Title

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Journal

Health services research, 53(3)

ISSN

0017-9124

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Publication Date

2018-06-01

DOI

10.1111/1475-6773.12693

Peer reviewed

HSR Health Services Research

DOI: 10.1111/1475-6773.12693
METHODS BRIEF

A Two-Step Method to Identify Positive Deviant Physician Organizations of Accountable Care Organizations with Robust Performance Management Systems

Alexander F. Pimperl, Hector P. Rodriguez, Julie A. Schmittdiel, and Stephen M. Shortell

Objective. To identify positive deviant (PD) physician organizations of Accountable Care Organizations (ACOs) with robust performance management systems (PMSYS).
Data Source. Third National Survey of Physician Organizations (NSPO3, n = 1,398).
Study Design. Organizational and external factors from NSPO3 were analyzed.
Data Collection/Extraction Methods. Linear regression estimated the association of internal and contextual factors on PMSYS. Two cutpoints (75th/90th percentiles) identified PDs with the largest residuals and highest PMSYS scores.
Principal Findings. A total of 65 and 41 PDs were identified using 75th and 90th percentiles cutpoints, respectively. The 90th percentile more strongly differentiated PDs from non-PDs. Having a high proportion of vulnerable patients appears to constrain PMSYS development.
Conclusions. Our PD identification method increases the likelihood that PD organizations selected for in-depth inquiry are high-performing organizations that exceed expectations.
Key Words. Healthcare organizations and systems, incentives in health care, information technology in health, quality of care/patient safety (measurement), health policy/politics/law/regulation, quality improvement/report cards (interventions)

Identifying organizational practices and strategies that provide value is essential to improving patient care. One method to achieve this objective is positive deviance (PD) analysis. A PD approach identifies positive outlier individuals or organizations within a population or sample. It suggests that obstacles to adoption of innovations can be mastered by learning from positive outliers who are able to overcome barriers and ultimately adopt the new practice in

spite of facing similar adoption constraints (Marsh et al. 2004; Bradley et al. 2009). The origin of PD analysis can be traced back to the 1970s, where families from deprived population groups were identified as positive deviants (PDs) because their children were well nourished despite the generally bad nutrition status of the other children of the population. Uncommon beneficial practices of these PDs were then studied to identify helpful habits that were within the reach of the general population (Wishik and Vynckt 1976; Marsh et al. 2004). In health services research, recent studies identify and select PDs using self-reported information or reputational considerations (Baxter et al. 2016; Rose and McCullough 2017). PD is also sometimes conflated with high performance rather than as a positive deviation from expectations (Curry et al. 2011). In this brief report, we demonstrate an empirically driven method for identifying, quantifying, and characterizing PDs.

A well-developed performance management system (PMSYS) is emphasized as a core competency of high-performing health care organizations (Porter 2010; Bohmer 2011; Mechanic and Zinner 2012). We use a PD approach to identify PD physician organizations participating in Accountable Care Organizations (ACOs) with more robust PMSYS than expected, compared to similarly structured organizations. A first national survey on ACOs (Colla et al. 2014) revealed that only about half of the ACOs had the ability to monitor quality performance metrics and provide internally meaningful and timely feedback to most physicians in the ACO network. Under a shared savings contract, the ability to provide performance feedback is critical to monitoring performance and reinforcing a continuous organizational learning to improve population health, patient experience, and costs (Colla et al. 2014). Because of the relevance of a robust PMSYS for ACO-affiliated physician practices, we focused our PD analyses on these practices. Our ultimate aim is to identify PDs for the purpose of conducting subsequent case studies to examine how PD practices overcame common barriers to implement their PMSYS and to understand the role ACOs play in PMSYS development for PDs.

The implementation and use of PMSYS in physician organizations may be driven by a range of modifiable and unmodifiable factors. Following

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Klaiman, Pantazis, and Bekemeier (2014), we divided relevant factors into two categories: (1) contextual factors over which practices have little or no control in the short term, but which may be associated with the implementation of internal PMSYS; (2) internal mechanisms or organizational processes for which practices have more short-term control over the implementation. We applied this categorization to distinguish factors by their potential modifiability and highlight the influence of the structures and processes of ACO-affiliated physician organizations that contribute to more robust than expected PMSYS.

