

# Trends in Hospital Ownership of Physician Practices and the Effect on Processes to Improve Quality

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A number of reports suggest an emerging trend for physician practices to change ownership from physicians to hospitals.<sup>1-8</sup> For example, reports from the Medical Group Management Association's (MGMA) Physician Compensation and Production Survey found that the percentage of physicians who were employed by hospitals increased from 20% in 2002 to over 50% in 2008.<sup>1,9,10</sup> Further, the Center for Studying Health System Change found that in 2010, hospitals were rapidly increasing employment of physicians in 9 of 12 markets.<sup>11</sup> An American Hospital Association survey also found that over 200,000 physicians were employed by hospitals in 2010—an increase of 34% since 2000.<sup>7</sup>

Published reports suggest that the movement toward hospital employment results from multiple factors.<sup>1,2,7,12</sup> In particular, policies being adopted by federal and state payers (ie, Medicare and Medicaid) and by health insurance plans, such as the movement toward bundled and capitated payments, encouragement of patient-centered medical homes and accountable care organizations, and incentives for the adoption of electronic health records (EHRs), such as the Health Information Technology for Economic and Clinical Health (HITECH) Act and CMS's "Meaningful Use" incentive, are thought to be large drivers of a shift to hospital-ownership.

It is unclear how a change to hospital ownership affects the quality of patient care. Given that hospitals generally have greater resources than physician practices, increased hospital ownership of practices may improve quality of care. There is evidence that hospital-owned practices use more recommended care management processes (CMPs) (eg, disease registries, nurse coordinators, health information technology [IT]) and may have the mechanisms to improve care coordination.<sup>13-15</sup> On the other hand, there may be negative effects on quality, such as less autonomy for physicians and staff or less personalized care. Hospital ownership may also be associated with increased market share by hospitals, and increased costs.<sup>16,17</sup>

## ABSTRACT

**Objectives:** Reports suggest a trend for physician practices to change ownership from physicians to hospitals. It remains unclear how this change affects quality of patient care. We report the effect of a change to hospital ownership on the use of care management processes (CMPs) and health information technology (IT) among practices in the United States.

**Study Design:** Trend analyses of 3 large national surveys of physician practices.

**Methods:** We included 2 cohorts of practices: large practices with 20 or more physicians and small/medium practices with fewer than 20 physicians. The main outcomes were the changes in CMP and health IT indices among practices that were acquired by hospitals. We used multivariate logistic regression to assess these changes.

**Results:** Large practices acquired by hospitals had larger increases in their CMP index than those that remained physician-owned (11.0-point increase vs 7.0-point decrease; adjusted  $P = .03$ ). Small/medium practices acquired by hospitals had smaller but significantly higher increases in their CMP score (3.8 points vs 2.6 points; adjusted  $P = .04$ ). Among all practices, there were no significant differences in the change of the health IT index.

**Conclusions:** We found a significant increase in the use of CMPs among practices that were acquired by hospitals and no difference in health IT use. These findings suggest that a trend for hospitals to own physician practices may have a positive effect on chronic disease management and quality of care.

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In this paper, we report findings from a series of 3 national surveys of physician groups conducted between 2006 and 2013, from which, we estimate changes in the use of systematic care management processes and health IT to improve the quality of care after practices were acquired by hospitals.

### Take-Away Points

Reports suggest a trend for physician practices to change ownership from physicians to hospitals. We analyzed data from the 3 largest surveys of US medical groups and found:

- No significant increase in the percentage of practices that were owned by hospitals.
- Increases in the use of evidence-based care management processes among practices that were acquired by hospitals versus those that remained physician-owned.
- No difference in the use of health information technology among practices that were acquired by hospitals versus those that remained physician-owned.

