

SPECIAL ARTICLE

A National Survey of Physician–Industry Relationships

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ABSTRACT

BACKGROUND

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Relationships between physicians and pharmaceutical, medical device, and other medically related industries have received considerable attention in recent years. We surveyed physicians to collect information about their financial associations with industry and the factors that predict those associations.

METHODS

We conducted a national survey of 3167 physicians in six specialties (anesthesiology, cardiology, family practice, general surgery, internal medicine, and pediatrics) in late 2003 and early 2004. The raw response rate for this probability sample was 52%, and the weighted response rate was 58%.

RESULTS

Most physicians (94%) reported some type of relationship with the pharmaceutical industry, and most of these relationships involved receiving food in the workplace (83%) or receiving drug samples (78%). More than one third of the respondents (35%) received reimbursement for costs associated with professional meetings or continuing medical education, and more than one quarter (28%) received payments for consulting, giving lectures, or enrolling patients in trials. Cardiologists were more than twice as likely as family practitioners to receive payments. Family practitioners met more frequently with industry representatives than did physicians in other specialties, and physicians in solo, two-person, or group practices met more frequently with industry representatives than did physicians practicing in hospitals and clinics.

CONCLUSIONS

The results of this national survey indicate that relationships between physicians and industry are common and underscore the variation among such relationships according to specialty, practice type, and professional activities.

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IN THE PAST 20 YEARS, PHYSICIAN-INDUSTRY relationships have received considerable attention.¹⁻¹² In 2000, Wazana reviewed 16 studies published between 1982 and 1997 and estimated that, on average, physicians met with industry representatives four times per month and residents accepted six gifts per year from industry representatives.¹³ A 2001 survey showed that 92% of physicians received drug samples, 61% received meals, tickets to events, or free travel, 13% received financial or other kinds of benefits, and 12% received incentives for participation in clinical trials.¹⁴

Many of these previous studies are now somewhat dated or focused on particular specialties or geographic areas or on physicians in training. Also, none have systematically explored the full range of possible predictors of physician-industry relationships such as the physician's sex, patient mix, practice setting, other professional activities, or type of clinical reimbursement.

Research on academic-industrial relationships involving scientists (many of whom are physicians in academic health centers) has shown that these relationships have both benefits and risks.^{15,16} It seems likely that physician-industry relationships have benefits and risks as well. For example, some of the drugs promoted by industry are underused by physicians in the United States, and sponsorship of professional meetings by industry may enhance physician education.^{4,17} However, some physician-industry relationships have been associated with problematic changes in prescribing behaviors, hospital formulary additions, and increased perceptions of conflicts of interest among physicians.¹⁸

Prompted by concern about physician-industry relationships, professional and industrial organizations have developed new regulations governing them. The Pharmaceutical Research and Manufacturers of America (PhRMA) implemented a new code of conduct governing physician-industry relationships among its members in 2002.¹⁹ This code states that the interactions between company representatives and physicians should primarily benefit patients and enhance the practice of medicine. The code also discourages companies from giving physicians tickets to entertainment and recreational events, goods (e.g., golf balls and sporting bags) that do not convey a primary benefit to patients, and token consulting and advisory relationships that are used to reim-

burse physicians for their time, travel, or out-of-pocket expenses. The American Medical Association and the American College of Physicians have also adopted new codes that are similar to that of PhRMA.²⁰

Despite the visibility of physician-industry relationships, data on the extent and predictors of such relationships are sparse, and there are no systematic data on physician-industry relationships since PhRMA's new code of conduct was issued. To provide such information, we analyzed responses from the survey of U.S. physicians conducted by the Institute on Medicine as a Profession (IMAP).²¹ Our goal was to answer three questions. First, what do physicians receive from industry? Second, how often do physicians meet with industry representatives? Third, what characteristics are associated with the frequency and nature of physician-industry relationships?

METHODS

SURVEY DESIGN

The IMAP survey of U.S. physicians was designed on the basis of information from a single focus group of eight physicians, four interviews with individual physicians, and a review of the literature; it was pretested with the use of eight cognitive interviews. The survey included 47 questions about professionalism, 3 of which focused on physician-industry relationships; 1 of these 3 questions comprised 10 subitems (see the Supplementary Appendix, available with the full text of this article at www.nejm.org). The survey was approved by the institutional review board at Massachusetts General Hospital.