Contextual factors, such as the extent of health plan use of performance incentives for quality and outcomes of care and public reporting of clinical and patient experience performance, have been previously associated with the use of care management processes in physician organizations (Landon et al. 2003; Shortell et al. 2005; Werner and Asch 2005; Fung et al. 2008; Rittenhouse et al. 2010; Meyer et al. 2012; Farmer, Black, and Bonow 2013; Wiley et al. 2015). The provision of data by health plans may also be linked to the development of robust PMSYS because these data may enable physician organizations to implement feedback reports irrespective of the reporting capabilities of electronic health records.

Other contextual factors that may be difficult to modify in the short run include payer mix, the mix of racial and ethnic minority patients served, and regional influences (Bach et al. 2004; Reschovsky and O'Malley 2008; Varkey et al. 2009; Friedberg et al. 2010); these factors may influence the adoption of PMSYS. The organizational structure context in which medical practices are embedded can also influence the implementation of PMSYS. Physician organization size and ownership, specialty mix (Rittenhouse et al. 2011; Wiley et al. 2015), and affiliation with independent physician association (IPA) or physician hospital organization (PHO; Casalino et al. 2013; Nembhard 2012; Rundall et al. 2002; Shortell et al. 2014) may have an impact on the implementation of PMSYS, as these organizational structures may provide resources available to support the implementation of PMSYS.

Internal organizational capabilities also may play an important role for the implementation of PMSYS. Internal mechanisms include health information technology (HIT) functionality (Nadeem et al. 2013; Cassel et al. 2014; Heisey-Grove et al. 2014), chronic disease registries, and practice participation in quality improvement (QI) learning collaboratives (Nembhard 2012; Nadeem et al. 2013). These factors may be relatively more modifiable in the short term and have been previously associated with the implementation of management processes, such as PMSYS, in physician organizations.

METHODS

Our objective was to exploit the potential linear relationship between internal mechanisms, contextual factors, and PMSYS robustness to identify positive outliers (PDs), rather than test hypotheses or draw causal inferences. In our case, PDs are physician organizations with more robust PMSYS than predicted compared to their similar structured peers. We posit that PD physician organizations overcome constraining characteristics in their implementation of PMSYS through use of internal mechanisms and through effective management of contextual factors that pose challenges for similar non-PD organizations, such as practice size or managing the complex needs of vulnerable patient populations.

