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Accountable care organizations and prostate cancer care

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Abstract

Purpose—Accountable care organizations have the potential to increase the value of healthcare by improving population health and enhanced financial stewardship. How practice context modifies effects on a specialty-focused disease, such as prostate cancer care, has implications for their success.

Methods—We performed a retrospective cohort study of newly diagnosed men with prostate cancer between 2012 and 2013 using national Medicare data. Practice affiliation (small single-specialty, large single-specialty, multispecialty groups) and accountable care organization alignment were measured at the patient level. Generalized linear multivariable models were fitted to derive adjusted rates of treatment and spending for the 12-month period after diagnosis according to accountable care organization alignment and practice affiliation.

Results—Of 15,640 patients with newly diagnosed prostate cancer, 1,100 (7.0%) were aligned with accountable care organizations. Patients in these organizations had similar use of curative treatment to those not in accountable care organizations (71.4% vs. 70.0%, respectively; $p=0.33$), which did not vary with practice affiliation ($p=0.39$). Adjusted spending was higher among patients in accountable care organizations (\$20,916 vs. \$19,773, $p=0.03$); however, this relationship was independent of the practice affiliation ($p=0.90$). Higher accountable care organization penetration within a practice was associated with increased spending ($p<0.05$) but not with treatment ($p=0.87$).

Conclusions—Prostate cancer patients aligned with accountable care organizations had similar rates of treatment, but increased spending, in the year following diagnosis. These findings were similar across practice affiliations. Better specialist engagement by accountable care organizations may be necessary for them to alter practice patterns for specialty care.

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Keywords

prostate; cancer; treatment

Introduction

Although prostate cancer is a common disease, it remains one of the most difficult to manage. Uncertainty about who to treat and how, has resulted in tremendous variations in prostate cancer care,¹⁻⁴ raising serious concerns about unnecessary treatment and spending.⁵ The implementation of Medicare Shared Savings Program Accountable Care Organizations (ACOs) encourages a shift in organized medicine towards population-based thinking about health and enhanced financial stewardship, both of which have the potential to increase the value of prostate cancer care.

To some extent, the nature and scope of the prostate cancer care delivered are related to the practice context, including how urologists organize themselves. Multispecialty groups, which most closely align with the culture of ACOs,⁶ are well positioned to share information and coordinate care across specialties,⁷⁻⁹ both of which can eliminate waste and reduce spending. Alternatively, single specialty groups allow for surgeon sub-specialization and enhanced integration^{10, 11} throughout the prostate cancer care continuum, which may lead to better outcomes and lower costs,^{6, 12, 13} particularly among larger groups.¹⁴ In both contexts, however, incentives in the fee-for-service delivery system favoring volume-based productivity have the potential to offset the advantages inherent to each model. How multispecialty and single specialty practices respond to ACO implementation, particularly for specialty service lines, invariably will impact the ability of reforms to achieve their goals of improving the value of healthcare.

For this reason, we performed a study to understand the early implications of ACOs for prostate cancer treatment and spending. In particular, we assessed the extent to which effects varied across the single and multispecialty practice models. We hypothesized that ACOs would be associated with lower rates of treatment and reduced spending and that these effects would be strongest for multispecialty groups. Findings from this study provide 'real world' data on relationships between practice context and policy implementation.

Methods

Study population

We performed a retrospective cohort study of fee-for-service Medicare beneficiaries with newly diagnosed prostate cancer in 2012 and 2013 using a 20% national sample. Incident cases of prostate cancer were identified in claims using an established method that has a specificity and positive predictive value of 99.8% and 88.7%, respectively.¹⁵ Only patients eligible for both Parts A and B throughout this period were included in the study. Patient alignment to a Shared Savings Program ACO was determined using the Beneficiary-level Research Identifiable File provided by Centers for Medicare and Medicaid Services. Follow-up for all beneficiaries was available through December 31, 2014.

We attributed each patient to the practice affiliation of his primary urologist. For this purpose, we first assigned patients to their primary urologist using well-established methods.¹⁶ Urologists then were assigned to their practice affiliation (single specialty vs. multispecialty group) with explicit fields in the Healthcare Relational Spheres provider files (IMS Health). Those employed by hospitals were classified to multispecialty groups. Because resources (e.g., ability to invest in health information technology), negotiating leverage and bandwidth for contractual arrangements within a practice typically increase with size, single specialty practices were further stratified into small (i.e., fewer than 10 urologists) and large (i.e., 10 or more urologists) groups.

