positive). For example, on a yes/no response scale, if “yes” represents the most positive response, then yes is equal to 100 and no is equal to 0; on an always/usually/sometimes/never response scale, if “always” represents the most positive response, then always is equal to 100; “usually,” 67; “sometimes,” 33; and “never,” 0. A higher score means that practices were rated more positively for care on that item. To estimate the effect of exposure to the intervention, we

used a DID model with fixed effects for practices. The dependent variables included the 5 survey composites and an overall rating. The effects of the intervention were represented by the coefficient estimates for survey time period (pre- or post) interacted with status (pilot or comparison). Covariates included standard CAHPS case-mix variables (age, education, self-reported health status, sex, race, ethnicity, and help with completing survey) and nonresponse weighting.

Quality. We used 31 measures from the American Society of Clinical Oncology’s Quality Oncology Practice Initiative (QOPI) to evaluate improvement in quality, including 25 core measures for patients receiving chemotherapy with new cancer diagnoses and 6 palliative care measures for patients with new advanced cancer diagnoses. The baseline sample included patients with a new cancer diagnosis from August 2011 through August 2013, and the follow-up sample included patients with a new cancer diagnosis from July 2015 through June 2016. For the core measures, pilot practices reported on a total sample of 308 patients at baseline and 349 patients at follow-up. For the palliative care measures, they reported on a total of 153 patients at baseline and 139 patients at follow-up. Demographic data for the quality measure patient sample are included in **Table 3**.

For the core and palliative care measures, we calculated mean, minimum, and maximum pilot practice performance rates. We calculated the percentage point difference in average performance rates across pilot practices, and we compared average pilot practice performance rates with national and regional benchmark data for all practices in the United States and all practices in HHS Region 3 (which includes Pennsylvania). There were no available benchmark data for the palliative care measures because these measures were not yet included in the regular QOPI reporting program.

RESULTS

Utilization

There were no statistically significant ($P < .05$) DID between the pilot and comparison groups on all-cause hospitalizations, all-cause ED visits, or PCP office visits (**Table 4**). Among patients with active chemotherapy, the unadjusted rate of all-cause hospitalization was 0.05 per member per month (PMPM) for the pilot practices compared with 0.05 PMPM for the comparison group; at follow-up, the rates were 0.10 and 0.08, respectively, and the adjusted DID was -0.03 (95% CI, -0.27 to 0.21). The pilot group was associated with an increase in specialist visits from baseline to intervention period relative to comparison practices. The unadjusted rates of specialty visits were 0.93 PMPM for the pilot group and 0.98 for comparison group at baseline; at follow-up, the rates were 1.4 and 1.3, respectively. The adjusted DID of 0.12 (95% CI, 0.05 - 0.19) was significant ($P = .002$). The sensitivity analysis results were fairly consistent and nonsignificant across all 3 patient groups: those in active treatment, continuously enrolled patients, and patients with a history of cancer since 2009.

Patient Experience

Nonresponse analyses showed that respondents were significantly more likely to be older and White and also more likely to have more consistent insurance coverage, coronary artery disease, and a recent chemotherapy visit. In the postintervention group, respondents were also more likely to have lower DxCG risk scores. Respondents and nonrespondents did not differ with regard to sex, education, or presence of other comorbid conditions.

The DID analysis showed mixed results of the pilot on patient experiences (Table 5). Pilot participation was significantly associated with greater improvement in scores on 1 composite, shared decision-making, where the pilot score improved from 76.6 to 83.2 vs a change from 77.9 to 79.7 in the comparison group, yielding a DID result of 4.03 (95% CI, 0.86-7.21). In contrast, the comparison group had greater improvement on 2 composites, access (-6.36 DID; $P < .001$) and exchanging information (-4.25 DID; $P = .013$). There were no statistically significant differences in affective communication, patient self-management, or the overall rating. Detailed results for items comprising the composites suggest items that contribute to the overall findings (not shown). Notably, the pilot practice score on “asked for patient opinion about treatment choices” increased from 79.4 to 90.1 for the pilot group compared with an increase from 80.7 to 83.2 for the comparison group. Further, the pilot practice score on “gave patient clear instruction how to contact them after hours” declined from 89.5 to 77.1 from pre- to post intervention in the pilot group, compared with an increase from 87.8 to 90.8 for the comparison practices.

