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Lawrence P. Casalino, Michael F. Pesko, Andrew M. Ryan, Jayme L. Mendelsohn, Kennon R. Copeland, Patricia Pamela Ramsay, Xuming Sun, Diane R. Rittenhouse and Stephen M. Shortell

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By Lawrence P. Casalino, Michael F. Pesko, Andrew M. Ryan, Jayme L. Mendelsohn, Kennon R. Copeland, Patricia Pamela Ramsay, Xuming Sun, Diane R. Rittenhouse, and Stephen M. Shortell

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# Small Primary Care Physician Practices Have Low Rates Of Preventable Hospital Admissions

**ABSTRACT** Nearly two-thirds of US office-based physicians work in practices of fewer than seven physicians. It is often assumed that larger practices provide better care, although there is little evidence for or against this assumption. What is the relationship between practice size—and other practice characteristics, such as ownership or use of medical home processes—and the quality of care? We conducted a national survey of 1,045 primary care–based practices with nineteen or fewer physicians to determine practice characteristics. We used Medicare data to calculate practices' rate of potentially preventable hospital admissions (ambulatory care–sensitive admissions). Compared to practices with 10–19 physicians, practices with 1–2 physicians had 33 percent fewer preventable admissions, and practices with 3–9 physicians had 27 percent fewer. Physician-owned practices had fewer preventable admissions than hospital-owned practices. In an era when health care reform appears to be driving physicians into larger organizations, it is important to measure the comparative performance of practices of all sizes, to learn more about how small practices provide patient care, and to learn more about the types of organizational structures—such as independent practice associations—that may make it possible for small practices to share resources that are useful for improving the quality of care.

The Affordable Care Act and initiatives by private health insurance companies are driving major changes in the ownership of physician practices, the incentives practices face to improve the care they provide, and the processes practices use to improve care. Many practices are consolidating into larger medical groups.<sup>1</sup> Many others are shifting from physician ownership to hospital ownership.<sup>2–5</sup> Practices are increasingly subjected to pay-for-performance and public reporting programs<sup>6,7</sup> and are being encouraged to implement processes used in patient-centered medical homes.<sup>8,9</sup> Despite these changes, and despite calls to focus more attention on physician practices,<sup>1,10,11</sup> rela-

tively little is known about the comparative performance of different types of physician practice structures.<sup>5,12–15</sup>

We used data from a large, unique data set, the National Study of Small and Medium-Sized Physician Practices (NSSMPP),<sup>16</sup> to analyze the association between an important outcome of care—the ambulatory care–sensitive admission rate—and key characteristics of physician practices, including their size and ownership, the processes they use to improve care, and the external incentives they are given to improve quality and control costs.

The NSSMPP focused on primary care–based practices with nineteen or fewer physicians. It has recently been estimated that 83.2 percent of

**Lawrence P. Casalino** (lpc2021@med.cornell.edu) is the Livingston Farrand Professor in the Department of Healthcare Policy and Research at Weill Cornell Medical College, in New York, New York.

**Michael F. Pesko** is an assistant professor in the Department of Healthcare Policy and Research, Weill Cornell Medical College.

**Andrew M. Ryan** is an associate professor in the Department of Healthcare Policy and Research, Weill Cornell Medical College.

**Jayme L. Mendelsohn** worked on this project as a research coordinator in the Department of Healthcare Policy and Research, Weill Cornell Medical College. She is currently a postbaccalaureate premedical student at Bryn Mawr.

**Kennon R. Copeland** is senior vice president and director in the Department of Statistics and Methodology, NORC at the University of Chicago, in Illinois.

**Patricia Pamela Ramsay** is a research specialist at the School of Public Health, University of California, Berkeley.

**Xuming Sun** worked on this project as a research biostatistician in the Department of Healthcare Policy and Research, Weill Cornell Medical College. She is currently working as a statistician in the New York City Department of Health and Mental Hygiene.

**Diane R. Rittenhouse** is an associate professor in the Department of Family and Community Medicine and Center for Excellence in Primary Care, University of California, San Francisco.