Outcomes

We assessed both curative treatment and spending among these newly diagnosed men with prostate cancer for the 12-month period after the diagnosis. Curative treatment was ascertained from the Medicare Provider Analysis and Review, Carrier, and Outpatient files using explicit codes for external beam radiation therapy, surgery, brachytherapy and cryotherapy. We determined spending using price-standardized payments to remove differences related to geography and facility characteristics (e.g., indirect medical education funds, disproportionate share payments) and adjusted all payments for inflation to 2013 U.S. dollars.¹⁷ Spending was characterized by all Medicare payments made from the initial prostate cancer diagnosis date through one year after diagnosis. We chose this comprehensive approach, as opposed to limiting it to claims associated with a diagnosis code of '185' for prostate cancer, because it captures claims (e.g., visits, complications, readmissions) related to the intervention. An analysis limiting payments to claims with a diagnosis code of '185' was performed as a sensitivity analysis and demonstrated findings consistent with the aforementioned comprehensive approach.

Analysis

We compared patient, practice affiliation and regional characteristics according to patient alignment in an ACO using chi-square tests. To examine the independent effect of ACO alignment on use of curative treatment, we fit a multivariable logistic model using the patient as the unit of analysis. We used the Area Resource File to derive the regional characteristics of the population, including urban residence, Medicare managed care penetration, and the supply of urologists, radiation oncologists, and hospital beds. The model was adjusted for patient age, race, socio-economic class, comorbidity, and the aforementioned regional characteristics. Comorbidity was determined with patient claims for the 12-month window prior to diagnosis using established methods.¹⁸ Socioeconomic class was estimated using a composite measure developed at the five-digit zip code level, as described by Diez-Roux.¹⁹ To determine whether the impact of ACOs was modified by the practice affiliation (small single specialty group, large single specialty group, multispecialty group), we fit a second model that additionally included a term for each urologist's practice affiliation and an interaction term between affiliation and ACO alignment. We derived adjusted percentages of patients treated across urologist practice affiliations and ACO alignment by back-transforming the predicted use from this second model.

We next assessed relationships between ACO alignment and Medicare payments in the year after diagnosis. In this context, a generalized linear model was used with a negative binomial distribution and a log link. A second model then was fit accounting for practice affiliation and an associated interaction term for ACO alignment. Both models were adjusted for the covariates noted above. Adjusted payments were derived for the second model as described above. All models used generalized estimating equations to account for the clustering of patients within hospital referral regions.

Sensitivity analysis

To some extent, the relationship between ACOs and prostate cancer treatment and spending may be related to the amount of ‘skin in the game’ of a given practice. In other words, practices with a patient population enriched by ACO beneficiaries may be more apt to align themselves with the value-based principles underlying these organizations. For this reason, we assessed relationships between the ACO penetration within a practice’s population of prostate cancer and both outcomes. We limited this sensitivity analysis to single specialty groups because we were able to capture all physicians within each practice. To measure ACO penetration, we examined the distribution of groups caring for at least 5 prostate cancer patients during the study interval and separated them into groups based on proportion of their patients in ACOs (none, 12.5% or less, or greater than 12.5% prostate cancer patients aligned with ACOs). Modeling was performed using the respective approaches outlined above for the main analyses.

All analyses were carried out in SAS 9.4 (Cary, NC). All tests were two-tailed and the probability of Type 1 error was set at 0.05. The study protocol was judged to be exempt by the institutional review board of the University of Michigan.

Results

We identified 15,640 patients with newly diagnosed prostate cancer in 2012 and 2013. Of these, 1,100 (7.0%) were aligned to a Shared Savings Program ACO. Characteristics of the patient population by ACO alignment are illustrated in Table 1. Prostate cancer patients in ACOs were similar to those not in ACOs with respect to age, race and comorbidity. Patients in ACOs resided in more affluent neighborhoods compared to those not in ACOs (41% vs. 34%, respectively; $p < 0.001$). Similarly, patients in ACOs more commonly resided in urban areas with a greater supply of urologists and radiation oncologists (both $p < 0.001$). Finally, those in ACOs were less likely to be cared for by a small single specialty group compared to patients not in ACOs (45% vs. 52%, respectively, $p < 0.001$).