DEPENDENT MEASURES AND VARIABLES

We asked, "Which of the following have you received in the last year from drug, device, or other medically related companies?" The possible answers were food or beverages in the workplace; free drug samples; honoraria for speaking; payment for consulting services; payment for service on a scientific advisory board or board of directors; payment in excess of costs for enrolling patients in industry-sponsored trials; costs of travel, time, meals, lodging, or other personal expenses for attending meetings; gifts received as a result of prescribing practices; free tickets to cultural or sporting events; and free or subsidized admission

Table 1. Characteristics of 1662 Survey Respondents.*

Characteristic	Respondents		
	No./Total No.	Unweighted Percentage	Weighted Percentage†
Personal			
Sex			
Male	1248/1651	76	73
Female	403/1651	24	27
Race or ethnic group‡			
Non-underrepresented	1495/1636	91	91
Underrepresented	141/1636	9	9
Professional			
No. of years in practice§			
<10 yr	282/1652	17	20
11–19 yr	516/1652	31	31
20–29 yr	473/1652	29	28
≥30 yr	381/1652	23	21
Specialty			
Family practice	298/1662	18	24
Cardiology	229/1662	14	7
Internal medicine	256/1662	15	32
Pediatrics	323/1662	19	17
Surgery	267/1662	16	8
Anesthesiology	289/1662	17	12
Primary practice organization			
Hospital or clinic	167/1662	10	11
University or medical school	199/1662	12	11
Staff-model HMO	68/1662	4	6
Group practice	776/1662	47	44
Solo or two-person practice	385/1662	23	24
Other	67/1662	4	5

to meetings or conferences for which continuing medical education (CME) credits were awarded.

Four post hoc categories of physician–industry relationships were created. The first category was free drug samples. The second category was gifts, which included food or beverages in the workplace, free tickets to cultural or sporting events, and gifts given because of prescribing practices. The third category was reimbursements for expenses, including the costs of travel, time, meals, lodging, or other personal expenses for attending meetings and free or subsidized admission to meetings for which CME credits were awarded. The fourth category was payments for consulting, serving on a scientific advisory board

or board of directors, speaking at a professional meeting, or enrolling patients in industry-sponsored clinical trials.

In addition to obtaining data regarding the categories of physician–industry relationships, the survey measured the frequency of meetings between physicians and industry representatives. The survey asked, “In an average month, how many times do you meet with representatives from drug, device, or other medically related companies?”

SURVEY SAMPLE

From the 2003 Physician Masterfile of the American Medical Association, we identified all U.S.

Table 1. (Continued.)			
Characteristic	Respondents		
	No./Total No.	Unweighted Percentage	Weighted Percentage†
Proportion of patients receiving Medicaid or uninsured and unable to pay			
<25%	828/1485	56	56
≥25%	657/1485	44	44
Preceptor for physicians in training			
No	619/1652	37	38
Yes	1033/1652	63	62
Reviewer for a professional journal			
No	1454/1642	89	90
Yes	188/1642	11	10
Development of clinical practice guidelines			
No	929/1640	57	61
Yes	711/1640	43	39

* The numbers of respondents vary slightly because of missing data. HMO denotes health maintenance organization.

† Percentages were weighted to adjust for the probability of selection within each specialty and for nonresponse.

‡ Race and ethnic group were self-reported by the survey respondents. Non-underrepresented groups include whites, Asians, and others. Underrepresented groups include blacks, Mexican Americans, Native Americans, and mainland Puerto Ricans.

§ In subsequent analyses, the number of years in practice was reclassified as <20 and ≥20 years.

physicians in primary care (internal medicine, family practice, and pediatrics) and those in three non-primary care specialties chosen to represent a medical specialty, a surgical specialty, and an inpatient specialty (cardiology, general surgery, and anesthesiology, respectively). Then, we excluded all doctors of osteopathy, residents, physicians working in federally owned hospitals, those with no listed address, those who requested not to be contacted, and those who were retired. From the resulting list of 271,148 physicians, we randomly selected 584 physicians in each specialty, for a total sample of 3504.

Of the 3504 physicians in the sample, 337 were ineligible to participate in the survey because they were deceased, out of the country, practicing in a specialty that was not included in the survey, on leave, or not providing patient care. This yielded a raw eligibility estimate of 90%. Of the 3167 eligible physicians, 1662 completed a questionnaire, for an overall raw response rate of 52% (the response rate among cardiologists was 42%; anesthesiologists, 55%; physicians in family practice, 54%; surgeons, 52%; internists, 50%; and pediatricians, 63%). The weighted overall response rate

was 58% (cardiologists, 43%; anesthesiologists, 57%; physicians in family practice, 55%; surgeons, 54%; internists, 52%; and pediatricians, 64%).²² To calculate the weighted overall response rate, we divided the number of completed interviews by the number of completed and partial interviews, plus the number of physicians who declined to participate or who could not be contacted, plus the eligibility estimate multiplied by the number of physicians with unknown eligibility. Physicians were classified as having unknown eligibility if no information was obtained about their eligibility either directly from the physician or from a gatekeeper. Also, in this study no physicians were classified as "other." In calculating the specialty-specific weighted response rates, we accounted for the differences in eligibility rates among the specialties.