**Stephen M. Shortell** is the Blue Cross of California Distinguished Professor of Health Policy and Management at the School of Public Health, University of California, Berkeley.

office-based physicians in the United States are in practices of ten or fewer physicians: 38.6 percent in solo or two-physician practices, 26.4 percent in practices with three to five physicians, and 18.2 percent in practices with six to ten physicians.<sup>5</sup> Other studies estimate lower but still very substantial percentages of physicians in small and medium-size practices.<sup>1,17</sup>

*Ambulatory care-sensitive admissions* are defined by the Agency for Healthcare Research and Quality (AHRQ) as admissions for conditions such as congestive heart failure for which good primary care may prevent admission.<sup>18</sup> There were more than 3.9 million such admissions of adults to US hospitals in 2010, at a cost of \$31.9 billion.<sup>19</sup> As many as 40 percent may have been preventable.<sup>20</sup>

## Study Data And Methods

### SURVEY SAMPLE AND SURVEY INSTRUMENT

The NSSMPP involved forty-minute telephone surveys, conducted between July 2007 and March 2009, with the physician leader or administrator of each practice in a national sample of practices with 1–19 physicians.<sup>16,21</sup> No publicly available database of US physician practices exists. We used a comprehensive private database, the IMS Healthcare Organizational Services database, to create the population from which we sampled practices. This national database includes nearly 800,000 US physicians linked to the practices in which they work. IMS data are widely accepted and have been used in many studies published in peer-reviewed journals.<sup>16,21–23</sup>

Practices were eligible for the survey if at least 60 percent of their physicians were some combination of adult primary care providers, cardiologists, endocrinologists, and pulmonologists. We included only practices with these specialties because they typically provide ongoing care for patients with one or more of four major chronic illnesses: asthma, congestive heart failure, diabetes, and depression. Details of the sampling process are available in online Appendix A.<sup>24</sup>

A total of 1,745 practices responded to the survey, for a response rate of 63.2 percent (Appendix A).<sup>24</sup> For this article we analyzed data only from the 1,045 practices that included at least 33 percent primary care physicians, were not community health centers, and had patients assigned to them in 2008 (Appendix A).<sup>24</sup>

The survey instrument was drawn, with minor updates, from the instrument used in our prior national survey of large medical groups.<sup>25,26</sup> The instrument includes questions on practice size; specialty mix; ownership; patient demographics and insurance; and practice exposure to pay-for-

performance, public reporting, and acceptance of financial risk for the cost of patients' care. It also includes questions on practices' use of clinical information technology and of care management processes such as disease registries and patient reminders.

**IDENTIFYING PHYSICIANS IN THE SURVEYED PRACTICES** The NSSMPP did not provide the names of physicians in the practices. Using Web searches and telephone calls, we identified 3,010 physicians who worked in the 1,045 eligible practices. We identified each physician's specialty using Medicare claims and categorized each as primary care (general internal medicine, family practice, general practice, or geriatrics) or specialist.

### LINKING THE SURVEY TO MEDICARE CLAIMS DATA

We obtained Medicare claims for 2008 for 999,990 beneficiaries who met the following criteria: The beneficiary had at least one Medicare Outpatient or Carrier File claim filed by at least one of the NSSMPP physicians in 2008; the beneficiary was at least sixty-five years old and during 2008 had both Part A and Part B coverage continuously; and was not in the End Stage Renal Disease Program or Medicare Advantage.

We attributed each beneficiary to the physician with whom the beneficiary had a plurality of outpatient evaluation and management visits. If this physician was not in the NSSMPP sample, the beneficiary was not included in the analyses. In case of ties between two NSSMPP physicians, the beneficiary was assigned to the physician (if any) who was a primary care physician. Further details about breaking ties are in online Appendix B.<sup>24</sup> Beneficiaries were attributed to the practice of their NSSMPP physician. In total, 284,401 beneficiaries were attributed to the 1,045 practices.

### VARIABLES

**▶AMBULATORY CARE-SENSITIVE ADMISSIONS:** Our unit of analysis was the beneficiary. Our outcome variable was the number of ambulatory care-sensitive admissions for that beneficiary in 2008. Appendix C<sup>24</sup> shows the twelve types of such admissions, as defined by AHRQ,<sup>18</sup> that were included. We obtained Medicare data only for beneficiaries who were alive throughout 2008, so death was not a competing risk for an ambulatory care-sensitive admission.