## METHODS

### Data Sources

We used data from the 3 largest national surveys of physician practices in the United States: the National Survey of Physician Organizations 2 and 3 (NSPO2 and NSPO3) and the National Survey of Small and Medium Physician Practices (NSSMPP).<sup>18-20</sup> The sample, methods, and content have been described previously and are outlined in [eAppendix 1](#) (eAppendices available at [www.ajmc.com](http://www.ajmc.com)).<sup>18-21</sup> Briefly, all 3 were 40-minute telephone surveys with the medical director, president, or chief executive officer of the physician organization, and focused on the use of evidence-based CMPs and health IT, particularly for patients with asthma, diabetes, congestive heart failure, and/or depression. All 3 surveys collected information on the structural characteristics of the group (eg, number of physicians, ownership, specialty mix) and the external incentives that were in place to improve quality (eg, payment for achieving quality measures, public reporting), in addition to the CMPs and use of health IT noted above.

NSPO2 collected data in 2006 and 2007, focusing on large practices with 20 or more physicians; NSSMPP collected data in 2007 through 2009, focusing on small and medium-sized practices with 1 to 19 physicians; and NSPO3 collected data in 2012 and 2013, including practices of all sizes. Academic faculty practices were excluded from these surveys. The adjusted response rates for each survey were 60.3% for NSPO2, 63.6% for NSSMPP, and 49.7% for NSPO3.<sup>22</sup> (Further details are shown in [eAppendix 1](#)).

### Sample

This article focuses on 2 comparison groups: the first comparison group includes large practices that responded to both NSPO2 and NSPO3 and were owned by physicians at the time of NSPO2 (n = 73); the second comparison group includes small/medium practices that responded to both NSSMPP and NSPO3 and were owned by physicians at the time of NSSMPP (n = 768) ([eAppendix 2](#)). We also report summary statistics for all the practices that responded to NSPO2, NSSMPP, and NSPO3, including the percentage of practices owned by hospitals in each of these surveys.

Given the complex sampling structures of NSPO3 and NSSMPP, population ratio-adjusted weights were derived based on sampling probabilities with poststratification adjustments.<sup>23</sup>

### Variables

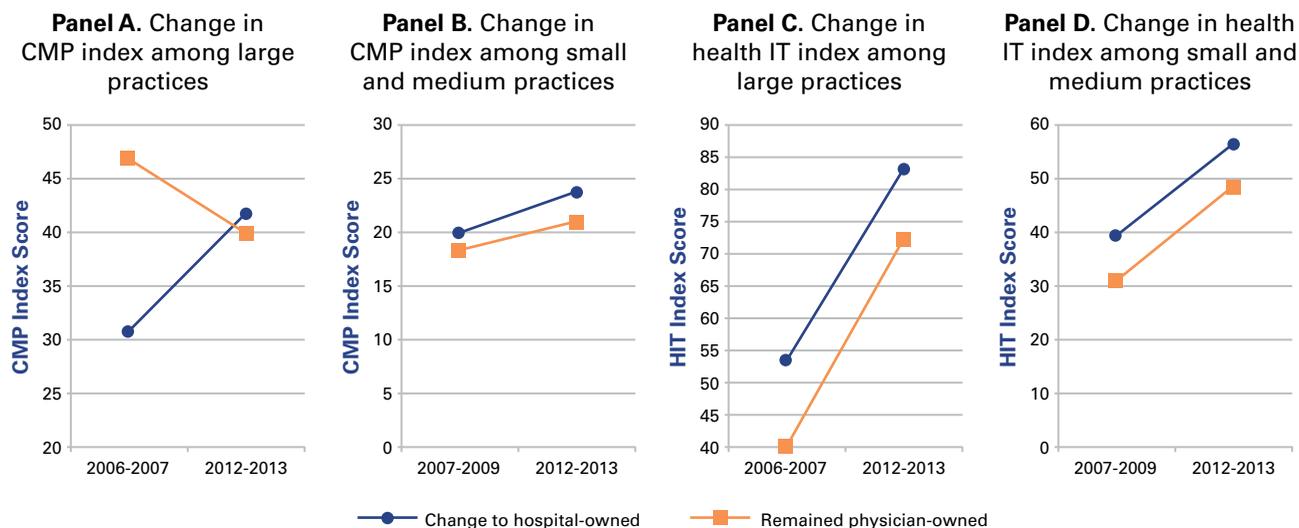
The main predictor variable was ownership, which was measured with the question: “Who owns the equipment and employs the nonphysician staff of your medical practice?” Response categories included physicians; a larger medical group; a hospital, hospital system, or healthcare system; an HMO or insurance entity, or nonphysician managers. We categorized ownership into 3 categories: 1) physician-owned if the respondent stated that the practice was owned by physicians or a larger medical group; 2) hospital-owned if the respondent stated that the practice was owned by a hospital, hospital system, healthcare system, HMO, or insurance entity; and 3) other ownership (eg, federally qualified health center or other nonprofit practice).

