

How Much Do Doctors Really Receive from Industry in the United States? An Analysis of Open Payments in 2014

Stephanie Purnell¹, Sarah Mohamedaly¹, Christina Lipscombe², Dynell Pinder¹, Gandhi Vallarapu¹, Gurpreet Kaur¹, Dr. Anthony Colon¹, Dr. Pamela Coleman¹

¹Howard University Hospital, Division of Urology, Washington, DC

²Philadelphia College of Osteopathic Medicine, Philadelphia, PA

Abstract: Financial relationships between doctors and industry (biotechnology, medical device, and pharmaceutical manufacturers) are common. Payments are made for public speaking, consulting, as well as for research. Due to increased concerns about the nature and implications of these relationships, the United States government enacted the Physician Payments Sunshine Act to increase transparency of the financial relationships between industry and doctors. Industry began collecting and reporting payments made to healthcare professionals through the Open Payments website beginning in 2013. Thus, our study aims to evaluate non-research payments made to physicians in the US by the type of payments, the geographic distribution of payments, and the key manufacturers making the payments in 2014.

Keywords: Conflict of interest; Financial relationships; Open Payments; Physician Payments Sunshine Act

I. Introduction

Financial ties between doctors and biotechnology, medical device, and pharmaceutical companies are common and include everything from compensation for speaking at healthcare related events to direct research. Studies have shown that these relationships can have effects on prescribing patterns of physicians¹⁻². As a result, patients, consumers, and media are paying greater attention to these ties, encouraging government oversight of physicians and hospitals.

In order to increase transparency surrounding the relationships between industry and medicine, the Physician Payments Sunshine Act, section 6002 of the Affordable Care Act of 2010, mandates medical product manufacturers to disclose any transfers of value made to physicians or teaching hospitals to the Centers for Medicare and Medicaid Services². Industry began collecting and reporting payments to physicians to the Centers for Medicare & Medicaid Services (CMS) beginning in August 2013². Reportable payments include cash and/or cash equivalents (i.e. stocks or in-kind services) for food, gifts, entertainment, consulting fees, honoraria, speaker fees, royalties, travel reimbursement, and research payments. Payments amounting to more than \$10, or several payments worth \$100 in aggregate over a year are reportable, while drug samples or devices intended for use with or by patients are exempt from reporting.

Open Payments data has been used to describe the scope of payments in ophthalmology, orthopedic surgery, otolaryngology, and compared the given specialty's payments to payments in other specialties. However, to our knowledge, there is no research on the payments made to physicians overall across the United States (US). Thus, we aimed to evaluate non-research payments made to all physicians in the US by describing the types of payments, their geographic distribution by American Medical Association (AMA) region, and the key manufacturers making the payments by nature of the physicians' specialty.

II. Methods

2.1 Data Collection

Open Payments data, collected by industry, contains details on the company making the payment, the payment recipient, the payment amount, the names of devices and/or drugs associated with each payments, and the nature of the payment. Nature of payment can be divided into the following: charitable contribution, consulting fees, education, entertainment, food and beverage, gifts, grants, honoraria, ownership or investment interests, royalty or licenses, space rental or facility fees, speaker fees, as well as travel and lodging.

This publicly available data covers payments made from August 2013 to December 2014 and was accessed on January 20, 2016 via the Centers for Medicare & Medicaid Services (CMS) website (www.openpaymentsdata.com)². We limited our study and analyses to the year 2014 and to non-research payments. Physician specialty and geographic information was obtained from the Open Payments physician

profile database². Physicians were grouped into one of three categories according to the procedural nature of their specialty -- procedural, intermediate procedural, or non-procedural. The procedural group included the specialties of urology, orthopedic surgery, cardiology, gastroenterology, ophthalmology, otolaryngology, dermatology, neurological surgery, plastic surgery, general surgery, colon and rectal surgery, and obstetrics and gynecology. The intermediate procedural group included physicians in endocrinology, nephrology, anesthesiology, interventional radiology, and emergency medicine. The non-procedural group included those practicing immunology, neurology, hematology and oncology, family medicine, internal medicine, infectious disease, psychiatry, pediatrics, pathology, and nuclear medicine.