**▶PRACTICE STRUCTURE:** We classified practices as physician or hospital owned and classified them into three size categories (1–2, 3–9, and 10–19 physicians). We also included a variable for the percentage of primary care physicians in the practice.

**▶PROCESSES USED TO IMPROVE CARE:** Our survey instrument included forty-five questions designed to provide information on the extent to

which practices used processes that were intended to improve the quality of care and that are integral to medical homes.<sup>16</sup> These included the use of primary care teams, processes aimed at coordinating patient care, clinical information technology (for example, electronic prescribing), guideline-based reminders for providers at the point of care, and electronic communication between providers and patients. A patient-centered medical home score was calculated for each practice as a percentage based on the processes used by the practice. Details of the questions included and our method for calculating the patient-centered medical home score have been previously published<sup>16</sup> and are shown in Appendix D.<sup>24</sup>

►**EXTERNAL INCENTIVES TO IMPROVE CARE:** We categorized practices as having a public reporting incentive if they indicated that data on their clinical quality or patient satisfaction were publicly reported by external entities such as health insurance plans. We categorized practices as having a pay-for-performance incentive if they reported that they had an opportunity to receive additional income from health plans or other external entities for scoring well on measures of clinical quality or patient satisfaction, excluding Medicare's physician reporting program. We categorized practices as having no financial risk for the cost of hospital care for their patients; risk for 10 percent or fewer of the practice's patients; or risk for more than 10 percent of the practice's patients.

►**PATIENT CHARACTERISTICS:** From the Medicare Master Beneficiary Summary File, we included measures of beneficiaries' age, sex, race or ethnicity, and whether the beneficiary was a "dual eligible" (that is, was covered by both Medicaid and Medicare). For each of the twenty-five chronic conditions included in the Centers for Medicare and Medicaid Services (CMS) Chronic Condition Warehouse, we included a variable for whether the beneficiary had been diagnosed with the condition prior to 2008.

►**STATISTICAL ANALYSES** We calculated descriptive statistics and estimated the bivariate relationship between key variables. We then estimated two negative binomial regression models, using the beneficiary as the unit of analysis. Negative binomial models are appropriate when the outcome is a count variable and the variance is larger than the mean. Model 1 estimated the relationship between practice size, ownership, and percentage of primary care physicians and the number of ambulatory care-sensitive admissions a beneficiary had in 2008. The second model added the patient-centered medical home score and the incentive variables. Model 2 asks, for example, "What is the strength of the associ-

ation between practice size and ambulatory care-sensitive admissions, holding the patient-centered medical home score and other variables constant?" However, the score and other variables vary by practice size, so we included model 1 because it may be of interest to test the strength of the association between practice size and ambulatory care-sensitive admissions without holding the patient-centered medical home score and other variables constant.

In both models we controlled for beneficiary characteristics, the hospital referral region in which the practice was located, the six-month period during which the practice responded to the survey, and the percentage of primary care physicians in the practice. Analyses were weighted to account for the probability of selection for the reporting practices, adjusted for non-response, and controlled to population distributions. Standard errors are robust to clustering at the level of the primary sampling units.

The study was approved by the Institutional Review Board at Weill Cornell Medical College. Analyses were performed using the statistical software Stata, version 12.0.

►**LIMITATIONS** Our study is unique in its scale and in the number of important explanatory variables that it includes. However, it has eight limitations.

First, although it is based on a very large, randomly selected sample of small and medium-size primary care-based practices in the United States, we cannot claim that it is a precisely representative sample, because no "gold standard" data set exists that contains the population of US physician practices.

Second, our study does not include practices that are primarily composed of specialist physicians. Third, our study does not include practices with twenty or more physicians. However, most physicians work in practices with fewer than twenty physicians. Although it is possible that much larger practices would have lower ambulatory care-sensitive admission rates, a recent study<sup>27</sup> found higher readmission rates in very large practices. The national ambulatory care-sensitive admission rate for practices of all sizes is 5.5 per hundred patients per year.<sup>20</sup> This rate was 5.1 for practices in our study with one to two physicians and 4.3 for practices with three to nine physicians (Exhibit 1).

