LEADING ARTICLE

Analysis of payments to GI physicians in the United States: Open payments data study

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Abstract
Background and Aim: The purpose of this study was to review and analyze the nature of industry payments to gastroenterology and hepatology (GI) physicians.

Methods: We conducted a retrospective study of open payments (OP) data for the year 2017. Payments to individual physicians were aggregated using a unique physician profile identification number. General payments to Centers for Medicare and Medicaid Services regions were also analyzed. The nature of financial transactions in general payments was reported overall and per physician payment. Research, ownership, and general payments were aggregated and analyzed by drug/device companies.

Results: During the study period, more GI physicians received contributions in the form of general payments compared to ownership or research payments. A small percentage of physicians received contributions greater than $100 000. The most frequent contributions were for food and beverages. Only 10 manufacturers made about 71% ($43 271 938) of general payments.

Conclusions: We found that only a small number of GI physicians received a significant portion of industry payments. A large portion of those payments came from drug or device companies. The impact of these payments on gastroenterologists needs to be examined further.

Introduction
Medical professionalism has been the cornerstone of medical practice, dating back many decades, at least to the inception of the Hippocratic oath. The modern health-care system includes various components beyond just the physician and the patient. Other components include the government, pharmaceutical companies, marketing agencies, insurance companies, and other stakeholders.

The financial aspect of health care is currently the driving factor in terms of research, access to care, and prescription patterns. Federal agencies, such as the National Institutes of Health and Centers for Disease Control and Prevention, have been the cornerstone of funding biomedical research for years, but industry-sponsored research is now outpacing federal funding. Pharmaceutical and medical device companies are both, directly and indirectly, investing in various forms of funding to reach physicians. As a result, many ethical questions are now arising from physician ties to the pharmaceutical industry. Initially, voluntary disclosure of financial conflict of interest was thought to be enough, but research studies have shown inadequate compliance with such disclosures.

Recognizing the importance of transparency in health care, the U.S. government passed “The PPSA (Physician Payments Sunshine Act)” as part of the Affordable Care Act. The PPSA requires manufacturers of medical products to disclose to Centers for Medicare and Medicaid Services (CMS) any payments of value that were made to teaching hospitals or individual physicians. The data collection was started in 2013 and first reported in 2014. Recent studies on Open Payments have shown the significant financial interaction between the medical industry and physicians in various specialties. This also brought to light the...
inaccuracies of financial disclosure statements and conflicts of interests, thus advocating for more stringent enforcement of disclosure policies.6,17,18 Few studies briefly reviewed payments to gastroenterology and hepatology (GI) physicians, but a detailed analysis has not yet been conducted.9,11,19 The rationale of our study is to address this gap and to bring into focus the nature of industry payments to gastroenterologists and hepatologists.

**Objective**

The main objective of our study is to review the industry payments to GI physicians. The secondary objective is to analyze the nature of payments and key industry sponsors to GI physicians.

**Methods**

We conducted a retrospective study of open payments (OP) data for the year 2017.20 OP is a federally run program that collects and publicly reports information about financial relationships between the health-care industry, individual physicians, and academic hospitals. Further details on OP data can be found in detail online through the government website.7

Payments made to the individual physician and teaching hospitals were broadly categorized into research payments, ownership interests, and general payments. Research payments include payments made with regard to research protocols or research agreements. Stocks, bonds, and partnership shares in the related company or group-purchasing organizations are included in ownership interest. General payments include all other payments.7

We collected data only for allopathic/osteopathic GI physicians. Payments to individual physicians were aggregated using a unique physician profile identification number. General payments to CMS regions were also analyzed.7 The nature of financial transactions in general payments was reported overall and per physician payment. Definitions and additional details for the nature of each type of financial transactions were reported as a Table S1, Supporting information. Research, ownership, and general payments were aggregated and analyzed by drug/device companies. All statistical analyses were performed using SPSS software version 23 (IBM Corp, Armonk, NY).