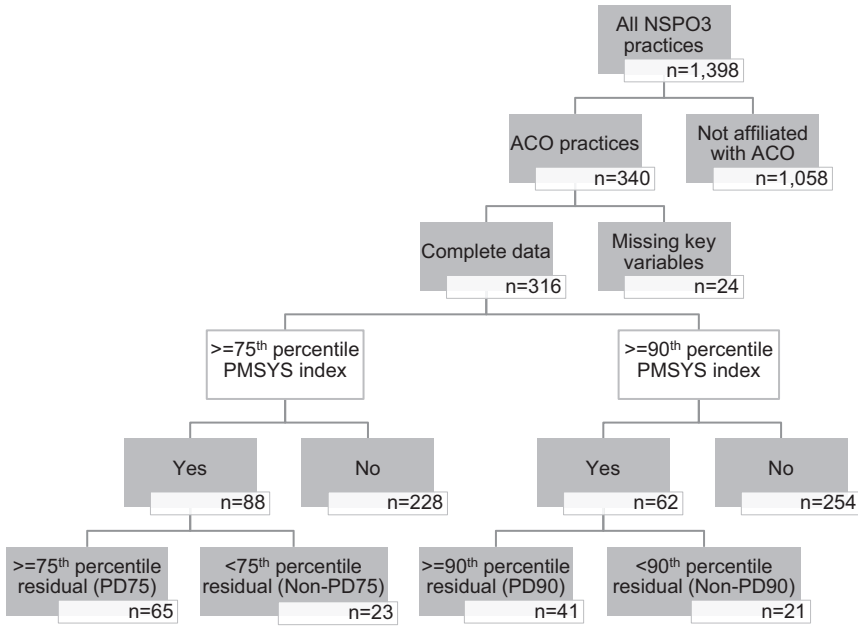
Data Source

The third National Study of Physician Organizations (NSPO3), a survey of a nationally representative sample of physician practices, was used for this study. Data on physician practice characteristics and organizational structures and processes were collected via a 40-minutes phone survey from January 2012 to November 2013. Respondents received $200 for their participation. Survey respondents (n = 1,398) were the lead physician or lead administrator of physician practices and medical groups. The adjusted NSPO3 survey response rate is 50 percent. The sample, methods, and administration of NSPO3 are detailed elsewhere (Wiley et al. 2015). NSPO3 uses the Centers for Medicare and Medicaid Services (CMS) definition of ACO, coordinated care, and use of shared savings. Per CMS, "when an ACO succeeds in both delivering high-quality care and spending healthcare dollars more wisely, it will share in the savings it achieves" (Centers for Medicare 2016). Because our analyses focus on physician organizations affiliated with an ACO (n = 340), we excluded organizations not participating in an ACO (n = 1,058) and those with missing values on key study variables (n = 24), resulting in an analytic sample of 316 ACO-affiliated physician organizations (Figure 1).

Measures

Outcome Measure: PMSYS Index. We define PMSYS as a "set of formalized, mostly quantifiable practices of reflexive control that organizations use to improve efficiency and effectiveness" (Pimperl 2015). A PMSYS refers to the set of performance measures and all processes connected to the use of those

Figure 1: Flow Chart of the Positive Deviants' Selection Process, Including Two Different Cutpoint Versions (75th and 90th Percentiles)



measures, such as feedback reports, quality improvement, and IT tools (e.g., decision support systems; Neely, Gregory, and Platts 1995; Hudson, Smart, and Bourne 2001; Adair et al. 2003; Pimperl 2015). Using this definition, we constructed a composite PMSYS index ($\alpha = 0.84$; Cronbach 1951) from 20 NSPO3 items using principal factor analysis. Using the scree test (D'Agostino and Russell 2005), we identified a four-factor solution: (1) performance feedback for chronic conditions ($\alpha = 0.85$); (2) and/or for preventive services ($\alpha = 0.71$); (3) PMSYS integration into the information technology (IT) system ($\alpha = 0.87$); and (4) regular review, update, and established continuous quality improvement process ($\alpha = 0.60$). For ease of interpretation, we did not use separate factor scores when calculating the composite PMSYS index but used a 0 to 100 percent index instead. We equally weighted each of the four subdimensions identified in the factor analysis by aggregating the subcomponents by their arithmetic means to the composite PMSYS index (range = 0–100 percent). An overview of the items and detailed calculation of the PMSYS index is shown in Appendix SA2.

Contextual Factors. The following contextual variables were included in the analyses: external evaluation by health plans or other entities index, pay-for-performance (P4P) participation index, public reporting of performance data index, and ACO membership breadth index.

The external evaluation index (range: 0–2) included (1) clinical quality; and (2) patient satisfaction evaluation by external entities such as health insurance plans. The P4P index (range: 0–3) accounts for the opportunity of the practice to receive additional income from external entities based on (1) clinical quality scores (HEDIS); (2) use of information technology; and (3) the efficient use of resources. The public reporting index (range: 0–2) was constructed for each practice based on whether their health plans publically report practice data on (1) patient satisfaction; and/or (2) clinical quality. The ACO membership breadth index (range: 0–4) measures the inclusion of each of the following organizations in the affiliated ACO: (1) one or more hospitals; (2) groups with 20 or more physicians; (3) groups with <20 physicians; (4) one or more nursing homes, home health agencies, or other institutions.