Fourth, our data on practice characteristics and incentives are self-reported by a single knowledgeable leader of each practice. Fifth, our measure of patient-centered medical home processes, although extensive, does not include all practice characteristics currently used in programs recognizing practices as patient-centered medical homes. However, a strength of our study

## EXHIBIT 1

## Practice Characteristics And Ambulatory Care-Sensitive Admissions (ACSAs): Bivariate Relationships, 2008

Characteristic	Practices		Risk for the cost of hospital care (%) <sup>a</sup>	Pay-for-performance (%) <sup>b</sup>	Public reporting (%) <sup>c</sup>	Patient-centered medical home score <sup>d</sup>	Percent of primary care physicians	ACSAs <sup>e</sup>
	Number	Percent of total						
Mean	— <sup>f</sup>		2.7	34.0	25.9	21.9	96.0	4.6
<b>Practice size</b>								
1–2 physicians	570	54.5	1.8***	32.9**	25.2	19.1***	98.3**	5.1***
3–9 physicians	422	40.4	4.0	36.5	27.9	25.6	93.5	4.3
10–19 physicians	53	5.1	0.4	19.0	11.6	24.1	88.4	6.1
<b>Practice ownership</b>								
Owned by physicians	871	83.3	1.9	35.2**	24.5**	21.2***	96.0	4.3***
Owned by a hospital	174	16.7	9.4	23.5	37.6	27.7	96.3	6.4
<b>Any risk for hospital costs</b>								
No risk	919	87.9	0.0***	32.2***	26.3***	21.4***	96.2***	4.5***
Risk for 1–10% of the practice's patients	84	8.0	3.7	43.9	28.9	21.4	92.8	5.3
Risk for >10% of the practice's patients	42	4.0	32.7	39.8	17.5	29.1	98.0	5.1
<b>Pay-for-performance</b>								
No pay-for-performance	556	53.2	2.7	— <sup>f</sup>	22.7**	21.0***	95.9	4.7
Some pay-for-performance	489	46.8	2.6	— <sup>f</sup>	32.3	23.8	96.2	4.5
<b>Public reporting</b>								
No public reporting	683	65.4	3.0	31.1**	— <sup>f</sup>	20.9**	95.9	4.5
Some public reporting	362	34.6	1.8	42.3	— <sup>f</sup>	24.7	96.4	4.9
<b>Patient-centered medical home score</b>								
Quartile 1	262	25.0	2.0***	26.5***	22.4**	6.6***	96.9	4.5***
Quartile 2	261	25.0	3.5	43.2	24.4	16.0	96.4	5.4
Quartile 3	261	25.0	1.5	31.4	25.1	27.7	94.0	4.7
Quartile 4	261	25.0	4.6	36.5	35.6	46.2	97.5	3.8

**SOURCE** Authors' analyses using data from the National Survey of Small and Medium-Sized Physician Practices and Medicare claims. **NOTES** N = 1,045. All counts are unweighted, while percentages and means are weighted. Statistical significance denotes difference across rows. Quartiles are arrayed from lowest scores (quartile 1) to highest scores (quartile 4). <sup>a</sup>Percent of the practice's patients for whom the practice takes some risk for hospital costs. <sup>b</sup>Percent of practices with some pay-for-performance incentive. <sup>c</sup>Percent of practices with some public reporting incentive. <sup>d</sup>Possible range 0–100. <sup>e</sup>Number per 100 beneficiaries per year. <sup>f</sup>Not applicable. \*\*p < 0.05 \*\*\*p < 0.01

is that it included a reasonably representative national sample of practices. Other studies of the patient-centered medical home have included only practices that volunteered to participate and, therefore, may have differed systematically from other practices.

Sixth, our incentive results should be interpreted with the caution that we did not measure the intensity of the pay-for-performance or public reporting incentives and had only a partial measure of the extent to which practices had an incentive to control the cost of care. Seventh, our data come from 2008. It is possible that since then larger practices have done more to reduce preventable admissions. Finally, our study is observational and demonstrates only an association, not necessarily a causal relationship, between the variables of interest and ambulatory care-sensitive admissions.