**Results**

**General characteristics.** The General Payments group had the highest number of recipients and total aggregated payments compared to the Research or Ownership groups (12 743/ $61 169 576 vs 185/ $1 607 286 vs 16/ $3 442 931, respectively). The median payments were higher for the Ownership group compared to the General group or Research group ($25 000 vs $398 vs $2905, respectively) (Table 1). Only a small number of GI physicians received contributions of more than $100 000. Most of the physicians received less than $1000 (median per physician payment $202) in the General group, between $1000 and $9999 (median per physician payment $4502) in the Research group, and $10 000–99 999 in the Ownership group (median per physician payment $30 653) (Table S1). The Atlanta area CMS region received the highest median general payment of $480, while the Seattle region received the lowest median payment of $144 (Graph 1).

**Method of compensation.** Most of the payments were made for compensation for services other than consulting ($24 495 320) (Table 2). The most frequent contributions were made for food and beverages (12 411). Median per physician payment was the highest for royalty or license ($48 565).

**Payments by industry.** A total payment of $61 169 576 was made by 393 drug/device companies to GI physicians in the General Payments group, $1 607 286 by 32 companies in the...
Graph 1  Open payments by Centers for Medicare and Medicaid Services region. ( ), Seattle; ( ), San Francisco; ( ), Denver; ( ), Kansas City; ( ), Dallas; ( ), Chicago; ( ), Atlanta; ( ), Philadelphia; ( ), New York; ( ), Boston.

Table 2  Nature of identified general payment to physicians

| Payment type                                      | Total ($) | Median ($) | No. of physicians | Per physician ($) |
|---------------------------------------------------|-----------|------------|--------------------|-------------------|
|                                                   |           |            |                    |                   |
| Charitable contribution                          | 750       | 750        | 1                  | 750               |
| Entertainment                                     | 14,432    | 43         | 96                 | 92 (1–2)          |
| Gift                                              | 47,396    | 15         | 166                | 87                |
| Education                                         | 667,585   | 12.51      | 1366               | 34 (1–2)          |
| Grant                                             | 754,921   | 1160       | 57                 | 1250              |
| Current or prospective ownership or investment    | 1,133,398 | 5020       | 6                  | 5020              |
| interest                                         |           |            |                    |                   |
| Honoraria                                         | 1,325,606 | 1800       | 236                | 3251 (1–3)        |
| Compensation for serving as faculty or as a speaker| 3,374,625 | 3000       | 278                | 6600 (2–4)        |
| Royalty or license                                | 5,407,668 | 34,212     | 27                 | 48,565 (4–14)     |
| Travel and lodging                                | 6,237,434 | 179        | 1946               | 1024 (4–20)       |
| Food and beverage                                | 7,479,193 | 14.66      | 12,411             | 335 (3–43)        |
| Consulting Fee                                    | 10,231,246| 2500       | 972                | 4425 (2–14)       |
| Compensation for service other than consulting    | 24,495,320| 2250       | 1296               | 8700 (5–20)       |
Research group, and $33 416 63 (invested amount) by 12 companies in the Ownership group for the year 2017 (Tables 3, 4, and 5 and Table S2). Only 10 manufacturers made about 71% ($43 271 938) of the general payments. GI Supply had the highest aggregated payments ($2 772 000) in the Ownership group, Eli Lilly in the Research group ($298 751), and AbbVie in the General Payments group ($9 560 796). While the payments in each category varied widely by drug/device company, compensation for service, consulting fee, education, food, and travel are the most frequently compensated categories. Linzess by Allergan was the highest-paid sponsored medication ($5 769 700) (Graph S1, Supporting information).