2.2 Statistical Analysis

We grouped payments according to the seven AMA regions using the recipient physician state and zip code. Region 1 includes the states of Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming. Region 2 includes Illinois, Iowa, Minnesota, Missouri, Nebraska, and Wisconsin. Region 3 includes Arkansas, Kansas, Louisiana, Mississippi, Oklahoma, and Texas. Region 4 includes Alabama, Florida, Georgia, North Carolina, Puerto Rico, South Carolina, and Tennessee. Region 5 includes Indiana, Kentucky, Michigan, Ohio and West Virginia. Region 6 includes Delaware, District of Columbia, New Jersey, Maryland, Pennsylvania, and Virginia. Region 7 includes Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont.

Each payment made by industry can be associated with up to five drugs and five devices. We reviewed drug and device names for duplicates and spelling errors. If more than one product was associated with a payment, it was assumed that equal proportion of the payment amount was associated with each item. The number of products associated with each payment was used to calculate the average payment per item and to estimate the total value of payments associated with each marketed product. Since payments were not normally distributed, we report medians with interquartile ranges (IQR). Data management and statistical analyses were performed using Microsoft Excel (version 2010, Seattle, WA) and SAS (Version 9.4).

III. Results

3.1 Nature of Payment

A total sum value of \$222,270,519.39 was paid to medical professionals (physicians, dentists, and podiatrists) in 2014. Amongst all medical professionals' categories, industry made the highest number of payments (n = 939,330) for food and beverages totaling \$23,960,538.36. The median food and beverage payment was \$15.70 (IQR = \$8.86). Conversely, industry made the lowest number of payments (n = 31) for ownership or investment interests totaling \$3,267,561.00. The median payment for ownership or investment interests was \$119,608.53 (IQR = \$158,627.47), the highest median payment made by pharmaceutical companies and device manufacturers.

In total, industry paid most for royalties or licenses -- \$74,396,767.83 representing 33.5% of the total sum paid in 2014. The median payment for royalties or licenses was \$9,336.66 (IQR = \$55,912.17) and the maximum payment was \$1,007,469.68. Gifts generated the second lowest sum value of payments totaling \$406,796.95 while entertainment produced the lowest sum of payments totaling \$21,626 made by industry. *Table 1* below provides more detailed information on the payments made to medical professionals based on the Open Payments Database for 2014.

Table.1 Payments made by industry to physicians in 2014 according to the *nature of payment*.

Nature of Payment	Number (N)	Sum Value	Maximum	Median	IQR
Charitable Contribution	93	\$589,944.47	\$45,000.00	\$1,350.00	\$7,750.00
Consulting Fees	10,474	\$37,064,423.72	\$558,050.00	\$2,000.00	\$3,128.00
Education	17,533	\$1,746,842.05	\$34,161.00	\$69.99	\$89.00
Entertainment	351	\$21,626.00	\$957.11	\$26.92	\$54.61
Food and Beverage	939,330	\$23,960,538.36	\$9,332.53	\$15.70	\$8.68
Gift	995	\$406,796.95	\$13,000.00	\$60.00	\$361.97

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Grant	950	\$8,996,206.75	\$611,500.00	\$3,331.67	\$8,793.39
Honoraria	900	\$1,727,443.71	\$41,937.00	\$1,750.00	\$1,434.20
Ownership or Investment Interest	31	\$3,267,561.00	\$438,450.00	\$119,608.53	\$158,627.47
Royalty or License	1,289	\$74,396,767.83	\$1,007,469.68	\$9,336.66	\$55,912.17
Space Rental or Facility Fees	460	\$1,105,780.85	\$32,500.00	\$1,500.00	\$2,487.50
Speaker Fees	28,661	\$52,395,847.38	\$79,353.36	\$1,700.00	\$1,150.00
Travel and Lodging	47,508	\$16,590,740.32	\$17,063.55	\$160.98	\$379.60

3.2 Procedural Nature of Specialty

The Open Payments database collected data on \$182,623,958.63 worth of payments to physicians in 2014. *Table 2* depicts the payments made to physicians by industry based on the procedural nature (procedural, intermediate procedural, or non-procedural) of the physician’s specialty and the nature of the payment made. Overall, industry made the most payments (n = 568,424) to non-procedural specialties totaling \$35,197,394.30, followed by procedural specialties (n = 275,695) totaling \$124,706,659.60, and lastly intermediate specialties (n = 66,007) totaling \$22,719,904.73.