To explore the effect of change in ownership on the use of evidence-based CMPs and health IT, we calculated a CMP index and a health IT index.<sup>18</sup> (These indices have been described previously and are outlined in [eAppendix 3](#).) Briefly, the CMP index ranges from a score of 0 to 20 and is based on a practices’ use of disease registries, nurse care managers, feedback of quality data to physicians, reminders to patients, and nonphysician staff for patient education. The health IT index ranges from a score of 0 to 14 and is based on a practice’s EHR capabilities, including documentation, clinical decision support, quality measurement, order entry, access to data, and connectivity with patients.

### Analysis

For large practices that responded to both NSPO2 and NSPO3 (comparison group 1, described above), we calculated the change in the CMP and health IT indices and used multivariate linear regression to compare the change in these indices between practices that changed ownership from physician-owned to hospital-owned, and practices that remained physician-owned, while controlling for other

**Figure.** Changes in CMP and Health IT Indices Between Practices That Changed to Hospital Ownership Compared With Those That Remained Physician-Owned<sup>a,b</sup>



CMP indicates care management program; IT, information technology.

<sup>a</sup>Weighted analyses using SAS v9.3 surveyreg procedure.

<sup>b</sup>Adjusted for practice size, specialty mix, years in existence, location, % revenue from Medicaid and/or poor, uninsured patients, pay-for-performance index score, external evaluation index score.

practice characteristic. We did a similar analysis for small/medium practices (comparison group 2, described above).

## RESULTS

### Hospital Ownership of Practices

Among all the practices that responded to NSPO3 in 2012 and 2013, 287 (13.2%) physician practices were owned by hospitals. (The characteristics of the practices in our sample are shown in [eAppendix 4](#).) Among large practices, 26.6% were owned by hospitals in 2004 through 2006, and 35.6% were owned by hospitals in 2012 and 2013. Among small and medium practices, 8.3% were owned by hospitals in 2007 through 2009 and 11.3% were owned by hospitals in 2012 and 2013. (The change in ownership is shown in [eAppendix 4](#)).

### Changes in Care Management and Health Information Technology

Among large practices that were physician-owned in 2005 and 2006, those that changed to hospital-owned had, on average, a lower baseline CMP score than practices that remained physician-owned (30.8 [SE = 6.4] vs 47.0 [SE = 3.1]; adjusted  $P = .03$ ) ([Figure](#)). By 2012/2013, practices that were acquired by hospitals had similar CMP scores

compared with practices that remained physician-owned (41.8 [SE = 7.8] vs 40.0 [SE = 6.2]; adjusted  $P = .14$ ), which reflected a significantly higher increase among practices that changed to hospital ownership (11.0-point increase vs 7.0-point decrease; adjusted  $P = .03$ ).

Among small and medium practices that were physician-owned in 2005/2006, those that changed to hospital-owned had a similar baseline CMP score compared with practices that remained physician-owned (20.0 [SE = 2.4] vs 18.4 [SE = 0.5]; adjusted  $P = .10$ ). By 2012/2013, small and medium practices that were acquired by hospitals had a slightly, but statistically significant, higher CMP score compared with practices that remained physician-owned (23.8 [SE = 4.4] vs 21.0 [SE = 0.7]; adjusted  $P = .03$ ), which reflected a significantly higher increase in the CMP score among these practices (3.8-point increase vs 2.6-point increase; adjusted  $P = .04$ ).