Quality

On average, the pilot practices improved performance between baseline and follow-up on 65% of the 25 core measures, had no improvement on 8% of measures, and declined in performance on 27% of measures (eAppendix [available at ajmc.com]). Measures that addressed care planning and assessment had the greatest improvements in performance, whereas performance declined on measures that assessed proper follow-up of identified problems. Mean pilot practice performance rates improved more than 10 percentage points and exceeded the national benchmark by follow-up on the care planning measures for documenting chemotherapy intent (80% at baseline vs 93% at follow-up) and discussing intent of chemotherapy with patients (73% vs 87%),

discussing infertility risk (28% vs 63%) and fertility preservation options (53% vs 64%), and documenting chemotherapy treatment summary (41% vs 56%) and providing summary to patient (6% vs 37%).

Mean performance rates improved more than 10 percentage points for each of the symptom assessment palliative care measures for patients with advanced cancer. Similarly, the pilot practices improved on the measures for assessing pain and emotional well-being within the first 2 visits for patients with a new diagnosis of cancer; however, they had lower performance on the measures for addressing problems identified during pain and emotional well-being assessments.

TABLE 4. Differences in Utilization Between Pilot and Comparison Practices: Members With E&M Claim and Active Chemotherapy in the Period of Interest; No Continuous Enrollment Criteria

Variable	Period	Unadjusted rates, per patient per month mean (minimum, maximum)		Adjusted difference-in-difference (95% CI), negative binomial distribution ^a	P
		Pilot practices	Comparison practices		
All-cause hospitalizations	Baseline	0.0403 (0, 0.8750)	0.0386 (0, 1.3333)	N/A	N/A
	Start-up	0.0484 (0, 1.6364)	0.0823 (0, 1.7273)	-0.063 (-0.253 to 0.127)	.5157
	Intervention	0.0623 (0, 1.3333)	0.0512 (0, 1.1667)	-0.078 (-0.307 to 0.151)	.5055
	Follow-up	0.0574 (0, 1.7143)	0.0529 (0, 2.2857)	-0.026 (-0.270 to 0.218)	.8325
All-cause emergency department visits	Baseline	0.0815 (0, 2.6667)	0.0781 (0, 4.1667)	N/A	N/A
	Start-up	0.0873 (0, 4.6364)	0.0973 (0, 6.0000)	0.028 (-0.117 to 0.174)	.7022
	Intervention	0.0825 (0, 9.5556)	0.0833 (0, 3.2778)	0.072 (-0.098 to 0.241)	.4088
	Follow-up	0.0969 (0, 3.8571)	0.1008 (0, 4.2857)	0.105 (-0.076 to 0.286)	.2568
PCP visits	Baseline	0.2539 (0, 3.5417)	0.2505 (0, 5.0417)	N/A	N/A
	Start-up	0.2657 (0, 10.909)	0.2679 (0, 8.6364)	-0.015 (-0.108 to 0.078)	.7500
	Intervention	0.2764 (0, 5.0556)	0.2781 (0, 12.889)	0.063 (-0.039 to 0.165)	.2251
	Follow-up	0.2731 (0, 4.4286)	0.2731 (0, 11.857)	0.086 (-0.027 to 0.199)	.1342
Specialist visits	Baseline	0.9211 (0, 18.208)	0.8967 (0, 8.7083)	N/A	N/A
	Start-up	1.0199 (0, 16.545)	1.0141 (0, 17.636)	0.003 (-0.055 to 0.060)	.9234
	Intervention	1.0018 (0, 10.167)	0.9549 (0, 11.111)	0.106 (0.037-0.176)	.0027
	Follow-up	1.2137 (0, 12.000)	1.1319 (0, 12.714)	0.117 (0.045-0.190)	.0015

E&M, evaluation and management; N/A, not applicable; PCP, primary care provider.

^aThese difference-in-differences do not exactly equal what can be computed from subtracting the pilot and comparison practice scores because of the inclusion of fixed effects in the regression models.