Table 2. Industry payments to physicians based on procedural nature of specialty and the nature of payment.

Specialty Category	Nature of Payment	N	Sum	Maximum	Median	IQR
Intermediate Procedural		66,007	\$22,719,904.73			
	Consulting Fee	637	\$2,357,615.42	\$40,000.00	\$2,400.00	\$3,480.00
	Education	481	\$12,926.08	\$347.98	\$10.00	\$21.29
	Entertainment	32	\$1,706.64	\$437.97	\$22.63	\$42.01
	Food and Beverage	48,014	\$1,605,278.55	\$868.00	\$17.70	\$17.03
	Gift	1	\$4,384.00	-	-	-
	Grant	3	\$44,806.67	\$37,500.00	\$6,666.67	\$36,860.00
	Honoraria	27	\$63,872.71	\$7,588.63	\$2,100.00	\$950.00
	Royalty or License	26	\$365,555.65	\$65,464.90	\$1,547.13	\$19,477.18
	Speaker Fees	8,597	\$16,246,327.74	\$12,500.00	\$1,700.00	\$750.00
	Travel and Lodging	8,189	\$2,017,431.27	\$17,063.55	\$86.00	\$281.58
Non-Procedural		568,424	\$35,197,394.47			
	Charitable Contribution	2	\$2,000.00	\$1,000.00	\$1,000.00	\$0.00
	Consulting Fee	1,457	\$4,589,764.76	\$69,688.00	\$2,200.00	\$2,800.00
	Education	7,683	\$312,711.65	\$1,500.00	\$15.00	\$75.00
	Entertainment	29	\$1,438.49	\$351.28	\$34.43	\$41.15
	Food and Beverage	538,022	\$12,247,802.39	\$9,332.53	\$15.30	\$6.90
	Gift	14	\$4,399.33	\$3,500.00	\$40.61	\$110.79
	Grant	28	\$256,735.97	\$73,502.80	\$1,000.00	\$2,502.00
	Honoraria	151	\$325,756.60	\$7,000.00	\$2,000.00	\$100.00
	Royalty or License	53	\$352,677.13	\$12,158.25	\$7,842.00	\$7,196.15
	Speaker Fees	9,266	\$13,274,194.66	\$15,000.00	\$1,500.00	\$1,250.00
	Travel and Lodging	11,719	\$3,829,913.32	\$14,396.12	\$140.22	\$347.42
Procedural		275,695	\$124,706,659.60			
	Charitable Contribution	1	\$300.00	-	-	-
	Consulting Fee	5,976	\$21,960,978.73	\$235,674.00	\$2,250.00	\$3,563.75
	Education	6,951	\$781,749.34	\$8,400.00	\$89.00	\$54.05
	Entertainment	233	\$11,922.76	\$531.27	\$22.50	\$49.50
	Food and Beverage	232,896	\$6,795,520.38	\$4,500.00	\$16.71	\$13.49
	Gift	59	\$111,092.01	\$13,000.00	\$845.00	\$2,221.39
	Grant	143	\$1,193,560.01	\$75,000.00	\$3,333.33	\$9,256.00

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	Honoraria	463	\$802,157.02	\$10,000.00	\$1,500.00	\$1,620.00
	Ownership or Investment Interest	31	\$3,267,561.00	\$438,450.00	\$119,608.53	\$158,627.47
	Royalty or License	1,000	\$66,110,289.15	\$1,007,469.68	\$11,276.97	\$65,196.39
	Speaker Fees	6,800	\$15,732,045.15	\$33,013.49	\$1,850.00	\$1,650.00
	Travel and Lodging	21,142	\$7,939,484.05	\$15,677.10	\$180.34	\$361.64

The majority, 68%, of the total value paid to physicians in 2014, went to those in procedural specialties. Interestingly, these payments represent only 30% of the total number of payments made. Industry paid the most for royalties or licenses to those in procedural fields totaling \$66,110,289.15 while paying the least (\$300) for charitable contributions. Charitable contributions also represented the lowest number of payments made. The highest number of payments (n = 232,896) made to procedural specialties was for food and beverages; this category represents 85% of the total number of payments with a value of \$6,795,520.38. Industry made the highest number of gift payments (n= 59) to procedural specialties, compared to all other specialties, with a total value of \$111,092.01.