Other contextual variables included whether the practice received data from health plans on quality of preventive care and/or care for patients with chronic illness, payer mix (percentage of patients who were insured by Medicaid or were low income and had no insurance), vulnerable patient populations served (percentage of African American patients and the percentage of patients with limited English proficiency), census region (nine dummy variables), whether the organization receives a significant portion of their patients from independent physician organizations (IPA) or physician hospital organizations (PHO), ACO governance, practice ownership, practice size, and specialty mix. Contextual factors examined are detailed in Appendix SA3.

Internal Mechanisms. Internal mechanisms included a HIT functionality index, whether the practice uses chronic disease registries for at least two of four chronic diseases (asthma, congestive heart failure, depression, and diabetes), and whether the practice participates in quality improvement learning collaboratives. The HIT functionality index (range: 0–12; $\alpha = 0.83$) was calculated by summing responses to each practice to 12 dichotomous (Yes/No) questions assessing whether a majority of physicians use the EHR and specific EHR functions, such as accessing patient's medication, problem lists, progress notes, and the ability to provide patients with clinical summaries (Appendix SA3).

Statistical Analysis

Our PD selection method extends the empirical approaches of Klaiman, Pantazis, and Bekemeier (2014) and Walker et al. (2007). Unlike previous PD research, we use a two-step process to select PDs to ensure that organizations selected were high-performing organizations in addition to performing better than expected.

First, we selected organizations with the highest scores on the PMSYS index. We used two different percentile cutpoints (75th and 90th percentiles) to examine the influence on the selection of PDs. Second, we used multivariable linear regression to examine constraining variables and analyzed residuals to identify PDs. Linear regression (Model 1) estimated the impact of contextual factors (over which practices have little or no control in the short term) on the development of PMSYS. In a second model (Model 2), we added internal mechanisms, processes where practices have more control over the implementation. Next, to test whether the addition of internal mechanism variables based on theoretical considerations improved model fit, we conducted an adjusted Wald test (Lee and Forthofer 2006; StataCorp 2013). For regression analyses, all continuous independent variables were standardized to enable consistent interpretation of continuous regression coefficients, that is, the effect of a standard deviation change in the variable on the PMSYS index. Finally, we used residuals to identify PD physician organizations. The PD selection from the first step (practices with high PMSYS index scores) was restricted to practices with the largest positive residuals (distance from the predicted value in the linear regression), using the same percentiles on the residual values as for the PMSYS index.

Then, we conducted bivariate analyses to compare PDs vs. comparable non-PDs—organizations in the same PMSYS index percentile as the PDs, but not selected as PDs—for each of the percentile PD cutpoints and each contextual factor and internal mechanism, using chi-square tests.

Multiple sensitivity analyses were conducted to examine the consistency of results with alternative specification of the PMSYS index, such as using the factor scores instead of the arithmetic means to aggregate the subcomponents of the PMSYS index to the composite measure.

Population ratio-adjusted weights were applied based on sampling probabilities with poststratification adjustments to account for the complex sampling design of NSPO3 (Little 1993; Wiley et al. 2015). Statistical analyses were conducted using *STATA* Version 13.1 (StataCorp, 2013). The Committee

for the Protection of Human Subjects at the University of California, Berkeley, approved the original survey upon which this study is based.

RESULTS

When comparing the two regression models (Table 1, Model 1 vs. Model 2), including internal mechanism variables (Model 2) improved model goodness of fit significantly (Model 1 R^2 = 0.65 vs. Model 2 R^2 = 0.80, adjusted Wald test: $p < .001$), suggesting that HIT functionality and the use of chronic disease registries contribute to the development of PMSYS. Therefore, Model 2 was used in subsequent analyses.