TABLE 5. Differences in CAHPS Cancer Care Survey Composite Score Between Pilot and Comparison Practices: Adjusted for Age, Education, Overall Rating of Mental Health, and Nonresponse

	Scaled, case mix-adjusted composite scores			P
	Preintervention (pilot: n = 175 patients from 5 practices; comparison: n = 431 patients from 18 practices)	Post intervention (pilot: n = 81 patients from 5 practices; comparison: n = 179 patients from 18 practices)	Difference-in-difference (95% CI) ^a	
Affective communication				
Pilot	90.1	92.8	-0.93 [-5.48 to 3.62]	.69
Comparison	90.0	92.4		
Shared decision-making				
Pilot	76.6	83.2	4.03 [0.86-7.21]	.013
Comparison	77.9	79.7		
Patient self-management				
Pilot	75.2	67.9	-0.94 [-10.92 to 9.04]	.85
Comparison	76.3	68.3		
Exchanging information				
Pilot	88.1	86.0	-4.25 [-7.61 to -0.89]	.013
Comparison	89.1	89.8		
Access				
Pilot	92.1	88.4	-6.36 [-9.72 to -3.01]	<.001
Comparison	91.0	93.6		
Overall rating of treatment team				
Pilot	92.9	89.8	-8.05 [-16.22 to 0.12]	.053
Comparison	90.1	94.2		

CAHPS, Consumer Assessment of Healthcare Providers and Systems.

^aThese difference-in-differences do not exactly equal what can be computed from subtracting the pilot and comparison practice scores because of the inclusion of fixed effects in the regression models.

DISCUSSION

Oncology practices participating in this patient-centered care pilot demonstrated an increase in specialist visits, no impact on hospitalizations and ED use, and mixed results for patient experiences, despite improvements in several patient-centered processes. These results are consistent with early studies of the primary care PCMH, which showed that financial incentives are needed to drive improvement in patient experiences and reductions in utilization and that time is required for outcomes to improve. The increase in specialty visits could indicate that the pilot practices were managing patients more closely, which is the intention of patient-centered care and better symptom management. However, more time may be needed to see a reduction in ED and hospital use. Also, practices may be affiliated with hospitals in which the incentive to reduce use of these services is dampened. Higher levels of care coordination require more staff and documentation resources, and neither this pilot project nor payers offered pilot practices increased reimbursement fees for implementing the patient-centered care model. With respect to the mixed results for patient experiences, one explanation could be that pilot practices had only partially demonstrated implementation of certain standards. For instance, comparison practices had greater improvement than pilot practices on the access composite, and we

learned that at follow-up, the pilot practices had not implemented all standards related to care access, including providing timely clinical advice before and after office hours.

There are several other explanations for the mixed results. Throughout the pilot, many of the practices were undergoing upgrades to electronic health record (EHR) systems and changes in ownership or organizational structure, which key informants reported may have disrupted care and affected patient experience. In addition, the practices faced barriers in fully implementing the patient-centered oncology care model due to a lack of resources. This intervention did not include a financial payment strategy, and practices did not receive any payment changes from payers to help transform or manage patients. In contrast, recent studies have shown that where there has been greater investment in systems for population management or alternative payment strategies, there have been decreases in costs and utilization and increases in quality of care and patient satisfaction.^{18,25-30} Some of these studies did not evaluate changes in patient experience or quality but focused only on utilization and cost.

Limitations

This study has several limitations. The intervention was not randomized, and practices that volunteered to participate differed somewhat from

the comparison practices on utilization outcomes from baseline to the start-up period. We did not have information on the implementation of patient-centered standards or quality measure performance for the comparison sites. Thus, participating and comparison practices might have differed on unobserved characteristics that could bias our estimates of intervention effects (eg, volunteering practices might have more engaged leadership that could drive observed differences that our models would erroneously attribute to the intervention; changes in EHR systems in the pilot or the comparison sites may have affected observed differences). A second limitation is that we did not perform a test of parallel trends. With only 2 years of baseline data and a small sample size, we had concerns that a parallel trends test would be underpowered and thus uninformative. A third limitation involves concerns about ceiling effects on the patient experience survey and the ability of oncology practices to improve on the composite scores over time, although there is evidence demonstrating the use of CAHPS scales for assessing and improving quality.^{31,32}

Finally, the approach we used to attribute patients to pilot and comparison practices to establish which practices should be accountable for patients' care is one that is commonly used, but we found that it was imperfect and the patterns of attribution changed over time. The percentage of survey respondents who denied receiving care at the attributed practice was higher at the second survey, and the number of patients attributed to the pilot practice decreased between baseline and follow-up. We found few claims for patients in 1 of the pilot practices, which was due to the practice billing chemotherapy through the affiliated hospital rather than through the medical oncology practice, and we were unable to separate the practice patient population claims from the hospital patient population claims. In addition, Independence Blue Cross made changes to the provider identification system between the baseline and follow-up period, which may have affected the number of patients attributed to practices in the follow-up utilization and survey samples. Any imperfections in attribution would constitute error in the main identification variable, which would bias any effect estimates of the intervention toward the null hypothesis (because the error term of the regression becomes correlated with the measurement error in the independent variable itself).