After adjusting for patient and regional characteristics, we found no relationship between use of curative treatment and ACO alignment [71.4% (95% Confidence Interval (CI) 68.6%–74.1%) in ACOs vs. 70.0% (95% CI 69.1%–71.0%) not in ACOs, $p=0.33$]. As illustrated in Figure 1, the absence of an ACO effect was consistent across the three practice contexts. In contrast, adjusted spending for the 12 month period after diagnosis was higher in prostate cancer patients in ACOs compared to those not in ACOs [\$20,916 (95% CI \$19,969–\$21,907) vs. \$19,773 (95% CI \$19,413–\$20,139), respectively; $p = 0.03$]. As shown in Figure 2, higher adjusted spending among patients in ACOs was consistent across the

practice affiliations (interaction between ACO alignment and group practice context $p=0.90$).

We then assessed the relationship between the extent of involvement of single specialty practices in the ACO program (i.e., the proportion of their prostate cancer population aligned with ACOs) and treatment and spending. Adjusted rates of treatment were similar for those practices with no ACO patients, those with 12.5% or less, and those with greater than 12.5% (Figure 3a). However, as shown in Figure 3b, adjusted rates of spending for the 12-month period after diagnosis increased with ACO penetration ($p=0.0494$)

Discussion

ACOs aim to improve the value of healthcare delivered by improving quality and reducing spending.²⁰ Their potential to eliminate unnecessary care would contribute significantly to both of these domains. We found that newly diagnosed patients with prostate cancer in ACOs had similar rates of treatment to those not in ACOs. Further, spending for the 12-month period after diagnosis was significantly higher for patients in ACOs.

Our findings of similar treatment and higher spending for prostate cancer among patients in ACOs could be explained by at least two structural characteristics embedded within the fee-for-service delivery system. First, policymakers have long believed a link between urologist practice context and the nature and extent of prostate cancer care.²¹ However, we found that urologist practice affiliation did not modify the relationship between ACOs and both outcomes. In other words, whether a patient with prostate cancer was managed by a single specialty group or a multispecialty group did little to explain our findings. This is somewhat surprising given that the latter embody several characteristics considered synonymous with efficiency. These include a focus on accountability; strong physician leadership; improved physician to physician communication; the presence of systems for coordination of care, performance measurement, and quality improvement; and, incentives that reward quality.^{9, 22–26}

The second potential structural characteristic that may impact our findings relates to urologist buy-in. Because practices invariably care for both patients in and out of ACOs, it is highly plausible that groups managing a larger market share of ACO beneficiaries (i.e., higher ACO penetration) would be more attuned to achieving the aims of ACOs. Specifically, these groups more heavily rely on referrals from primary care physicians aligned with ACOs. At least among patients managed in single specialty groups, increasing ACO penetration was not associated with curative treatment but was associated with higher spending.

That spending for patients in ACOs is higher than for those outside of the program is not surprising. Shared Savings Program ACOs receive financial incentives for, among other things, reducing per beneficiary spending.²⁰ Participation by primary care physicians, and by extension their patients, is voluntary and currently virtually none bear downside financial risk.²⁷ Our findings are consistent with selection to participate by higher spending physicians and are supported by prior work in this area.^{20, 28} As opportunities to share in

savings are benchmarked against historical average spending for each ACO, “expensive” group practices invariably joined because they have more room to move in terms of cutting costs (e.g., by eliminating easy to identify superfluous costs).

Our findings should be interpreted in the context of several limitations. First, our inference is limited to Medicare beneficiaries with prostate cancer. While it is possible patterns of treatment and spending might differ for younger patients, our findings are generalizable to the target population for the Shared Savings Program. Second and most importantly, we cannot get at the appropriateness of the use of treatment or spending for these patients. Although there is no biological rationale for why prostate cancer disease severity would vary according to ACO alignment, we acknowledge that such information would lend further insight into appropriateness. While other datasets, such as SEER-Medicare, contain such information, sample size constraints preclude inference due to the limited initial diffusion of ACOs in this population. However, that practice affiliation does not modify relationships between ACOs, treatment and spending is informative for anticipating the broader impact of these organizations moving forward, as concerns about their generalizability continue to ebb.²⁹ Third, this study design does not imply a causal relationship between ACOs and spending. Rather, our study describes the early patterns of treatment and spending for prostate cancer among the Shared Savings Program ACOs and demonstrates that more is spent on participants in the program. As we note above, that early ACOs are selected for higher Medicare spending at baseline is well established. However, spending differences for non-participants compared to ACO patients have generally been more modest, suggesting that spillover effects to specialty conditions has not occurred. Fourth, our analysis does not consider urologist employment status nor distinguish between ACO types (e.g., independent practice association vs. hospital-based). There is some evidence to suggest that ACOs independent of hospitals deliver better care at lower cost.²⁰ Finally, this study primarily examines cost, only one part of the “value” equation. It is possible that the higher spending by ACOs is made up for by improvements in quality, such as enhanced access, patient centeredness and better cancer-specific outcomes.