Constraining Characteristics

For Model 2, greater external P4P incentives ($p < .05$), a higher percentage of patients with limited English proficiency ($p < .01$), more hospital-owned practices ($p < .01$), practices of mid-size (3–7 physicians, $p < .01$), and a greater number of mostly specialist physician organizations ($p < .05$) had a significant negative association with the PMSYS index score and could therefore be classified as constraining characteristics in the development of PMSYS. In contrast, practices with greater external evaluation ($p < .01$) and public reporting incentives ($p < .1$), affiliating with an IPA and/or PHO ($p < .01$), those participating in an ACO with a greater membership breath index (2–4 points, $p < .05$ to $p < .1$), owned by physicians ($p < .01$) or community health centers or others ($p < .01$), consisting of mostly primary care physicians or multispecialty groups ($p < .01$), and those using health information technology ($p < .01$) and chronic disease registries ($p < .01$) to greater degrees had more robust PMSYS (Table 1).

PD Identification

In the first step of the PD selection process, 88 practices (28 percent of our analytic sample of 316 ACO practices) were identified using the weighted 75th percentile of the PMSYS index and 62 PD practices (20 percent) using the 90th percentile (Figures 1 and 2). Notable is that the analytic samples of PDs include a higher proportion of practices with robust PMSYS than would be expected. For example, a 90th percentile would generally result in the selection of 10 percent of the sample. Because of our weighted analyses, approximately 20 percent of the practices were classified as at or above the 90th percentile on the PMSYS index.

Table 1: Contextual Factors and Internal Mechanisms Associated with Scores on the PMSYS Index

	Regression Coefficient (in %)	
Composite PMSYS Index Factor	*M1*	*M2*
Contextual factors		
Evaluated by external entities (range = 0–2)	14.7***	12.4***
Pay-for-performance index (range = 0–3)	−0.7	−4.1**
Public reporting index (range = 0–2)	3.2**	2.1*
Health plans provide data	−3.0	−2.6
Medicaid, uninsured or low-income revenue	−3.4*	−1.2
African American patients	0.1	0.5
Patients with limited English	−1.1	−2.9***
Region†		
East South Central	−11.2***	−0.7
Mountain	10.1**	3.8
Middle Atlantic	−15.3**	−1.7
New England	0.3	3.3
Pacific	−1.2	4.1
South Atlantic	−5.2	−2.5
West North Central	10.5*	5.9
West South Central	−14.2**	−11.3**
Independent physician organization| Physician hospital organization affiliation	1.1	11.7***
Accountable Care Organization (ACO) governance‡		
Physicians	−5.6	3.7
Shared physician-hospital	−4.8	2.1
Other	−50.3***	−21.5***
Missing	−8.5	0.5
ACO membership breadth index§		
2	−0.1	6.9**
3	−1.1	3.6*
4	0.0	4.7*
Practice/group ownership¶		
Physician owned	11.1**	10.9***
Community health center or other	33.5***	20.6***
Practice/group size (number of physicians)††		
3 to 7	−5.3***	−6.1***
8 to 12	13.2*	−1.9
13 to 19	18.8***	8.7
20 to 99	2.9	−12.7***
>100	18.7***	3.1
Specialty mix‡‡		
Multispecialty	2.4	10.1***
Mostly specialist physicians	−6.6	−10.6***

Continued

Table 1 *Continued*

	Regression Coefficient (in %)	
Composite PMSYS Index Factor	*M1*	*M2*
Internal mechanisms		
Health Information Technology index (range = 0–12)		10.3***
Electronic chronic disease registry		5.0***
Taking part in quality improvement collaboratives		5.0
Observations (ACO subpopulation)	316	316
R-squared	0.654	0.802
F test model	26,566***	48,762***

Note: Analyses are weighted. All estimates are complex sample design estimates computed using the survey procedure in Stata/IC, version 13.1. M1 = Regression only with contextual characteristics variables. M2 = Contextual characteristics and internal mechanisms variables used in regression.
†Ref: East North Central.
‡Ref: governed by hospital.
§Ref: 1 point.
¶Ref: owned by hospital.
††Ref: 1–2 physicians.
‡‡Ref: mostly primary care.
***$p < .01$, **$p < .05$, *$p < .1$.