CONCLUSIONS

Oncology practices participating in this patient-centered care pilot demonstrated improvement in quality on several patient-centered processes, particularly symptom assessment and care planning, but patient experiences showed mixed results. Use of specialty care increased, but there was no impact on hospitalizations or ED use. These findings are consistent with early evaluations of the PCMH in primary care.³³ This was the first such intervention to be tried and evaluated in oncology practices. Future research is needed to evaluate different oncology practice interventions and identify effective approaches for improving patient-centered outcomes in oncology and among subgroups of patients. ■

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Author Affiliations: National Committee for Quality Assurance (LMR, MT, TP, SHS), Washington, DC; RAND Inc (MF), Boston, MA; Independence Blue Cross (AS-M), Philadelphia, PA.

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Address Correspondence to: Lindsey M. Roth, MPP, National Committee for Quality Assurance, 1100 13th St NW, Third Floor, Washington, DC 20005. Email: roth@ncqa.org.

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eAppendix. Pilot Practice Average Performance Rates, National and Regional Benchmarks on Quality Measures

Measures	Overall Pilot Practices		Overall Pilot Practices		National Benchmark		HHS Region 3 Benchmark	
	Baseline N=5 practices		Follow-Up N=5 practices		Follow-Up N=288 practices		Follow-Up N=32 practices	
	Mean Perf. Rate (Min Rate; Max Rate)	N Charts	Mean Perf. Rate (Min Rate; Max Rate)	N Charts	Mean Perf. Rate (Min Rate; Max Rate)	N Charts	Mean Perf. Rate (Min Rate; Max Rate)	N Charts
Pain assessed by second office visit	77.90% (53%; 99%)	307	95.70% (86%; 100%)	349	93.80% (0%; 100%)	19,536	94.50% (36%; 100%)	2,169
Pain intensity quantified by second office visit (includes documentation of no pain)	74.90% (44%; 100%)	235	94.60% (90%; 100%)	329	92.60% (0%; 100%)	18,373	93.50% (65%; 100%)	2,060
Plan of care for moderate/severe pain documented	88.30% (60%; 100%)	25	79.50% (38%; 100%)	61	75.40% (0%; 100%)	3,352	76.40% (17%; 100%)	380
DEFECT-FREE: Pain addressed appropriately	58.80% (30%; 98%)	307	87.30% (67%; 100%)	349	83.40% (0%; 100%)	19,537	84.70% (28%; 100%)	2,169
Patient emotional well-being assessed by the second office visit	42.90% (7%; 100%)	266	75.80% (46%; 100%)	349	80.10% (0%; 100%)	19,535	84.20% (14%; 100%)	2,169
Action taken to address problems with emotional well-being by the second office visit	92.70% (67%; 100%)	65	84.50% (58%; 100%)	78	85.40% (0%; 100%)	4,486	86.60% (0%; 100%)	505
Serotonin antagonist prescribed with	98.50% (92%; 100%)	97	98.70% (99%; 100%)	228	95.70% (0%; 100%)	9,692	98.60% 89%; 100%	1,138

moderate/high emetic risk chemotherapy								
Corticosteroids and serotonin antagonist prescribed with moderate/high emetic risk chemotherapy	89.90% (78%; 100%)	215	88.90% (58%; 100%)	228	93.10% (0%; 100%)	9,668	95.00% (58%; 100%)	1,136
Aprepitant/Fosaprepitant prescribed with high emetic risk chemotherapy	84.90% (70%; 100%)	101	75.80% (67%; 100%)	72	77.20% (0%; 100%)	2,983	79.50% (0%; 100%)	366
DEFECT-FREE: Anti-emetics prescribed appropriately with moderate/high emetic risk chemotherapy	71.20% (31%; 96%)	214	92.50% (69%; 100%)	129	94.80% (0%; 100%)	6,161	97.00% (69%; 100%)	697
Documented plan for chemotherapy, including doses, route, and time intervals	96.40% (91%; 100%)	278	93.20% (82%; 100%)	290	86.80% (0%; 100%)	14,567	88.30% (0%; 100%)	1,724
Number of chemotherapy cycles documented	74.50% (46%; 100%)	146	94.60% (80%; 100%)	149	94.20% (23%; 100%)	8,847	94.30% (50%; 100%)	1,059
Chemotherapy intent (curative vs palliative) documented	80.30% (61%; 97.4%)	276	92.80% (77%; 100%)	290	92.80% (33%; 100%)	14,551	92.30% (50%; 100%)	1,721
Chemotherapy intent discussion with patient documented	72.50% (49%; 94%)	277	87.10% (70%; 100%)	290	88.40% (0%; 100%)	14,584	88.90% (45%; 100%)	1,725
DEFECT-FREE: Chemotherapy planning completed appropriately	73.20% (48%; 96%)	276	86.00% (74%; 100%)	290	79.90% (0%; 100%)	14,584	81.80% (0%; 100%)	1,725
Chemotherapy treatment summary completed	41.10% (4%; 89%)	259	55.60% (7%; 91%)	80	45.40% (0%; 100%)	4,606	29.10% (0%; 97%)	534