## Study Results

**PRACTICE SIZE, OWNERSHIP, AND PATIENT POPULATIONS** Most practices were in the 1–2 and 3–9 physician size range (Exhibit 1). Hospitals owned 16.7 percent of practices. The smallest (1–2 physician) practices cared for significantly higher percentages of dual-eligible and racial or ethnic minority patients and for patients who had more chronic conditions (Exhibit 2), compared to the practices with 3–9 physicians.

**USE OF PATIENT-CENTERED MEDICAL HOME PROCESSES** The largest practices (10–19 physicians) used significantly more patient-centered medical home processes than the smallest practices, with 1–2 physicians (24.1 percent vs. 19.1 percent of possible processes), although not more than the practices with 3–9 physicians (25.6 percent). Hospital-owned practices used more processes than physician-owned practices (27.7 percent versus 21.2 percent). Practices with incentives from pay-for-performance and

**EXHIBIT 2**

**Characteristics Of Beneficiaries: Bivariate Relationships Between Practice Characteristics And Beneficiary Characteristics, 2008**

Characteristic	Percent dual-eligible	No. of chronic conditions per beneficiary	Percent female	Percent racial or ethnic minority	Beneficiary age (years)
Mean	8.0	6.0	61.1	9.6	76.6
<b>Practice size</b>					
1–2 physicians	11.6***	6.4***	61.9***	14.1***	76.9***
3–9 physicians	6.4	5.8	60.7	7.7	76.6
10–19 physicians	9.7	5.8	61.7	11.3	76.4
<b>Practice ownership</b>					
Physician-owned	7.6	6.0	61.1	10.3***	76.7
Hospital-owned	10.2	6.1	61.4	5.8	76.5
<b>Any risk for hospital costs</b>					
No risk	7.9***	5.9**	61.0	9.8	76.5***
Risk for 1–10% of the practice's patients	10.0	6.1	61.5	8.1	77.1
Risk for >10% of the practice's patients	5.7	6.2	62.0	9.9	77.4
<b>Pay-for-performance</b>					
No pay-for-performance	8.4	6.0***	61.4	8.7	76.6
Some pay-for-performance	7.2	5.8	60.6	11.3	76.6
<b>Public reporting</b>					
No public reporting	8.2	6.0	61.1	10.0	76.6
Some public reporting	7.3	6.0	61.1	8.3	76.6
<b>Patient-centered medical home score</b>					
Quartile 1	10.1***	6.1***	60.9***	10.1***	76.7
Quartile 2	9.4	6.3	62.6	9.8	76.9
Quartile 3	6.9	5.9	60.6	11.0	76.5
Quartile 4	5.2	5.6	60.6	6.5	76.5

**SOURCE** Authors' analyses using data from the National Survey of Small and Medium-Sized Physician Practices and Medicare claims.  
**NOTES** Number of beneficiaries is 284,401. All counts are unweighted, while percentages and means are weighted. Statistical significance denotes difference across rows. Quartiles are arrayed from lowest scores (quartile 1) to highest scores (quartile 4).  
 \*\**p* < 0.05 \*\*\**p* < 0.01

public reporting programs used significantly more patient-centered medical home processes than practices without these incentives, as did practices that took some financial risk for the cost of hospital care for at least 10 percent of the practice's patients. Practices in the lowest quartile of use of patient-centered medical home processes used 6.6 percent of processes compared to a mean of 46.2 percent of processes in the highest quartile (Exhibit 1).

**AMBULATORY CARE-SENSITIVE ADMISSIONS**

The mean ambulatory care-sensitive admission rate was 4.6 per hundred beneficiaries per year (Exhibit 1). In unadjusted, bivariate analyses, practices with 1–2 and 3–9 physicians had rates of 5.1 and 4.3 per hundred patients per year, compared to 6.1 for practices of 10–19 physicians (Exhibit 1). Practices owned by physicians had significantly lower ambulatory care-sensitive admission rates than those owned by hospitals (4.3 versus 6.4). Practices also had lower rates if they were in the highest quartile of use of patient-centered medical home processes.