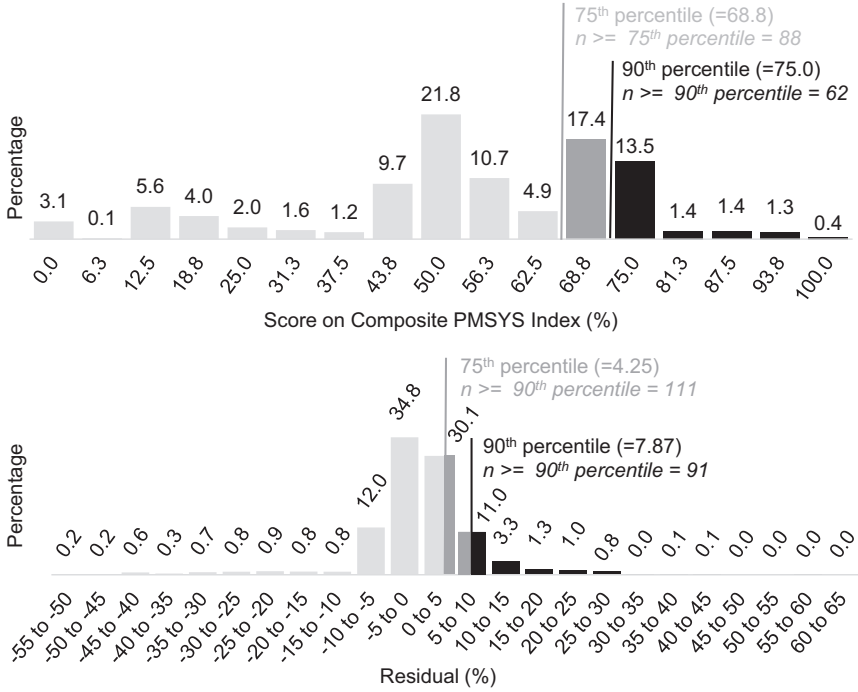
In the second step, we examined the residual values of practices (distance from the predicted value) from the regression model (Model 2). Residuals ranged from −0.54 to 0.59 (Figure 2). A total of 111 practices (35 percent) were in the 75th percentile of the residuals and 91 PD practices (29 percent) in the 90th percentile (Figure 2). Combining the two criteria—a high PMSYS index and positive residuals—a final set of 65 practices (21 percent) were identified as PDs (PD75) when applying the weighted 75th percentile as cutpoint for both criteria; 41 PDs (PD90: 13 percent) using the 90th percentile (Figure 1).

PD Characteristics

Table 2 shows the results of the bivariate analysis comparing PDs versus comparable non-PDs—organizations in the same PMSYS index percentile as the PDs, but not selected as PDs. The selection process of PDs and non-PDs for the two different cutpoints—75th and 90th percentiles—is illustrated in Figure 1. Using the 75th percentile cutpoint version, 65 PDs are compared to 23 non-PDs. In the 90th percentile version, 41 PDs are compared to 21 non-PDs.

The PDs (PD75, PD90) included a significant ($p < .05$ to $p < .1$) higher proportion of practices with constraining characteristics compared to non-PDs, including less public reporting, higher percentage of patients with limited

Figure 2: Distribution and Percentile Cutpoints of Residuals and PMSYS Index Scores among 316 US Physician Organizations Affiliated with Accountable Care Organizations (the Analysis Uses Weighted Data)



English proficiency (for PD90), less IPA or PHO affiliation (for PD75), less ACO membership breath (for PD75), more hospital-owned practices and practices of mid-size (3–7 physicians), and lower chronic-disease registries use.

The PD90 criteria (90th percentile of residuals and PMSYS) resulted in a more pronounced distinction between PDs and non-PDs than the PD75 criteria for several variables, including public reporting, patients with limited English proficiency, practice/group ownership, practice size, and chronic disease registries. Results of sensitivity analyses based on different scoring of the PMSYS index were consistent with the main analyses (data not shown).