For non-procedural specialties, speaker fees generated the largest sum of payments with a value of \$13,274,194.66 and a median payment of \$1,500.00. Food and beverage had the second largest sum payment of \$12,247,802.39 accounting for the 94% the number of payments made in 2014. Entertainment generated the lowest value totaling \$1438.49 with a median payment of \$34.43 in 29 payments.

Industry made the least number of payments (7.2%) to intermediate procedural specialties in 2014. Companies paid the largest sum value for speaker fees to those in intermediate procedural specialties totaling \$16,246,327.74 in 8,597 payments. The median payment was \$1,700.00. Consulting fees represented the second largest sum paid with a value of \$2,357,615.42 and a median payment of \$2,400.00. Food and beverage accrued the highest number of payments (n = 48,014) totaling \$1,605,278.55, and the lowest, one payment, was made for gifts with a value of \$4,384.00.

3.3 Payments by Region

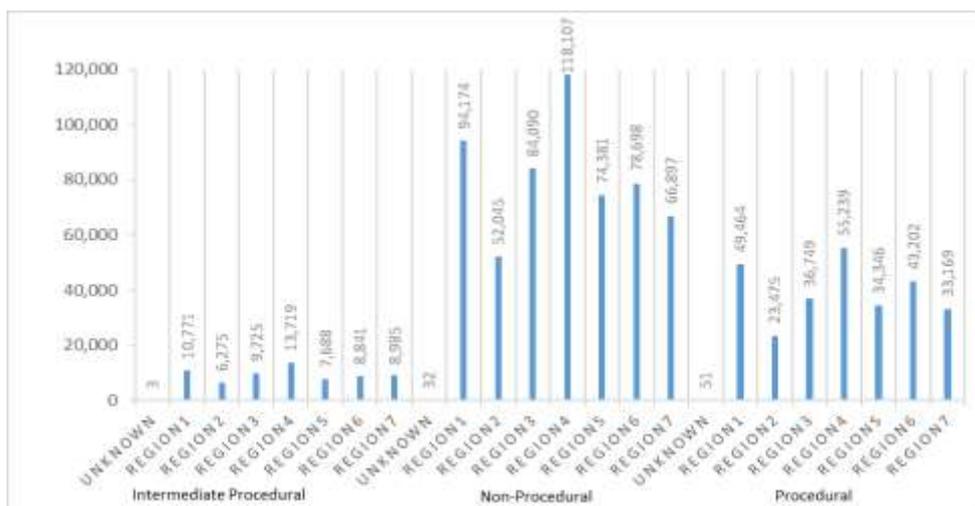
Physicians in region 1 were paid the highest sums by industry, regardless of category of specialty, totaling \$45,236,699.97. Table 3 below describes the payments made to physicians by region while Fig. 1 depicts the number of payments made per region by specialty category. For non-procedural specialties, industry made the most (n=118,107) payments to physicians in region 4 and the least (n = 52,045) payments to those in region 2. Similarly, industry made the most (n = 13,719) payments to region 4 physicians and the least number of payments (n = 6,275) to region 2 physicians in intermediate procedural specialties. For procedural specialties, industry made the most (n = 49,464) payments to region 1 and the least payments to region 1 (n = 23,475).

Table 3. Payments made by industry to specialties by region.