Discussion

The advent of the PPSA has shed light on the role of industry contributions to physicians of various subspecialties. This study

Table 3  Top 10 industry payments in general payments section

| Name of the manufacturer | Aggregate amount of payments | No. of physicians | Compensation for service | Consulting fees | Education | Food | Travel | Others |
|--------------------------|-----------------------------|-------------------|-------------------------|-----------------|-----------|------|--------|--------|
| AbbVie                   | 9 560 796                   | 84 238            | 6 068 523               | 998 782         | 3865      | 1 581 180 | 899 030 | 9416 (grant) |
| Gilead sciences          | 8 086 431                   | 4025              | 4 611 713               | 1 782 684       | 2269      | 599 700 | 975 985 | 114 081 (grant) |
| Allergan                 | 6 339 060                   | 5886              | 4 796 113               | 15 896          | 1291      | 806 360 | 717 380 | 20 (gift) |
| Valeant pharmaceuticals  | 4 263 539                   | 5827              | 55 200                  | 176 667         | 1602      | 767 910 | 408 989 | 2 732 650 |

* Takeda (Takeda Development Center America; Takeda Pharmaceutical Company; Takeda Pharmaceuticals America; Takeda Pharmaceuticals Puerto Rico; Takeda Pharmaceuticals U.S.A.); Cook (Cook Incorporated; Cook Medical LLC; Wilson Cook Medical Incorporated); Johnson and Johnson (Janssen Biotech, Inc.; Janssen Global Services, LLC; Janssen Pharmaceuticals, Inc.; Janssen Products, LP; Janssen Research & Development; Janssen Scientific Affairs, LLC; Johnson & Johnson Health Care; Johnson & Johnson Surgical Vision.

Table 4  Industry payments in ownership section

| Name of the manufacturer | Frequency | Aggregated payments |
|--------------------------|-----------|---------------------|
| GI Supply, Inc.          | 1         | 2 772 000           |
| Saphena Medical, Inc.    | 2         | 215 658             |
| Endogastric Solutions, Inc | 2     | 124 996             |
| Atlas Spine, Inc.        | 2         | 75 000              |
| Cardiosolutions, Inc.    | 3         | 50 015              |
| The North Carolina Mutual Wholesale D | 1 | 36 306 |
| Bio2 Medical, Inc.       | 1         | 25 000              |
| Medimetriks Pharmaceuticals, Inc. | 1 | 25 000 |
| Romark Laboratories, LC  | 1         | 11 600              |
| Vertebral Technologies, Inc. | 1       | 3572                |

Table 5  Industry payments in research section

| Name of the manufacturer | Aggregate | Number |
|--------------------------|-----------|--------|
| Eli Lilly and Company    | 298 751   | 78     |
| Gilead Sciences Inc      | 217 735   | 46     |
| ChiRhoClin, Inc.         | 188 475   | 11     |
| AbbVie, Inc.             | 168 610   | 168    |
| Valeant Pharmaceuticals North America | 143 184 | 4 |
| UCB Biosciences Inc.     | 127 415   | 15     |
| Olympus Corporation      | 114 469   | 5      |
| SANOFI US SERVICES INC.  | 76 515    | 1      |
| Vanda Pharmaceuticals Inc. | 75 000  | 7     |
| EndoStim, Inc.           | 70 677    | 12     |
characterizes the nature of industry payments made to gastroenterologists using the Open Payments Database.

We found that general payments made up a more substantial proportion of industry contributions to physicians compared to research and ownership payments. It is similar to other studies that examined industry payments to various subspecialties. In a study by Pathak et al. looking into payments to pediatric orthopedic surgeons, 0.07% of payments were for research, and 0.2% were for ownership, with the remaining total going toward general payments. These findings may be due to specific preferences in spending patterns by different companies. It could also be a result of the wide variety of payments that are included within the general payments category.

Our study shows that a small subset of GI physicians received the most significant industry contributions, greater than $100,000. This is similar to several other studies. Some of the earlier studies have inferred this disproportionality to targeting influential leaders in the industry, who are more likely to have an impact within their respective fields. In a study by Brauer et al., the investigators examined the nature of payments to otolaryngologists. They noted that there was a disparity in total payments to the top 40 versus the remaining 417 otolaryngologists. The investigators further evaluated the data and discovered that the top 40 received payments from more companies and for more studies compared to those not in the top 40. Although our study examines the general nature of industry payments to GI physicians, this does not specifically differentiate the payments made between top and bottom earners. This could be pursued in future studies.