At baseline, health IT index scores were similar among large, hospital-owned practices and physician-owned practices (53.5 [SE = 12.1] vs 40.0 [SE = 6.01]; adjusted  $P = .54$ ) and increased similarly for both groups (29.7-point increase [SE = 6.7] vs 32.2-point increase [SE = 5.4]; adjusted  $P = .79$ ). Among small practices, those that changed ownership had a higher baseline health IT index score (39.6 [SE = 1.9] vs 31.4 [SE = 0.3]; adjusted  $P < .001$ ). In both groups, the health IT index increased a similar amount [17.2 [SE = 2.3] vs 17.2 [SE = 1.3];  $P = .41$ ).

## DISCUSSION

In this analysis of 3 national surveys of physician groups, we found that the majority were owned by physicians at all time periods; however, practices that were acquired by hospitals had greater change in their use of CMPs compared with practices that remained physician-owned. We found no difference in the use of health IT among practices acquired by hospitals versus those that remained physician-owned.

The current findings suggest that hospital acquisition of practices may have beneficial effects for patients with chronic illnesses. We found significant increases in the use of recommended evidence-based CMPs among practices that changed to hospital ownership compared with practices that remained physician-owned. This was true for practices of all sizes, and may be the result of more financial resources or shared resources that become available to practices as they are acquired by hospitals.

Like CMPs, one could argue that the financial resources of a hospital enable practices to cover the capital expense of installing an EHR system. Our findings do not support this hypothesis, however, as we found no difference in the use of health IT or change in the use of health IT in practices that were acquired by hospitals versus those that remained physician-owned. This may be due to policies such as the HITECH Act, enacted under the American Recovery and Reinvestment Act of 2009, which provided incentives for the meaningful use of health IT (and EHRs in particular).<sup>24</sup>

However, there may be off-setting negative effects if practices acquired by hospitals enable them to raise prices through increased negotiating leverage with payers. A recent study found that markets where hospitals report an increase in ownership of practices were associated with higher healthcare spending.<sup>14</sup> Hospital acquisition of practices may also have unintended effects on physician autonomy or rapport with patients—although, to date there are no data to support this possibility.

### Limitations

There are 2 main limitations to the present analysis. First, the response rate ranged from almost 50% to more than 63% across the 3 surveys. Although this is a robust response rate—particularly for physician groups—there may be unobservable differences between respondents and nonrespondents. Second, the data are based on the responses of a single informant in each group. We sought the person who was the most knowledgeable respondent for the questions asked; however, it was beyond the scope of our research to validate the responses. Nevertheless, a number of internal checks of the responses suggested consistent validity.

## CONCLUSIONS

These surveys of physician groups showed minimal increase in the percentage of practices that were owned by hospitals. However, there appears to be increased use of processes for the management of chronic disease among practices that did change ownership. As the healthcare environment continues to change and evolve due to changes in public and private policies, it will be important to continue to monitor both the prevalence and the effects of hospital ownership of practices on patients and physicians. This is particularly important, given the current findings that those practices that became hospital-owned experienced a significant increase in their use of recommended evidence-based CMPs for patients with asthma, congestive heart failure, depression, and diabetes. Future research should examine the relationship between practice ownership and clinical and patient-reported outcomes of care.

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## REFERENCES

1. Kocher R, Sahni NR. Hospitals' race to employ physicians—the logic behind a money-losing proposition. *N Engl J Med*. 2011;364(19):1790-1793. doi:10.1056/NEJMp1101959.