Region	N	Sum	Maximum	Median	IQR
Non-Procedural					
1	94,174	\$6,650,246.73	\$25,000.00	\$17.03	\$9.24
2	52,045	\$3,445,997.86	\$23,000.00	\$15.14	\$7.28
3	84,090	\$4,202,050.32	\$69,688.00	\$15.39	\$6.81
4	118,107	\$6,603,366.10	\$73,502.80	\$15.38	\$6.91
5	74,381	\$3,904,968.31	\$30,000.00	\$13.69	\$5.78
6	78,698	\$4,577,108.55	\$40,750.00	\$15.74	\$7.36
7	66,897	\$5,813,016.83	\$66,666.00	\$16.79	\$8.52
Unknown	32	\$639.60	\$91.26	\$15.15	\$8.27
Intermediate Procedural					
1	10,771	\$3,556,282.57	\$40,000.00	\$22.08	\$90.05
2	6,275	\$2,423,735.52	\$10,765.31	\$24.98	\$112.26
3	9,725	\$3,242,987.92	\$31,708.01	\$20.15	\$90.77
4	13,719	\$4,674,355.71	\$26,800.00	\$21.30	\$95.94
5	7,688	\$2,920,720.30	\$65,464.90	\$20.92	\$100.33
6	8,841	\$2,769,864.76	\$26,325.00	\$20.92	\$84.96
7	8,985	\$3,131,911.70	\$34,050.00	\$21.32	\$97.07
Unknown	3	\$46.25	\$18.12	\$15.54	\$5.53

Procedural						
1	49,464	\$35,030,170.67	\$1,007,469.68	\$20.74	\$66.00	
2	23,475	\$13,338,897.69	\$634,853.01	\$19.26	\$63.11	
3	36,749	\$13,494,922.80	\$311,682.48	\$18.00	\$33.74	
4	55,239	\$20,366,863.96	\$383,049.86	\$18.43	\$39.14	
5	34,346	\$8,025,865.19	\$130,165.90	\$16.07	\$37.36	
6	43,202	\$17,680,449.11	\$700,305.60	\$18.06	\$27.28	
7	33,169	\$16,766,111.96	\$665,506.63	\$20.08	\$53.44	
Unknown	51	\$3,378.22	\$843.00	\$21.94	\$38.21	

Figure 1. Number of payments made by procedural nature of specialty per region.



3.4 Payments by Company

A total of 184 companies made payments to medical professionals in 2014. The top 10 companies, representing 5% of the total, paid physicians \$196,331,968.42 representing 88% of the total sum paid (\$222,270,519.40). DePuy Synthes paid the largest sum value (\$86 million) while making the third highest number of payments in our study. AstraZeneca made the second highest sum payment but made the most (n= 689,362) payments in 2014. Tables 4a and 4b below describe the payments made to medical professionals in the US by sum amount and number of payments respectively.

Table 4a. Top 10 companies making payments, by sum, in the US in 2014.

Company	Sum	% of Sum
DePuy Synthes Sales Inc.	\$86,441,674.14	38.9
AstraZeneca Pharmaceuticals LP	\$64,586,265.63	29.1
Janssen Pharmaceuticals, Inc	\$16,972,920.46	7.6
Ethicon Inc.	\$7,904,043.69	3.6
GE Healthcare	\$5,740,314.17	2.6
Janssen Research & Development, LLC	\$4,775,208.53	2.1
Biosense Webster, Inc.	\$2,941,564.95	1.3
Avanir Pharmaceuticals, Inc.	\$2,731,059.42	1.21
Johnson & Johnson Vision Care, Inc.	\$2,336,818.75	1.1
Braintree Laboratories, Inc.	\$1,902,098.68	0.9

Table 4b. Top 10 companies making the highest number (N) of payments in 2014.

Company	N	% of Payments
AstraZeneca Pharmaceuticals LP	689,362	65.7%
Janssen Pharmaceuticals, Inc	130,339	12.4%
DePuy Synthes Sales Inc.	53,660	5.1%
Ethicon Inc.	31,120	2.9%
Johnson & Johnson Vision Care, Inc.	26,614	2.5%
Avanir Pharmaceuticals, Inc.	20,586	1.9%
Acclarent, Inc	11,869	1.1%
Biosense Webster, Inc.	10,335	0.98%
LIPOSCIENCE, INC.	8,669	0.83%
Mentor Worldwide LLC	7,900	0.75%

