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The Sunshine Act and surgeons: a nation-wide analysis of industry payments to physicians

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ABSTRACT

Background: The Physician Payments Sunshine Act mandates the submission of payment records between medical providers and industry. We used the Open Payments Program database to compare industry payments to surgeons and nonsurgeons, as well as among surgical specialties, and to identify geographic distribution of payments.

Materials and methods: We included all reported industry payments in the Centers for Medicare and Medicaid Services' Open Payments Program in the United States, 2014-2015. Multivariable regression fixed effects panel analysis of total payments was conducted among surgeons, adjusting for surgeon specialty, payor type, payment category, and state. A geographic heat map was created.

Results: Of 2,097,150 subjects meeting criteria, 1,957,528 (45.66%) were physicians. The mean standard deviation (SD) payment overall was $232.64 ($6262.00), and the state with the highest mean (SD) payment was Vermont at $2691.61 ($11,508.40). Surgeons numbered 153,916 (7.86%). The specialty with the highest mean (SD) payment was orthopedic surgery at $2811.50 ($33,632.71, $P < 0.001$). Among 2,097,150 subjects meeting criteria, in multivariable regression fixed effects panel analysis, orthopedic compared to general surgeons were significantly likely to receive more industry payments (beta $1065.34 [95% CI $279.00-1851.00, $P = 0.008$), even controlling for payor, payment type, and state. Significant geographic disparities in payment were noted as 12 states received the top mean ($24.52-$500,000.00), leaving seven states with the lowest ($0.00-$12.56).

Conclusions: There are significant differences in industry payments to surgeons *versus* nonsurgeons and among surgical specialties, as well geographic distribution of payments. These data may prompt further investigation into trends and their causality and effects on research and practice.

Introduction

Section 6002 of the United States Patient Protection and Affordable Care Act of the 111th Congress (H.R. 3590, Public Law 111-148, March 23, 2010, 42 USC 18001), entitled "Transparency Reports and Reporting of Physician Ownership or Investment Interests", requires drug, device, biological, and medical supply manufacturers to report transfers of value made to a physician, physician medical practice, physician group practice, or teaching hospital, as well as information on

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any physician ownership or investment interest in the manufacturer.[1] It also mandates public availability of this information. The Centers for Medicare and Medicaid Services is required by law to collect and display information reported by applicable manufacturers and group purchasing organizations about payments and transfers of value between these organizations and physicians and teaching hospitals in the public Open Payments Program (OPP) database.[2] This information has been utilized by various groups to describe specialty-specific trends in industry payments, including the fields of ophthalmology, interventional radiology, interventional cardiology, cardiothoracic surgery, plastic surgery, otolaryngology, and orthopedic surgery.[3-13] There is no current data to investigate the overall disparity by surgical subspecialties and geographical distribution. We seek to use the OPP database to further compare industry payments to surgeons and nonsurgeons, as well as among surgical specialties, and to describe geographic distribution of payments.

Materials and methods

This is a multicenter panel cohort study. Institutional Review Board approval was not required given the publicly available data set per the Sunshine Act reporting guidelines. Inclusion criteria were any reported industry payments to medical professionals as recorded by the Centers for Medicare and Medicaid Services' OPP in the United States from January 1, 2014 to December 31, 2015. Exclusion criteria were no reported specialty or payment amount. The primary endpoint was a $200 US mean difference in payment across specialties. Descriptive statistics were conducted for the overall sample to report numbers (no.) with standard errors (SEs) for payment totals, and means and standard deviations (SDs) or medians and ranges as appropriate for interval data depending on data normality. Subanalysis among surgeons was conducted to determine the payment number and average by payor and specialty.

Multivariable regression fixed effects panel analysis of total payments (to control even for unknown time invariant variables) among surgeons was conducted to test possible independent associations with the outcome of payments. Variables included in the final linear regression model were first identified through statistical significance in bivariable analysis or the published literature, tested in forward and backward stepwise regression augmenting statistical and clinical consideration, and then the variables were tested via the following regression diagnostics to confirm adequate model fit. The final variables therefore included surgeon specialty, payor type, payment category, and state. The regression diagnostics assessed model performance according to the following criteria: linearity (augmented partial residual plot); normality (Kernel density, standardized normal probability, and quantile plots, and the Shapiro–Wilk W test); homoscedasticity (residual *versus* predictor plot, and the Breusch-Pagan test); error independence (Durbin–Watson test for correlated residuals given the time series fixed effects panel analysis); model specification (regression specification error test for omitted variables); influence (residual *versus* predictor plot); and collinearity (variance inflation factor and condition number). All regression estimates with 95% confidence intervals (CIs) are reported as fully adjusted results. A

Table 1 – Descriptive statistics and bivariable analysis of industry payments and physicians *versus* nonphysician health professionals, 2014-2015.

Covariates	Sample $n = 2,097,150$	Nonphysicians $n1 = 129,096$ (6.19%)	Physicians $n2 = 1,957,528$ (93.81%)	P value
Overall mean payments, US$ (SD)	232.64 (6626.01)	219.78 (3374.35)	209.18 (6406.54)	0.556
Overall median payments, US$ (range)	16.29 (12.56-24.52)	19.87 (12.66-70.00)	16.14 (12.54-23.53)	**<0.001**
Levels, no. (%)				**<0.001**
<$100	1,836,949 (87.91%)	106,062 (82.65%)	1,727,541 (88.56%)	
$100-$999	180, 298 (8.63%)	18,729 (14.60%)	158,428 (8.12%)	
$1000-$9999	68,478 (3.28%)	3206 (2.50%)	62,073 (3.18%)	
≥$10,000	3921 (0.19%)	322 (0.25%)	2765 (0.14%)	
Total, no. (SE)	488,000,000.00 (9,595,483.00)	28,400,000.00 (1,212,401.00)	409,000,000 (8,963,496.00)	**<0.001**
Largest payment, total, by category (SE)	169,000,000.00 (8,424,599.00) royalties/licenses	707,291.90 (32,872.74) education	149,000,000.00 (7,801,329.00) royalties/licenses	
Largest payment, total, by state (SE)	55,500,000.00 (2,443,687.00) California	9,666,914.00 (1,019,717.00) New York	49,100,000.00 (2,386,557.00) California	
Largest mean payment, by category (SD)	39,534.38 (128,773.80) royalties/licenses	37,008.17 (66,952.62) royalties/licenses	60,702.59 (157,386.00) royalties/licenses	
Largest mean payment, by state (SD)	2691.61 (11,508.40) Vermont	1023.93 (10,494.72) New York	2748.07 (11,790.25) Vermont	

Bolded values represents statistically significant by $P < 0.05$.
$n = 278,058$ professionals; $n = 2,097,150$ payments.