SURVEY ADMINISTRATION

Between November 2003 and June 2004, physicians received a mailed survey, cover letter, postcard with the subject's name on it, postage-paid return envelope, and check for \$20. The subjects were asked to return the completed survey sepa-

Table 2. Frequency of Physician–Industry Relationships According to Benefit Received.

Benefit	No. of Respondents (%) [*]
Drug samples	1255 (78)
Gifts	1391 (83)
Food or beverages in workplace	1386 (83)
Tickets to cultural or sporting events	122 (7)
Reimbursements	542 (35)
For admission to CME meetings (free or subsidized)	382 (26)
For meeting expenses (e.g., travel, food, lodging)	260 (15)
Payments	456 (28)
For consulting	282 (18)
For serving as a speaker or on a speakers' bureau	278 (16)
For serving on an advisory board	139 (9)
For enrolling patients in clinical trials	55 (3)
Any of the above relationships	1554 (94)

* Percentages were weighted to adjust for the probability of selection within each specialty and for nonresponse.

rately from the postcard. This system permitted the tracking of nonrespondents while preserving the anonymity of respondents, since the questionnaire had no identifying information. Nonrespondents were contacted by mail and telephone and were encouraged to participate.

STATISTICAL ANALYSIS

Logistic-regression models were used to assess the multivariate associations between types of physician–industry relationships and physicians' sex, race or ethnic group, number of years in practice, specialty, and primary practice type, as well as the financial status of their patients (whether 25% or more were receiving Medicaid or were uninsured and unable to pay) and their other professional roles (a preceptor of physicians in training, reviewer for a professional journal, or developer of clinical guidelines). We used the 25% cutoff because it divided the respondents into two groups of approximately equal size. Odds ratios with 95% confidence intervals were calculated, and all P values were two-tailed.

We performed pairwise comparisons of each specialty with every other specialty and then compared each primary practice type with every other type. Bonferroni corrections were used to adjust

for multiple comparisons (a total of 37). A P value of less than 0.0014 (0.05 divided by 37) was considered to indicate statistically significant differences between specialties and between primary practice types.

To examine the association between the physicians' characteristics and the frequency of their meetings with industry representatives, we used the same independent variables in a negative binomial regression model, with adjusted odds ratios for the frequency of meetings. The negative binomial regression was used because the number of meetings with industry representatives most closely approximated a negative binomial distribution rather than a Poisson or normal distribution. Similar results were obtained when logistic regression was used. All of the analyses, except for the analysis of characteristics of the respondents, were weighted to adjust for differences in the rates of sampling and nonresponse according to specialty.

RESULTS

The characteristics of the respondents are shown in Table 1. Table 2 shows the frequency of various types of physician–industry relationships. Overall, 94% of the respondents reported some kind of relationship with industry during the previous year.

MULTIVARIATE ANALYSES

The results of multivariate analyses are shown in Table 3. The frequency of physician–industry relationships differed significantly according to the specialty and the primary practice organization. For example, after adjustment for other factors, pediatricians were less likely than internists to have received reimbursements or payments. Anesthesiologists were less likely to have received samples, reimbursements, or payments than were family practitioners, internists, or cardiologists. Cardiologists were more than twice as likely as family practitioners to receive payments for professional services and were also significantly more likely to receive payments than were pediatricians, anesthesiologists, or surgeons (P<0.002 for all comparisons).

As compared with physicians in hospitals or clinics and those in staff-model health maintenance organizations (HMOs), physicians in group practices were six times as likely to receive sam-

ples, three times as likely to receive gifts, and nearly four times as likely to receive payments for professional services ($P < 0.002$ for all comparisons). Physicians in solo or group practices and those in university or medical-school practices also had much higher odds of receiving payments than did physicians in hospitals or clinics and those in staff-model HMOs. Other factors significantly associated with the receipt of payments were male sex, a patient population in which less than 25% of patients were receiving Medicaid or were uninsured, and a role as a preceptor of physicians in training or a developer of clinical guidelines.