DISCUSSION

We used an empirical method to identify PD physician organizations participating in ACOs with more developed PMSYS than predicted (via

Table 2: Bivariate Analysis of PDs versus Non-PDs

Variable	Type†	n	PD75 (n=65) Col %	Non-PD75 (n=23) Col %	p	n	PD90 (n=41) Col %	Non-PD 90 (n=21) Col %	p
Contextual factors									
Evaluated by external entities									
0	+	0	0.0	0.0		0	0.0	0.0	
1	+	12	7.3	11.4	0.613	7	12.0	20.3	0.545
2	+	76	92.7	88.6		55	88.1	79.7	
Pay-for-performance index (range = 0-3)									
0	-	14	22.9	0.8		10	12.6	0.4	
1	-	25	49.7	59.7	0.000 ***	12	44.1	23.1	0.000 ***
2	-	32	23.3	0.5		24	38.0	7.8	
3	-	17	4.0	39.0		16	5.3	68.7	
Public reporting index (range = 0-2)									
0	+	13	19.9	1.4		11	45.6	2.4	
1	+	13	31.7	56.6	0.032 **	7	3.6	19.2	0.013 **
2	+	62	48.4	42.0		44	50.8	78.5	
Percent patients with limited English proficiency									
0 to <1%	-	10	11.3	0.8		7	17.8	7.3	
1 to <5%	-	43	57.7	45.8	0.003 ***	29	20.1	77.0	0.060 *
>5%	-	35	31.0	53.4		26	62.1	15.7	
Significant proportion of patients from an IPA|PHO									
No	-	56	73.5	57.9	0.002 ***	37	46.1	28.2	0.345
Yes	+	32	26.5	42.1		25	53.9	71.8	
ACO membership breath index (range = 1-4)									
1	-	17	24.0	12.4		14	8.1	25.6	
2	+	20	33.2	46.7	0.016 **	11	3.6	4.0	0.064 *
3	+	33	22.1	7.6		25	44.0	15.0	
4	+	18	20.7	33.4		12	44.4	55.4	
Practice/group ownership									
Physician owned	+	43	76.5	86.2		29	55.6	76.1	
Hospital or health system	-	33	18.7	0.4	0.032 **	23	33.7	1.6	0.041 **
CHC or other	+	12	4.8	13.5		10	10.7	22.3	
Practice/group size (Number of physicians)									
1 to 2		25	34.2	34.0		15	7.9	57.1	
3 to 7	-	22	39.2	2.4		16	46.5	4.0	
8 to 12		8	8.1	16.6	0.044 **	8	18.4	28.4	0.015 **
13 to 19		6	3.8	0.4		5	0.9	6.6	
20 to 99	-	12	3.4	1.0		7	3.4	2.5	
>100		15	11.3	45.7		11	23.0	1.4	
Specialty mix									
Primary care	+	52	77.6	86.5		36	64.0	69.3	
Multispecialty	+	28	20.1	13.5	0.506	21	31.4	30.7	0.564
Mostly specialist	-	8	2.3	0.0		5	4.7	0.0	
Internal mechanisms									
HIT index (range = 0-12)									
0 to 5	+	3	1.0	0.0		2	0.9	0.0	
6 to 8	+	29	74.8	78.6	0.719	17	53.3	62.7	0.593
9 to 12	+	56	24.2	21.4		43	45.8	37.3	
Electronic chronic disease registry									
No	-	33	61.8	47.0	0.075 *	19	61.3	8.4	0.096 *
Yes	+	55	38.2	53.0		43	38.7	91.6	

Note: Analyses are weighted. Restraining and facilitating variables had been identified via the regression analysis (M2). The table shows variables with a significant associations with the PMSYS index in the regression.

†+ = facilitating, − = restraining, no symbol = no significant association. HIT = health information technology; IPA = independent practice association; PHO = physician hospital organization.