Exhibit 3 presents the adjusted rates of ambu-

latory care-sensitive admissions per hundred patients per year after controlling for other variables. Model 1 examines the associations of practice size and ownership with the rate. Model 2 examines these associations as well as associations with the patient-centered medical home score, pay-for-performance incentives, acceptance of risk for the cost of hospital care, and public reporting. Practices with 1–2 physicians had a significantly lower ambulatory care-sensitive admission rate than practices with 10–19 physicians in both multivariate regression models (4.31 versus 6.47 in model 2). Practices with 3–9 physicians had rates that were much lower than those with 10–19 physicians and slightly higher than those with 1–2 physicians. In both models, physician-owned practices had ambulatory care-sensitive admission rates that were lower than hospital-owned practices—significantly so in model 2 (4.63 versus 5.31).

Neither the patient-centered medical home score, nor pay-for-performance incentives, nor the acceptance of risk for the cost of hospital care for the practice's patients was significantly asso-

## EXHIBIT 3

## Adjusted Ambulatory Care–Sensitive Admission Rates Across Practice Characteristics, Per 100 Patients, 2008

	Model 1 <sup>a</sup>			Model 2 <sup>b</sup>		
	Rate	95% CI	p value	Rate	95% CI	p value
<b>Practice size</b>						
1–2 physician practice	4.34	(3.71,4.97)	Ref	4.31	(3.58,5.04)	Ref
3–9 physician practices	4.72	(3.87,5.57)	0.08	4.73	(3.91,5.55)	0.04
10–19 physician practices	6.43	(5.55,7.31)	<0.001	6.47	(5.55,7.40)	<0.001
<b>Practice ownership</b>						
Physician-owned	4.66	(3.89,5.43)	Ref	4.63	(3.85,5.41)	Ref
Hospital-owned	5.14	(4.30,5.97)	0.15	5.31	(4.59,6.03)	0.02
<b>Any risk for hospital costs</b>						
No risk for hospital costs	— <sup>c</sup>	— <sup>c</sup>	— <sup>c</sup>	4.69	(4.04,5.34)	Ref
Risk for some cost of hospital care for 1–10% of the practice's patients	— <sup>c</sup>	— <sup>c</sup>	— <sup>c</sup>	5.10	(3.98,6.23)	0.17
Risk for some cost of hospital care for >10% of the practice's patients	— <sup>c</sup>	— <sup>c</sup>	— <sup>c</sup>	4.85	(3.62,6.08)	0.60
<b>Pay-for-performance (range 0–3), mean value</b>						
No pay-for-performance	— <sup>c</sup>	— <sup>c</sup>	— <sup>c</sup>	4.76	(3.95,5.57)	Ref
Pay-for-performance	— <sup>c</sup>	— <sup>c</sup>	— <sup>c</sup>	4.73	(4.09,5.37)	0.89
<b>Public reporting (range 0–2), mean value</b>						
No public reporting	— <sup>c</sup>	— <sup>c</sup>	— <sup>c</sup>	4.57	(3.90,5.24)	Ref
Public reporting	— <sup>c</sup>	— <sup>c</sup>	— <sup>c</sup>	5.46	(4.10,6.81)	0.05
<b>Patient-centered medical home score</b>						
Quartile 1	— <sup>c</sup>	— <sup>c</sup>	— <sup>c</sup>	4.50	(3.69,5.30)	Ref
Quartile 2	— <sup>c</sup>	— <sup>c</sup>	— <sup>c</sup>	5.20	(4.87,5.53)	0.09
Quartile 3	— <sup>c</sup>	— <sup>c</sup>	— <sup>c</sup>	5.10	(4.18,6.01)	0.07
Quartile 4	— <sup>c</sup>	— <sup>c</sup>	— <sup>c</sup>	4.06	(3.27,4.86)	0.44

**SOURCE** Authors' analyses using data from the National Survey of Small and Medium-Sized Physician Practices and Medicare claims. **NOTES** N = 284, 401 patients. The values shown are the adjusted rates of ambulatory care–sensitive admissions (ACSAs). Quartiles are arrayed from lowest scores (quartile 1) to highest scores (quartile 4). CI is confidence interval. <sup>a</sup>Model 1 tests the association of practice size and practice ownership with ACSAs. The model controls for beneficiary characteristics (including the beneficiary's chronic conditions, age, sex, race or ethnicity, and dual-eligible status), the hospital referral region in which the practice was located, the six-month period during which the practice responded to the survey, and the percentage of primary care physicians in the practice. Coefficients for all variables in the model are displayed in Appendix E (see Note 24 in text). <sup>b</sup>Model 2 tests the association of practice size, practice ownership, external incentives, and the practice's medical home score with ACSAs, controlling for the same variables as in model 1. <sup>c</sup>Not applicable (these variables were not included in Model 1).

ciated with the ambulatory care–sensitive admission rate (Exhibit 3). Practices exposed to public reporting had somewhat higher rates.