MEETINGS WITH INDUSTRY REPRESENTATIVES

Family practitioners reported the highest average number of meetings with industry representatives (16 meetings per month), followed by internists (10 per month), cardiologists (9 per month), pediatricians (8 per month), surgeons (4 per month), and anesthesiologists (2 per month). Multivariate analyses showed that, as compared with family practitioners, physicians in all other specialties met significantly less frequently with industry representatives. For example, for every 10 meetings that family practitioners had with industry representatives, internists met 7.3 times, cardiologists 5.8 times, pediatricians 4.9 times, surgeons 2.6 times, and anesthesiologists 1.6 times ($P < 0.05$ for all comparisons).

DISCUSSION

Our data show that physician-industry relationships are common in medicine, as are relationships between professionals and industrial organizations in the health sciences and many other sectors of the U.S. economy.^{15,23} Furthermore, our data suggest that physicians' relationships with industry vary according to physicians' personal and professional characteristics and according to their practice setting. For example, pediatricians and anesthesiologists were significantly less likely than family practitioners to receive samples, reimbursements, and payments for professional services. We can only speculate about the reasons for these variations by specialty. Further research should consider factors such as the number and costs of drugs prescribed by physicians in the specialties in question, the accessibility of physicians in each specialty to company representa-

tives, and the influence of physicians on the prescribing practices of their peers.

With regard to peer influence in particular, our findings suggest that industry may focus marketing efforts on physicians who are perceived as influencing the prescribing behaviors of other physicians. Cardiologists, whose prescribing patterns as specialists and opinion leaders are thought to influence the prescribing patterns of nonspecialists, are significantly more likely to receive direct payments from companies than are physicians in other specialties.¹ A Dutch study showed that two thirds of family practitioners' prescriptions for cardiovascular drugs were for regimens initiated by specialists.²⁴ The possibility that companies may target opinion leaders for marketing is further suggested by the higher frequency of industry payments to physicians who have developed clinical practice guidelines and to those who have served as preceptors for doctors in training.

Our survey showed that physicians in solo, two-person, or group practices were significantly more likely to have all types of relationships with industry than were physicians in hospitals or clinics. There are at least three possible explanations for this finding related to the practice setting. First, physicians in solo, two-person, or group practices may have more freedom in their prescribing choices than physicians in hospitals and clinics, which frequently use drug formularies that limit the prescribing autonomy of physicians. Second, hospitals and clinics may be more likely to have policies designed to restrict physician-industry relationships. Third, hospitals and large clinics are more likely to provide medical information through educational programs such as grand rounds and CME events, which may make the physicians at these facilities feel less dependent on industry representatives as the source of medical information. Further research is needed to explore these and other possible explanations for the influence of the practice setting on physician-industry relationships.

We found that in all specialties except anesthesiology, physicians met more frequently with industry representatives than the average of 4.4 meetings per month reported by Wazana in 2000.¹³ The reason for this apparent increase in meeting rates is unknown, but it may reflect an intensification of industry marketing since the 1990s or result from differences in study design.⁴

Our study has several limitations. First, the re-

Table 3. Multivariate Predictors of Physician–Industry Relationships.*

Characteristic	Type of Physician–Industry Relationship			
	Samples	Gifts	Reimbursements	Payments
	<i>odds ratio (95% CI)</i>			
Personal				
Sex				
Male	1.00	1.00	1.00	1.00
Female	0.93 (0.61–1.41)	1.18 (0.75–1.84)	1.01 (0.73–1.42)	0.37 (0.24–0.58)†
Race or ethnic group				
Non-underrepresented	1.00	1.00	1.00	1.00
Underrepresented	1.80 (0.97–3.34)	1.69 (0.83–3.43)	1.77 (1.14–2.74)†	1.46 (0.89–2.40)
Professional				
No. of years in practice				
<20 yr	1.00	1.00	1.00	1.00
≥20 yr	0.92 (0.67–1.27)	0.58 (0.40–0.84)†	1.18 (0.89–1.56)	1.18 (0.86–1.61)
Specialty				
Family practice	1.00‡	1.00	1.00‡	1.00‡§¶
Internal medicine	0.72 (0.42–1.25)‡	0.54 (0.32–0.90)†	1.26 (0.87–1.83)‡	1.35 (0.89–2.04)‡¶
Pediatrics	0.56 (0.33–0.94)†‡	0.67 (0.40–1.12)	0.59 (0.41–0.86)†**	0.51 (0.33–0.78)†§**
Anesthesiology	0.05 (0.03–0.09)†§¶ ***†	0.89 (0.49–1.64)	0.31 (0.20–0.48)†§¶***††	0.21 (0.12–0.36)†§***††
Cardiology	1.64 (0.79–3.41)‡¶	1.14 (0.61–2.13)	1.04 (0.69–1.55)‡	2.20 (1.43–3.38)†‡¶ ††
Surgery	0.43 (0.24–0.77)†‡§	0.82 (0.47–1.43)	0.75 (0.51–1.11)‡	0.43 (0.27–0.67)†§***††
Primary practice organization				
Hospital or clinic	1.00‡	1.00	1.00	1.00‡
Staff-model HMO	0.66 (0.29–1.48)‡	0.61 (0.25–1.44)	1.11 (0.49–2.51)	0.71 (0.23–2.19)‡
Group	6.34 (3.65–11.00)†¶***††	3.26 (1.82–5.83)†‡***††	1.60 (0.99–2.60)	3.97 (2.06–7.65)†***††
Solo or two-person practice	7.77 (4.32–13.97)†¶***††	1.18 (0.66–2.12)	1.55 (0.92–2.62)	3.33 (1.68–6.63)†***††
Other	1.74 (0.68–4.48)	1.03 (0.41–2.61)	1.37 (0.60–3.12)	0.31 (0.07–1.35)
University or medical school	1.74 (0.89–3.37)‡	1.38 (0.66–2.92)	1.11 (0.58–2.14)	3.31 (1.56–7.05)†