2. Kocher R, Sahni NR. Physicians versus hospitals as leaders of accountable care organizations. *N Engl J Med*. 2010;363(27):2579-2582. doi:10.1056/NEJMp1011712.
3. O'Malley AS, Bond AM, Berenson RA. Rising hospital employment of physicians: better quality, higher costs? [issue brief No. 136]. Center for Studying Health System Change website. <http://www.hschange.com/CONTENT/1230/>. Published August 2011. Accessed December 25, 2011.
4. Wilde Mathews A. When the doctor has a boss. *The Wall Street Journal* website. [http://online.wsj.com/article/SB10001424052748703856504575600412716683130.html?mod=googlenews\\_wsj](http://online.wsj.com/article/SB10001424052748703856504575600412716683130.html?mod=googlenews_wsj). Updated November 8, 2010. Accessed December 25, 2011.
5. Casalino LP, November EA, Berenson RA, Pham HH. Hospital-physician relations: two tracks and the decline of the voluntary medical staff model. *Health Aff (Millwood)*. 2008;27(5):1305-1314. doi:10.1377/hlthaff.27.5.1305.
6. Chen PW. What 'big medicine' means for doctors and patients. *The New York Times* website. <http://well.blogs.nytimes.com/2011/04/14/what-big-medicine-means-for-doctors-and-patients/>. Published April 14, 2011. Accessed January 9, 2012.
7. Lowes R. Number of physicians employed by hospitals snowballing. <http://www.medscape.com/viewarticle/757386>. Medscape website. Accessed August 5, 2014.
8. Kirchoff SM. Physician practices: background, organization, and market consolidation. Federation of American Scientists website. <http://fas.org/spp/crs/misc/R42880.pdf>. Published January 2, 2013. Accessed August 5, 2014.
9. Physician Compensation and Production Survey: 2014 report based on 2013 data. Medical Group Management Association website. [http://www.mgma.com/Libraries/Assets/Key-Findings-PhysComp\\_FINAL-with-copyright.pdf](http://www.mgma.com/Libraries/Assets/Key-Findings-PhysComp_FINAL-with-copyright.pdf). Accessed February 29, 2016.
10. Table 5 -1: comparison of data from AMA PPIS and MGMA surveys for GPPI. Institute of Medicine website. [http://www.iom.edu/Reports/2011/Geographic-Adjustment-in-Medicare-Payment-Phase-I-Improving-Accuracy/~/\\_media/Files/Report%20Files/2011/Geographic-Adjustment-in-Medicare-Payment-Phase-I-Improving-Accuracy/Table%205-1.pdf.pdf](http://www.iom.edu/Reports/2011/Geographic-Adjustment-in-Medicare-Payment-Phase-I-Improving-Accuracy/~/_media/Files/Report%20Files/2011/Geographic-Adjustment-in-Medicare-Payment-Phase-I-Improving-Accuracy/Table%205-1.pdf.pdf). Accessed December 26, 2011.
11. CTS Site Visits. Center for Studying Health System Change website. <http://www.hschange.org/index.cgi?data=21>. Accessed February 2015.
12. Clinical transformation: new business models for a new era in healthcare. Accenture website. [https://www.accenture.com/t20150726T034208\\_\\_w\\_/us-en/\\_acnmedia/Accenture/Conversion-Assets/DotCom/Documents/Global/PDF/Dualpub\\_9/Accenture-Clinical-Transformation-New-Business-Models-for-a-New-Era-in-Healthcare.pdf](https://www.accenture.com/t20150726T034208__w_/us-en/_acnmedia/Accenture/Conversion-Assets/DotCom/Documents/Global/PDF/Dualpub_9/Accenture-Clinical-Transformation-New-Business-Models-for-a-New-Era-in-Healthcare.pdf). Published 2012. Accessed February 2015.
13. Mehrotra A, Epstein AM, Rosenthal MB. Do integrated medical groups provide higher-quality medical care than individual practice associations? *Ann Intern Med*. 2006;145(11):826-833.
14. Casalino LP. Which type of medical group provides higher-quality care? *Ann Intern Med*. 2006;145(11):860-861.
15. Weeks WB, Gottlieb DJ, Nyweide DE, et al. Higher health care quality and bigger savings found at large multispecialty medical groups. *Health Aff (Millwood)*. 2010;29(5):991-997. doi:10.1377/hlthaff.2009.0388.
16. Baker LC, Bundorf MK, Kessler DP. Vertical integration: hospital ownership of physician practices is associated with higher prices and spending. *Health Aff (Millwood)*. 2014;33(5):756-763. doi:10.1377/hlthaff.2013.1279.
17. Robinson JC, Miller K. Total expenditures per patient in hospital-owned and physician-owned physician organizations in California. *JAMA*. 2014;312(16):1663-1669. doi:10.1001/jama.2014.14072.
18. Casalino L, Gillies RR, Shortell SM, et al. External incentives, information technology, and organized processes to improve health care quality for patients with chronic diseases. *JAMA*. 2003;289(4):434-441.
19. Rittenhouse DR, Casalino LP, Gillies RR, Shortell SM, Lau B. Measuring the medical home infrastructure in large medical groups. *Health Aff (Millwood)*. 2008;27(5):1246-1258. doi:10.1377/hlthaff.27.5.1246.
20. Rittenhouse DR, Casalino LP, Shortell SM, et al. Small and medium-size physician practices use few patient-centered medical home processes. *Health Aff (Millwood)*. 2011;30(8):1575-1584. doi:10.1377/hlthaff.2010.1210.
21. Wiley JA, Rittenhouse DR, Shortell SM, et al. Managing chronic illness: physician practices increased the use of care management and medical home processes. *Health Aff (Millwood)*. 2015;34(1):78-86. doi:10.1377/hlthaff.2014.0404.
22. American Association for Public Opinion Research. Standard definitions: final dispositions of case codes and outcome rates for surveys. 7th ed. [https://www.esomar.org/uploads/public/knowledge-and-standards/codes-and-guidelines/ESOMAR\\_Standard-Definitions-Final-Dispositions-of-Case-Codes-and-Outcome-Rates-for-Surveys.pdf](https://www.esomar.org/uploads/public/knowledge-and-standards/codes-and-guidelines/ESOMAR_Standard-Definitions-Final-Dispositions-of-Case-Codes-and-Outcome-Rates-for-Surveys.pdf). Updated 2011. Accessed February 29, 2016.
23. Little RJA. Post-stratification: a modeler's perspective. *J Am Statist Assoc*. 1993;88(423):1001-1012.
24. Blumenthal D. Stimulating the adoption of health information technology. *N Engl J Med*. 2009;360(15):1477-1479. doi:10.1056/NEJMp0901592. ■