***$p < .01$, **$p < .05$, *$p < .1$.

linear regression) based on the internal mechanisms of practices and contextual factors. The empirical approach enables the identification of PDs in a systematic and reproducible way using large-scale surveys and performance data sources. We extended the approach of Klaiman, Pantazis, and Bekemeier (2014) using a two-step selection process (positive residuals and high PMSYS index scores). Previous research used residuals to select PDs and did not simultaneously consider overall performance as a selection criterion. We used the two-step approach to ensure that in regard to our definition of PD, we look at top performing organizations that are also positive outliers. Our approach to PD identification may generate innovative and more generalizable insights for organizational peers with low uptake of evidence-based practices. We also found that more stringent criteria for defining high performance, that is, 90th percentile, better distinguish PDs from non-PDs, which may enable greater learning opportunities when studying PDs.

The adjusted R^2 for the final regression model is high (0.80); however, unexplained deviance from predicted PMSYS values indicates that PDs may have underlying best practices or resources that were not measured. As a next step, qualitative research methods, such as comparative case studies, will be used to examine how the identified PD practices overcame common barriers when implementing their PMSYS and to understand the role ACOs play in supporting PMSYS development for PDs. These methods support the discovery of new internal mechanisms and contextual factors that can support or impede implementation and enable a more in-depth and detailed examination of the relationships uncovered in the quantitative analyses, including how external P4P incentives or having high proportions of vulnerable patients impacts PMSYS adoption and implementation.

Limitations

Some limitations should be considered, including potential limited sample representativeness and social desirability bias apply to NSPO3 (Wiley et al. 2015) and other organizational surveys. Prior analyses of NSPO3, however, identified only minor differences between respondent and nonrespondent organizations, and highlight internal consistency reliability and predictive validity of the survey items (McHugh et al. 2016; Ramsay et al. 2016). Moreover, available variables in NSPO3 were extensive but not exhaustive; information about the timeliness of

feedback or the ease of use of the PMSYS was not available (Pimperl 2015). Nonetheless, the PMSYS index measure encompasses core components of PMSYS that physician organizations need to manage their performance. Finally, the cross-sectional nature of the data limits our ability to assess the extent to which internal mechanisms and external factors result in more developed PMSYS or whether more developed PMSYS alters internal mechanisms or the impact of external factors. Longitudinal information on temporal changes in PMSYS could enable more clear selection of deviant cases that demonstrated improvements in PMSYS or showed a consistently high PMSYS implementation. Key variables of the PMSYS composite measure and ACO affiliation, however, were not assessed in earlier waves of the NSPO survey. Longitudinal analyses should be pursued when appropriate data are available.

Implications for Policy or Practice

We developed and illustrated the use of an empirical method to identify PD practices that, nonetheless, were able to overcome constraints and develop robust PMSYS for deeper assessment in subsequent research. We found that constraining characteristics included having high proportions of vulnerable patients. Clarifying the strategies and resources PDs use to overcome constraints may generate more generalizable insights for other organizations that encounter similar challenges. PD analyses may also assist in facilitating the broader dissemination of evidence-based structures and processes in health care organizations.

Acknowledgments

Joint Acknowledgment/Disclosure Statement: The statements, findings, conclusions, 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. University of California, Berkeley Committee for the Protection of Human Subjects protocol #2014-06-6480, Weill Cornell Medical

College Human Research Protections Programs protocol #EXE2011-035. The authors thank Lawrence P. Casalino and Diane Rittenhouse for their contributions in helping to develop and field the NSPO survey, Kennon R. Copeland constructing survey weights, and Patricia P. Ramsay for analytic support.

Funding: The National Study of Physician Organizations III was funded by the Robert Wood Johnson Foundation (Award No. 68847). Dr. Pimperl was supported by The Commonwealth Fund, a private independent foundation based in New York City. The views presented here are those of the authors and not necessarily those of The Commonwealth Fund, its directors, officers, or staff. Dr. Schmittdiel received support from the Health Delivery Systems Center for Diabetes Translational Research (P30 DK092924).

Disclosures: None.

Disclaimer: None.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the supporting information tab for this article:

Appendix SA1: Author Matrix.

Appendix SA2: Construction of the PMSYS Robustness Index Score from Specific NSPO3 Questionnaire Items (Adapted from Pimperl et al. 2016).

Appendix SA3: Description of Contextual Factors and Internal Mechanisms.