Regarding regional differences in compensation, we found that the Atlanta area received the highest payments, whereas the Seattle region received the lowest. These differences may reflect regional variations in physician compensation. They may also reflect differences in physician attitudes toward accepting industry payment. Further studies would be required to better understand the geographic distribution of payments.

The findings of this study reveal from whom GI physicians receive compensations and the types of compensation by using the data that are made available through the Open Payments Database. However, this study’s findings are primarily descriptive and do not analyze the potential influence of payments on GI physician clinical practice patterns and delivery of care. Several prior studies found that physician behavior can be influenced by compensation from industries. Drug/Device companies made the largest contribution of payments by industry. Previously Tringale et al. noted that interventionalists (cardiologist, gastroenterologists, and anesthesiologists) received highest median payment compared to others (surgeons, primary care physicians and non-interventional specialists). Additional studies are warranted to understand whether and how compensation from industries directly affects GI physician practice patterns.

The main limitation of this study derives from the data that were available through the Open Payments Database. Parts of the data lacked the granularity to allow for precise analysis. For example, while the data were able to categorize the many different types of compensation in the general payment’s category, the most significant number of payments was labeled compensation for services other than consulting. It is unclear what these compensations are based on the data available through the Open Payments Database. Because it has been shown that behavior can be influenced by compensation from industries, it may be valuable to characterize what types of compensations are utilized in this broad group of payments to allow for more transparency of the interactions between industry and GI physicians.

Moreover, GI physicians are a broad group that encompasses general GI physicians, hepatologists, advanced endoscopists, etc. Our study and others like it have shown that industries tend to target a select group of GI physicians, and one can only speculate who these physicians are. Stratification of the different subspecialties may allow for follow-up analyses on the effect of compensation by industries and physician practice patterns.

**Conclusion**

Our study took the data from the Open Payments Database from 2017 and teased out the different methods of compensation that were similar to other medical specialties, such as cardiology, orthopedic surgery, and otolaryngology. A significant portion of the payments was made to a small number of GI physicians, and a large part of the payments came from drug or device companies. Additional studies on the influence of industry payments and changes in practice patterns of GI physicians will help achieve the goal of the PPSA for transparency in the relationship between industry and physicians.