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**eAppendix 1.** Characteristics of the National Study of Physician Organizations Surveys

<b>Study</b>	National Survey of Physician Organizations 2 (NSPO2)	National Survey of Small and Medium Sized Practices (NSSMPP)	National Survey of Physician Organizations 3 (NSPO3)
<b>Dates of survey</b>	03/2006 – 03/2007	07/2007 – 10/2010	01/2012 – 11/ 2013
<b>Total sample</b>	1520	4803	3977
<b>Total respondents</b>	339 medical groups and 199 IPAs	1931 medical groups	1398 medical groups
<b>Adjusted response rate</b>	60.3%	63.6%	49.7%
<b>Eligibility for survey</b>	<ul style="list-style-type: none"> <li>• Medical groups with at least 20 physicians</li> <li>• Must include physicians who treat asthma, diabetes, congestive heart failure, or depression</li> </ul>	<ul style="list-style-type: none"> <li>• Medical groups with 1-19 physicians</li> <li>• ≥60% must be primary care physicians, cardiologists, endocrinologists, or pulmonologists</li> </ul>	<ul style="list-style-type: none"> <li>• Medical groups of any size</li> <li>• For medical groups with 1-19 physicians, ≥40% must be primary care physicians, cardiologists, endocrinologists, or pulmonologists</li> <li>• For medical groups with at least 20 physicians, ≥30% must be primary care physicians, cardiologists, endocrinologists, or pulmonologists</li> </ul>
<b>Sample</b>	<ul style="list-style-type: none"> <li>• All medical groups nationally with physicians treating one of 4 chronic disease (including all NSPO1 respondents)</li> </ul>	<ul style="list-style-type: none"> <li>• Stratified random sample of eligible medical groups nationally</li> </ul>	<ul style="list-style-type: none"> <li>• NSPO2 medical group respondents</li> <li>• NSSMPP respondents</li> <li>• Additional stratified random sample of eligible medical groups nationally</li> <li>• Oversampled in AF4Q RWJF Communities</li> </ul>