within 3 months of chemotherapy end								
Chemotherapy treatment summary provided to patient within 3 months of chemotherapy end	5.60% (0%; 23%)	255	37.30% (0%; 80%)	78	21.70% (0%; 100%)	4,450	16.00% (0%; 97%)	522
Chemotherapy treatment summary provided or communicated to practitioner(s) within 3 months of chemotherapy end	5.60% (0%; 24%)	256	41.60% (7%; 73%)	73	32.50% (0%; 100%)	4,301	19.70% (0%; 75%)	516
DEFECT-FREE: Chemotherapy treatment summary process completed within 3 months of chemotherapy end	15.40% (0%; 64%)	45	34.10% (7%; 60%)	76	23.10% (0%; 100%)	4,411	13.80% (0%; 75%)	515
Smoking status/tobacco use documented in past year	89.70% (76%; 99%)	298	99.60% (98%; 100%)	343	99.20% (61%; 100%)	18,972	99.50% (98%; 100%)	2,144
Smoking/tobacco use cessation counseling recommended to smokers/tobacco users in past year	51.60% (29%; 67%)	38	47.10% (15%; 86%)	50	60.00% (0%; 100%)	2,964	61.50% (0%; 100%)	341
Tobacco cessation counseling administered or patient referred in past year	43.50% (21%; 63%)	38	16.70% (0%; 57%)	50	41.60% (0%; 100%)	2,964	39.50% (0%; 100%)	341
DEFECT-FREE: Smoking/tobacco use cessation administered	89.50% (78%; 96%)	298	85.80% (75%; 97%)	343	89.80% (50%; 100%)	18,972	90.30% (78%; 100%)	2,144

appropriately in the past year								
Infertility risks discussed prior to chemotherapy with patients of reproductive age	28.30%	39	63.40%	28	43.50%	1,075	41.40%	128
	(0%; 100%)		(0%; 100%)		(0%; 100%)		(0%; 100%)	
Fertility preservation options discussed or referral to specialist	52.50%	39	63.90%	28	28.30%	1,075	29.90%	128
	(25%; 100%)		(46%; 100%)		(0%; 100%)		(0%; 100%)	
Pain quantified using a standardized instrument at every clinical encounter in the past 3 months for patients with advanced/metastatic cancer	66.80%	148	79.60%	139	N/A	N/A	N/A	N/A
	(27%; 100%)		(62%; 97%)					
Dyspnea assessed on every clinic visit in the past 3 months for patients with advanced/metastatic cancer	82.20%	145	93.20%	139	N/A	N/A	N/A	N/A
	(59%; 100%)		(76%; 100%)					
Nausea and vomiting assessed on every clinic visit in the past 3 months for patients with advanced/metastatic cancer	78.60%	146	96.90%	101	N/A	N/A	N/A	N/A
	(43%; 100%)		(90%; 100%)					
Performance status assessed at every clinic visit in the past 3 months for patients with advanced/metastatic cancer	50.20%	147	73.40%	139	N/A	N/A	N/A	N/A
	(0%; 100%)		(21%; 100%)					

Documented substance abuse history, including tobacco, alcohol and illicit drug use within the first 3 visits after diagnosis with advanced/metastatic cancer	74.30%	139	100%	138	N/A	N/A	N/A	N/A
	(31%; 100%)		(100%; 100%)					
Advance directive documentation within first 3 visits after diagnosis with advanced/metastatic cancer	25.70%	140	28.90%	138	N/A	N/A	N/A	N/A
	(3%; 100%)		(0%; 77%)					