**REFERENCES**

1. Feld LD, Yeh J, Feld AD. Here comes the sun: medical professionalism and the implications of the sunshine act for gastroenterology practice. *Clin. Gastroenterol. Hepatol.* 2014; 12: 1587–91.
2. Dorsey ER. Funding of US biomedical research, 2003-2008. *JAMA.* 2010; 303: 137.
3. Campbell EG, Gruen RL, Mountford J, Miller LG, Cleary PD, Blumenthal D. A national survey of physician-industry relationships. *N. Engl. J. Med.* 2007; 356: 1742–50.
4. Okike K, Kocher MS, Wei EX, Mehlin CT, Bhandari M. Accuracy of conflict-of-interest disclosures reported by physicians. *N. Engl. J. Med.* 2009; 361: 1466–74.
5. Alhamoud HA, Dudum R, Young Heather A, Choi BG. Author self-disclosure compared with pharmaceutical company reporting of physician payments. *Am. J. Med.* 2016; 129: 59–63.
6. Norris SL, Holmer HK, Ogden LA, Burda BU, Fu R. Characteristics of physicians receiving large payments from pharmaceutical companies and the accuracy of their disclosures in publications: an observational study. *BMC Med. Ethics.* 2012; 13: 24. https://doi.org/10.1186/1472-6939-13-24.
7. CMS.ORG. *Open Payments.* Cited 19 Sep 2018. Available from URL: https://www.cms.gov/OpenPayments/About/About.html
8. Khan MS, Siddiqui TJ, Fatima K et al. Evaluation of industrial compensation to cardiologists in 2015. *Am. J. Cardiol.* 2017; 120: 2294–8.
9. Marshall DC, Jackson ME, Hattangadi-Gluth JA. Disclosure of industry payments to physicians. *Mayo Clin. Proc.* 2016a; 91: 8–96.
10. Marshall DC, Moy B, Jackson ME, Mackey TK, Hattangadi-Gluth JA. Distribution and patterns of industry-related payments to oncologists in 2014. *J. Natl. Cancer Inst.* 2016b; 108: djw163.
11 Tringale KR, Marshall D, Mackey TK, Connor M, Murphy JD, Hattangadi-Gluth JA. Types and distribution of payments from industry to physicians in 2015. JAMA. 2017; 317: 1774–84.
12 Ahmed R, Bae S, Hicks CW et al. Here comes the sunshine: industry’s payments to cardiothoracic surgeons. Ann. Thorac. Surg. 2017; 103: 567–72.
13 Baadh AS, Baadh PK, Islam S, Katz DS. IR and the sunshine act: two-year analysis of the open payments database and comparison with related specialties. J. Vasc. Interv. Radiol. 2017; 28: 200–5.
14 Samuel AM, Webb ML, Lukasiewicz AM et al. Orthopaedic surgeons receive the most industry payments to physicians but large disparities are seen in sunshine act data. Clin. Orthop. Relat. Res. 2015; 473: 3297–306.
15 Fleischman W, Ross JS, Melnick ER, Newman DH, Venkatesh AK. Financial ties between emergency physicians and industry: insights from open payments data. Ann. Emerg. Med. 2016; 68: 153.e4–8.e4.
16 Parreco J, Donath E, Kozol R, Faber C. Comparing industry compensation of cardiothoracic surgeons and interventional cardiologists. J. Surg. Res. 2017; 208: 51–9.
17 Carlisle A, Bowers A, Wayant C, Meyer C, Vassar M. Financial conflicts of interest among authors of urology clinical practice guidelines. Eur. Urol. 2018; 74: 348–54.
18 Checketts JX, Sims MT, Vassar M. Evaluating industry payments among dermatology clinical practice guidelines authors. JAMA Dermatol. 2017; 153: 1229.
19 Harewood GC, Ryan T, Lewis S. Industry payments to gastroenterologists across the United States. Clin. Gastroenterol. Hepatol. 2015; 13: 1209.
20 CMS.ORG. Open Payments Data. Cited 19 Sep 2018. Available from URL: https://openpaymentsdata.cms.gov/
21 Chao AH, Gangopadhyay N. Industry financial relationships in plastic surgery. Plast. Reconstr. Surg. 2016; 138: 341e–8e.
22 RathI VK, Samuel AM, Mehra S. Industry ties in otolaryngology. Otolaryngol. Head Neck Surg. 2015; 152: 993–9.
23 Modi PK, Farber NJ, Zavaski ME, Jang TL, Singer EA, Chang SL. Industry payments to urologists in 2014: an analysis of the open payments program. Urol. Pract. 2017; 4: 342–8.
24 Horn J, Checketts JX, Jawhar O, Vassar M. Evaluation of industry relationships among authors of otolaryngology clinical practice guidelines. JAMA Otolaryngol. Head Neck Surg. 2018; 144: 194.
25 Svider PF, Bobian M, Lin H-S et al. Are industry financial ties associated with greater scholarly impact among academic otolaryngologists? Laryngoscope. 2017; 127: 87–94.
26 Sismondo S. Key opinion leaders and the corruption of medical knowledge: what the Sunshine Act will and won’t cast light on. J. Law Med. Ethics. 2013; 41: 63–43.
27 Brauer PR, Morse E, Mehra S. Industry payments for otolaryngology research: a four-year analysis of the open payments database. Laryngoscope. 2020; 130: 314–20.
28 Kanter GP, Carpenter D, Lehmann LS, Mello MM. US nationwide disclosure of industry payments and public trust in physicians. JAMA Netw. Open. 2019; 2: e191947.
29 Pathak NI, Mets EJ, Mercier MR et al. Industry payments to pediatric orthopaedic surgeons reported by the open payments database. J. Pediatr. Orthop. 2019; 39: 534–40.

Supporting information

Additional supporting information may be found in the online version of this article at the publisher’s website:

Graph S1 Top 10 highest paying sponsored medications.
Table S1 Characteristics per physician.
Table S2 General payments: Top 10 aggregated payments per physician by drug or device manufacturers.