Conclusion

Newly diagnosed patients with prostate cancer in Shared Savings Program ACOs have similar use of treatment but higher spending in the year after diagnosis. This relationship is not impacted by the practice affiliation of the urologist. Future work should examine the effects of ACOs on prostate cancer care over time as they disseminate across a larger swath of the Medicare population. For some diseases, such as prostate cancer, ACOs will have to figure out how to engage specialists if they are to be successful at reducing spending. Further, until ACOs are forced to bear more than nominal downside risk, such as through participation in an advanced alternative payment model implied by the Medicare Access and CHIP Reauthorization Act, savings are likely to be modest, if at all.

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Abbreviation

ACO	Accountable Care Organization
CI	Confidence interval

Figure 1. Relationship between ACO alignment and adjusted rates of curative treatment, stratified by practice context

Patients in ACOs had similar adjusted rates of treatment to those not in ACOs ($p=0.33$) independent of the group practice context (interaction between ACO alignment and practice context $p=0.39$).

Figure 2. Relationship between ACO alignment and adjusted spending in the 12 months subsequent to prostate cancer diagnosis, stratified by practice context
Patients in ACOs had higher adjusted spending to those not in ACOs ($p=0.03$) for the 12-months following their prostate cancer diagnosis. This pattern was similar across the three group practice contexts (interaction between ACO alignment and practice context $p=0.90$).

Figure 3. Adjusted rates of treatment (a) and spending (b) for newly diagnosed prostate cancer patients managed by single specialty groups according to the proportion of the group's patients aligned with ACOs (i.e., ACO penetration)

Among single specialty group practices, adjusted rates of treatment were similar according to the ACO penetration within a group's panel of patients ($p=0.87$). Adjusted spending increased with ACO penetration ($p<0.05$). Groups without patients in ACOs had significantly lower spending than those with a high level of ACO penetration ($p=0.01$).

Table 1

Clinical and regional characteristics of newly diagnosed prostate cancer patients by ACO alignment

Characteristics	ACO patient alignment		p-value
	No	Yes	
Number of patients	14,540	1,100	-
Patient characteristics			
Age, years			0.36
66–69	4557 (31)	329 (30)	
70–74	4954 (34)	363 (33)	
75–79	3098 (21)	263 (24)	
80–84	1390 (10)	103 (9)	
85+	541 (4)	42 (4)	
Race/ethnicity			0.20
White	12814 (88)	952 (87)	
Black	1276 (9)	114 (10)	
Other/unknown	450 (3)	34 (3)	
Comorbidity			0.085
0	8345 (57)	627 (57)	
1	3306 (23)	256 (23)	
2	1537 (11)	96 (9)	
3+	1352 (9)	121 (11)	
Socioeconomic status			<0.001
Low	4712 (32)	281 (26)	
Medium	4942 (34)	366 (33)	
High	4886 (34)	453 (41)	
Urology practice characteristics			
Practice affiliation			<0.001
Small single specialty (1 to 9 urologists)	7538 (52)	496 (45)	
Large single specialty (10 + urologists)	3701 (25)	314 (29)	
Multispecialty group	3301 (23)	290 (26)	
Regional characteristics			
Residing in urban area			<0.001
non-urban	3004 (21)	122 (11)	
Urologists per 100,000			<0.001
Low (34)	4902 (34)	312 (28)	
Intermediate	4892 (34)	328 (30)	
High (71)	4746 (33)	460 (42)	
Radiation oncologists per 100,000			<0.001
Low (14)	4972 (34)	290 (26)	

Characteristics	ACO patient alignment		p-value
	No	Yes	
Intermediate	4785 (33)	389 (35)	
High (29)	4783 (33)	421 (38)	
Hospital beds per 100,000			0.37
Low (3338)	4885 (34)	350 (32)	
Intermediate	4832 (33)	365 (33)	
High (6350)	4823 (33)	385 (35)	
Medicare Managed Care penetration			0.003
Low (13.6%)	4921 (34)	323 (29)	
Intermediate	4763 (33)	406 (37)	
High (25.1%)	4856 (33)	371 (34)	