AF4Q indicates Alliances for Quality; IPA, Independent Practice Association; RWJF, Robert Wood Johnson Foundation.

Source: National Study of Physician Organizations II, National Study of Small and Medium-Sized Physician Practices, National Study of Physician Organizations III.

## eAppendix 2. Comparison Groups

<b>Comparison Group</b>	<b>Sample Size</b>
All practices in NSPO2, large practices ( $\geq 20$ physicians) in NSPO3	589
All practices in NSSMPP, small/medium practices (1-19 physicians) in NSPO3	3078
Large practices ( $\geq 20$ physicians ) that responded to NSPO2 and NSPO3 that were owned by physicians in NSPO2	73
Small practices (1-19 physicians) that responded to NSSMPP and NSPO3 that were owned by physicians in NSSMPP	768

NSPO2 indicates National Survey of Physician Organizations 2; NSPO3, National Survey of Physician Organizations 3; NSSMPP, National Survey of Small and Medium Sized Practices.

### eAppendix 3. Index Elements

<b>Care management processes index (range: 0-20 points)<sup>a</sup></b> <i>For each of 4 conditions—asthma, coronary heart failure, depression, and diabetes—practice receives 1 point for the following:</i>	
Practice maintains an electronic registry for majority of patients with each condition	0-4 points
Practice provides nurse care managers for patients with each condition	0-4 points
Practice provides data to physicians on the quality of their care for patients with these conditions	0-4 points
Practice routinely sends reminders to patients with these conditions for preventive care	0-4 points
Practice has nonphysician staff to educate patients about managing their condition	0-4 points
<b>Health information technology index (range: 0-14 points)</b>	
1. Electronic Documentation - Practice makes available an electronic medical record (EMR) that contains the patients medications - Majority of physicians in the practice use the EMR for the patient’s problem list - Majority of physicians in the practice use the EMR for progress notes	0-3 points
2. Clinical Decision Support - Majority of physicians in the practice use the EMR for potential drug interactions - Majority of physicians in the practice use the EMR for prompts and reminders - Majority of physicians in the practice use the EMR for alerts on abnormal test results	0-3 points
3. Quality Measurement - Practice uses EMR to collect data for clinical quality measures	1 point
4. Physician order entry - Majority of physicians in the practice transmit prescriptions electronically	1 point
5. Electronic access to data - Majority of physicians have electronic access to clinical information on patient ER visits - Majority of physicians have electronic access to clinical information on patient hospital discharge summaries - Majority of physicians have electronic access to laboratory results - Majority of physicians have electronic access to pharmacy record of prescriptions filled by patients	0-4 points
6. Electronic connectivity for patients - Majority of physicians communicate with patients by email - Patients can view their medical record online	0-2 points

<sup>a</sup>Score is normalized to account for specialist practices that do not treat all 4 conditions.