spondents may have underreported their associations with industry, a phenomenon known in the survey literature as social desirability bias.²⁵ Second, our results may not apply to specialties other than those we studied. Third, the results may be influenced by unmeasured factors, such as working hours or patient characteristics. Fourth, our overall response rate (52% when unweighted and 58% when weighted) reflects the increasing difficulty of obtaining physicians' responses to surveys, even when using the most professional techniques. This limitation may be especially salient with regard to cardiology, which had the lowest response rate (43%) among the specialties we surveyed. Finally, this study did not assess the

risks, benefits, or overall appropriateness of various types of physician–industry relationships. Such judgments are the logical next step in discussions regarding physician–industry relationships, but they cannot be made solely on the basis of the data from this study, although they have been described extensively elsewhere.¹

Despite these limitations, the high prevalence of physician–industry relationships underscores the need to consider their implications carefully. The variations in the nature and frequency of physician–industry relationships among specialties and practice settings suggest that specialties, organizations, and practice leaders with an interest in reporting and managing physician–indus-

Table 3. (Continued).

Characteristic	Type of Physician-Industry Relationship			
	Samples	Gifts	Reimbursements	Payments
	<i>odds ratio (95% CI)</i>			
Professional				
Proportion of patients receiving Medicaid or uninsured and unable to pay				
<25%	1.00	1.00	1.00	1.00
≥25%	1.16 (0.81–1.66)	0.75 (0.52–1.09)	0.85 (0.65–1.11)	0.72 (0.52–0.98)†
Preceptor for physicians in training				
No	1.00	1.00	1.00	1.00
Yes	0.96 (0.66–1.39)	1.61 (1.10–2.37)†	0.82 (0.61–1.10)	1.67 (1.19–2.34)†
Reviewer for a professional journal				
No	1.00	1.00	1.00	1.00
Yes	0.53 (0.31–0.91)†	0.46 (0.25–0.84)†	1.18 (0.72–1.93)	1.41 (0.85–2.34)
Developer of clinical practice guidelines				
No	1.00	1.00	1.00	1.00
Yes	0.74 (0.53–1.03)	0.92 (0.64–1.33)	1.08 (0.83–1.42)	1.41 (1.04–1.91)†

* Adjustment was made for all independent variables. CI denotes confidence interval; HMO health maintenance organization. Race and ethnic group were self-reported by the survey respondents. Non-underrepresented groups include whites, Asians, and others. Underrepresented groups include blacks, Mexican Americans, Native Americans, and mainland Puerto Ricans.

† P<0.05 for the comparison with reference group (not adjusted for multiple comparisons).

‡ P<0.0014 for the comparison with anesthesiology for specialty and solo or two-person practice for primary practice organization.

§ P<0.0014 for the comparison with cardiology for specialty and other for primary practice organization.

¶ P<0.0014 for the comparison with surgery for specialty and university or medical school for primary practice organization.

|| P<0.0014 for the comparison with pediatrics for specialty and group for primary practice organization.

** P<0.0014 for the comparison with internal medicine for specialty and staff-model HMO for primary practice organization.

†† P<0.0014 for the comparison with family practice for specialty and hospital or clinic for primary practice organization.

try relationships may need to develop guidelines and recommendations that are specific to the context of each specialty and setting.

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