IV. Discussion

This analysis of the Open Payments database revealed that industry made the most payments to non-procedural specialties while procedural specialties grossed the largest sum value of payments totaling \$124,706,659.60. Physicians in procedural specialties are paid more by industry on average than those in other specialties. This could be due to the fact that the devices, biologics, and other pharmaceuticals provided to doctors in procedural specialties are more complex, newer, and/or more expensive than those developed for or used by physicians in other specialties. The innovation typically associated with and encouraged by surgical specialties is likely related to the higher value of payments made to procedural specialties. Oddly, while the public expects medical advances, financial ties between industry and physicians are generally considered unfavorable⁸⁻¹⁰.

More payments were made to non-procedural specialties likely due to the volume of products available for the conditions and diseases treated by non-procedural physicians (i.e. oncologists, immunologists, and pulmonologists). AstraZeneca pharmaceuticals, for example, made 65.7% of payments to physicians in 2014. This company focuses on treatments related to oncology, metabolic diseases, inflammation and autoimmunity, infection and vaccination, as well as medications for the respiratory system. Resultantly, AstraZeneca likely seeks out and pays physicians who use these medications most; more payments are made to physicians of non-procedural specialties given the number of conditions treated by these physicians as well as the number of medications and devices that have been developed over the years to treat these conditions.

In support of this idea is the most recent data available from the CDC on patient trends with physicians -- 54.6% of physician office visits in 2012 were made to primary care physicians (PCPs) with the most frequent principle illness-related reason for the visit being cough and the most common diagnosis made being arthropathy or related disorders⁵. If most patients are being seen by PCPs, many of whom fit into the category of non-procedural, and if most patients are being seen for symptoms like cough and joint pain, industry likely develops medications and devices that treat these common conditions as well as making payments to the physicians who treat these conditions.

Industry made the highest number of payments to non-procedural and intermediate procedural physicians in region 4. We believe this finding is associated with the population density and demographics of the region. Region 4 includes Florida, which has the highest proportion (>14%) of people over 65 years, and Alabama, which has a high proportion (13.9%) of people older than 65^{6,7}. Since seniors visit the doctor more often than those in the US population to manage multiple chronic conditions, as well as to seek preventable care, and obtain newly-available drugs, it is likely that industry takes this into account when targeting physicians for information on their products and payments¹¹. Ultimately, states like Florida and Alabama, due to the high proportions of elderly, are premier locations for device manufacturers and pharmaceutical companies to cultivate financial relationships with physicians.

Industry develops the treatments and tools that physicians and patients need, making a relationship between medicine and industry essential. Similarly, companies provide funds for educational conferences and meetings for students, residents, and other health professionals -- another benefit to having financial ties to industry. While studies have shown that gifts, in particular, can influence the prescribing patterns of physicians, there is no data that shows these ties cause a decrease in the quality of healthcare, likely because the nature of medicine revolves around the principles of beneficence and non-maleficence¹². In our study, gift payments represented the second lowest sum value totaling \$406,796.95 while speaker fees, which are looked upon more favorably by patients¹³, represented the second highest sum value (\$52,395,847.38) paid to physicians.

Our study is not without limitations. The Open Payments database aims to increasingly describe the financial ties between healthcare and industry, yet there are some payments not accounted for -- the payments made to resident physicians and non-physician practitioners as well as reporting of drug samples given. Similarly, this open access database does not provide any insight into the effects of these financial ties. One cannot infer the effects of industry payments on physician practices without more detailed data (which is unavailable on openpayments.cms.gov) nor do we know what the consequences are of payment reporting through the Open Payments database to date.

Regardless of the negative associations that exist between industry and medicine, these financial relationships remain common and necessary. The data provided by Open Payments, may be limited but it allows

for public scrutiny and analysis. In order to assess the consequences of payments made to physicians, future research should include data on the prescribing patterns after payment as well as detailed data on morbidity and mortality after use of a devices or pharmaceuticals from industry. It would also be useful for this information to be available online at no cost to the public. Future studies have the potential to reveal various trends on financial relationships as well as the ability to highlight the longitudinal effects of the Sunshine Act.

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