As a sensitivity analysis, we ran both models while excluding the 10 percent of beneficiaries who had only one claim with a physician in the NSSMPP sample. Results of this analysis were virtually identical—the same variables were statistically significant—to the results just presented (data not shown).

## Discussion

In our large national study of small and medium-size primary care–based practices, practices with 1–2 physicians had ambulatory care–sensitive admission rates that were 33 percent lower than those of the largest small practices (having 10–19 physicians). Practices with 3–9 physicians also had rates that were lower than the rates for the largest small practices, although slightly higher than the rates for practices with 1–2 physicians. These findings were unexpected, since small

practices presumably have fewer resources to hire staff to help them implement systematic processes to improve the care they provide.<sup>5,16,25,28</sup> Larger practices did have higher patient-centered medical home scores than the practices with 1–2 physicians (though not higher than those with 3–9 physicians) and so appear to use more such processes, but these higher scores were not associated with lower ambulatory care–sensitive admission rates in multivariate analyses.

**POSSIBLE REASONS FOR THE DIFFERENCES** Our cross-sectional analysis cannot determine whether there is a causal relationship between practice size or ownership and ambulatory care–sensitive admission rates. Larger practices are likely to have more resources to implement organized processes to improve care, and these processes are likely to result in better performance on process measures of care, such as appropriate test ordering for people with diabetes.<sup>29,30</sup> But it is possible that small practices have characteristics that are not easily measured

but result in important outcomes, such as fewer ambulatory care–sensitive admissions. For example, there is evidence that patients in smaller practices are better able to get appointments when they want them and better able to reach their physician via telephone, compared to larger practices.<sup>15,31,32</sup> It is also possible that physicians, patients, and staff know each other better in small practices, and that these closer connections result in fewer avoidable admissions.<sup>5,15,31</sup>

We cannot fully exclude the possibility that the largest practices, which had a somewhat higher percentage of specialists, had patients who were sicker and, therefore, more likely to have an ambulatory care–sensitive admission. However, we controlled for the percentage of specialists in practices and for patients' demographic characteristics and comorbidities, and we found that the smallest practices cared for a significantly higher percentage of dual-eligible patients and for patients with more comorbidities.

**OTHER FINDINGS** To our knowledge, no study is directly comparable to ours, but two studies had results that are relevant and broadly consistent with ours, although their methods differed. Michael McWilliams and colleagues found that smaller practices had slightly lower readmission rates (1.9 percent lower) than medium-size and large practices.<sup>27</sup> The size categories in that study were quite large (the mean number of physicians in small, medium, and large practices, respectively, was seven, forty-three, and 217), ambulatory care–sensitive admission rates were not analyzed, and patient-centered medical home scores and pay-for-performance and public reporting incentives were not included. John Krlewski and colleagues, in a study of Medicare patients with diabetes, found that smaller practices had fewer ambulatory care–sensitive admissions and lower overall costs of care.<sup>33</sup> Use of patient-centered medical home processes and incentives faced by the practices were not included in the analyses. Practices in this study ranged from 5 to 750 physicians, and size was measured as a continuous variable, so the performance of small practices in this study is not clear. In a study with results that differed from ours, twenty very large practices (250–1,300 physicians) had lower ambulatory care–sensitive admission rates compared to the average for all other physicians in their hospital referral regions.<sup>29</sup> These practices are self-selected members of the Council of Accountable Physician Practices and may not be representative of large groups in general.