## eAppendix 4

**Table.** Characteristics of Hospital-Owned Practices in NSPO3, 2012-2013<sup>a,b,c</sup>

	All Practices (N = 1278)			Large Practices (n = 208)			Small/Medium Practices (n = 1070)		
	Hospital- Owned	Physician- Owned	<i>P</i>	Hospital- Owned	Physician- Owned	<i>P</i>	Hospital- Owned	Physician- Owned	<i>P</i>
% of practices	13.2	82.7		35.6	58.5		11.3	84.8	
Practice size (number of physicians), mean (SE)	84.5 (65.9)	16.1 (7.0)	.29	372.5 (118.8)	240.5 (68.4)	.36	4.6 (0.9)	2.6 (0.3)	<b>.004</b>
Specialty mix, <sup>b</sup> %			.22			.26			.54
Primary care– only	49.3	77.0		2.5	32.4		62.3	79.7	
Single specialty, nonprimary care	14.0	11.2		16.7	10.2		24.5	11.3	
Multi-specialty	36.7	11.8		80.8	57.4		13.2	9.0	
Years in existence, mean (SE)	8.1 (3.2)	23.3 (0.3)	<b>&lt;.0001</b>	23.2 (5.3)	17.4 (7.0)	.55	3.9 (0.8)	23.6 (0.6)	<b>&lt;.0001</b>
Location, %			.48						
Northeast	26.9	24.4		20.6	17.0	.08	28.6	24.8	.21
West	9.6	30.1		15.8	14.2		7.9	31.0	
South	26.8	30.0		32.9	64.3		25.1	27.9	
Midwest	36.8	15.6		30.7	4.4		38.4	16.3	
% revenue from Medicaid and/or poor, uninsured patients, mean (SE)	15.2 (1.8)	11.9 (0.2)	<b>.04</b>	15.5 (0.9)	8.1 (0.8)	<.0001	15.1 (2.0)	12.1 (0.2)	.10
Pay-for- performance index score (0-3), mean (SE)	1.0 (0.2)	0.8 (0.0)	.24	1.6 (0.1)	1.6 (0.1)	.94	0.8 (0.07)	0.7 (0.04)	.35

NSPO3, National Survey of Physician Organizations 3; SE, standard error.

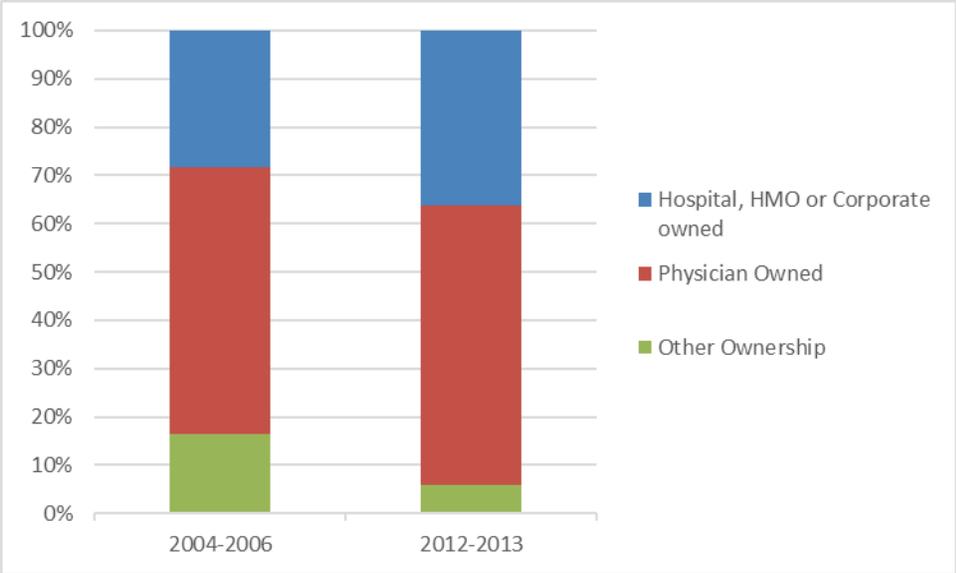
<sup>a</sup>All analyses are weighted.

<sup>b</sup>Primary care is defined as practices with only primary care physicians (general internists, family practitioners, or general practitioners); multi-specialty care is defined as practices with between 33% and 99% primary care physicians; specialist is defined as practices with <33% primary care physicians.

<sup>c</sup>Bolding indicates significant *P* value (<.05).

**Figure.** Percentage of Practices Owned by Hospitals by Year and Size

**Panel A.** Large practices ( $\geq 20$  physicians)



**Panel B.** Small practice ( $< 20$  physicians)