Physician-owned practices had lower ambulatory care–sensitive admission rates than hospital-owned practices in both bivariate and multivariate analyses—approximately 13 percent lower in multivariate analysis, although the ef-

fect was somewhat smaller and did not reach statistical significance in model 1. Krlewski and colleagues found higher ambulatory care–sensitive admission rates for patients with diabetes in hospital-owned practices,<sup>33</sup> and McWilliams and colleagues found higher readmission rates in large hospital-owned practices but did not analyze rates in small and medium-size hospital-owned practices.<sup>27</sup>

Hospital ownership would be expected to result in a lower ambulatory care–sensitive admission rate if hospitals provided additional resources to practices to hire staff and implement systematic processes to improve care.<sup>5,16</sup> In fact, consistent with prior studies,<sup>16,25,34</sup> we found that hospital-owned practices used more patient-centered medical home processes than physician-owned practices. But these practices nevertheless had higher ambulatory care–sensitive admission rates. Hospital acquisition of a practice might disrupt longstanding referral relationships between the practice's physicians and specialists outside the practice and might lead to other changes that result in worse performance by the practice and higher ambulatory care–sensitive admission rates.<sup>5</sup>

We did not find an association between the ambulatory care–sensitive admission rate and the use of patient-centered medical home processes or between that rate and pay-for-performance or public reporting incentives. Prior research has resulted in inconsistent findings regarding the relationship between patient-centered medical homes and physician practice performance<sup>8,35–39</sup> and between incentives and physician practice performance.<sup>7,40–44</sup> We found that practices subject to public reporting of performance had somewhat higher ambulatory care–sensitive admission rates. The reason for this is not clear, although it should be noted that these rates are not typically used as a publicly reported measure of practice performance.

## Conclusion

Our results suggest that the common assumption that bigger is better<sup>45</sup> should not be accepted without question, at least in practices of nineteen or fewer physicians. Given physician practices' fundamental importance as the base from which most health care delivery emanates, it is surprising that so little information exists on the comparative performance of different types of practices.<sup>12</sup> Evidence on the relationship of structures to processes to outcomes in physician practices is scarce. More research effort and funding would help to close this information gap.

Meanwhile, public policy makers and health insurance company executives might consider



policies that support organizations that help small practices share resources—such as nurse care managers for patients with chronic illnesses.<sup>46</sup> Independent practice associations, for example, have been shown to increase the number of patient-centered medical home processes provided to patients of small and medium-size practices.<sup>23</sup> These organizations might provide a viable alternative, in the era of health care reform, for physicians who do not want to become employed by hospitals and do not have the desire or the opportunity to join a large medical group (large groups do not exist in most US communities). The Medicare Shared Savings and Pioneer accountable care organization (ACO) programs, as well as private health insurance companies, contract with independent practice associations. In addition, the Medicare Shared Savings Program offers an Advance Payment Program that provides large loans to develop ACO infrastructure to relatively small independent practice associations or medical groups with less than \$50 million in annual revenue. Thirty-five Advance Payment contracts have been signed to date. Regional Extension Centers—similar to those funded by the Office of the National Coordinator for Health Information Technology—could also be of use in helping

small practices implement organized processes to improve their quality of care.<sup>47–49</sup>

Physicians in small practices have no negotiating leverage with health insurers, so insurers typically pay them much lower rates for their services than they pay to physicians who practice in larger groups or are employed by hospitals. This policy might be penny wise and pound foolish if it drives small practices out of existence and if further research confirms that small practices have lower ambulatory care-sensitive admission rates, and possibly lower overall costs for patients' care, than larger groups.

Leaders of hospitals and large medical groups that absorb physician practices might consider whether there are advantages to trying to preserve the small practice environment within their organizations, while providing resources to help small practices proactively improve care for their populations of patients.

Small practices have many obvious disadvantages. It would be a mistake to romanticize them. But it might be an even greater mistake to ignore them, and the lessons that might be learned from them, as larger and larger provider organizations clash to gain advantageous positions in the new world of payment and delivery system changes catalyzed by health care reform. ■

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views, and opinions contained and expressed in this article are based in part on data obtained under license from the following IMS Health information services: Healthcare Organizational Services, (2007) IMS Health Inc. All rights reserved. The statements, findings, conclusions, views, and opinions contained and expressed herein are not necessarily those of IMS Health Inc. or any of its affiliated or subsidiary entities. [Published online August 13, 2014.]

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