

Pharmaceutical Industry Support and Residency Education

A Survey of Internal Medicine Program Directors

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Background: Interactions with the pharmaceutical industry are known to affect the attitudes and behaviors of medical residents; however, to our knowledge, a nationally representative description of current practices has not been reported.

Methods: The Association of Program Directors in Internal Medicine surveyed 381 US internal medicine residency program directors in 2006-2007 regarding pharmaceutical industry support to their training programs. The primary outcome measure was program director report of pharmaceutical financial support to their residency. Demographic and performance variables were analyzed with regard to these responses.

Results: In all, 236 program directors (61.9%) responded to the survey. Of these, 132 (55.9%) reported accepting support from the pharmaceutical industry. One hundred seventy of the 236 program directors (72.0%) expressed the opinion that pharmaceutical support is not desirable. Residency programs were less likely to

receive pharmaceutical support when the program director held the opinion that industry support was not acceptable (odds ratio [OR], 0.07; 95% confidence interval [CI], 0.02-0.22). Programs located in the southern United States were more likely to accept pharmaceutical support (OR, 8.45; 95% CI, 1.95-36.57). The American Board of Internal Medicine pass rate was inversely associated with acceptance of industry support: each 1% decrease in the pass rate was associated with a 21% increase in the odds of accepting industry support (OR, 1.21; 95% CI, 1.07-1.36).

Conclusions: Although most of the program directors did not find pharmaceutical support desirable, more than half reported acceptance of industry support. Acceptance of pharmaceutical industry support was less prevalent among residency programs with a program director who considered support unacceptable and those with higher American Board of Internal Medicine pass rates.

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OVER THE PAST 2 DECADES, the impact of pharmaceutical industry marketing on the professionalism and prescribing practices of physicians has gained national media attention. In response to this concern, several professional organizations, including the American Medical Association,¹ the Association of American Medical Colleges,² and the American College of Physicians³ have issued guidelines for appropriate relationships between physicians and the pharmaceutical industry.⁴ Because residency training represents a particularly formative time for physicians, the Accreditation Council for Graduate Medical Education (ACGME) issued its own guidelines in 2002.⁵

Previous studies have shown that contact with pharmaceutical company representatives is common and may influence resident attitudes and behaviors.⁶⁻¹⁰ Com-

pany sales visits and industry-sponsored conferences may lead to changes in resident prescribing practices, which are not always consistent with evidence-based recommendations.^{9,11-13} Residents often do not believe that their own actions are influenced by industry contact^{8,14-16} or gifts,^{8,15,17} but they believe that their colleagues' prescribing practices could be altered.¹⁵ Residency programs have sought to address this potential conflict of interest through the development of curricula and guidelines that outline appropriate residency-industry interactions.¹⁸

In 2006, Brennan et al,¹⁹ on behalf of the American Board of Internal Medicine (ABIM) and Institute on Medicine as a Profession, proposed that academic medical centers more strongly regulate their interactions with industry to eliminate existing conflicts of interest. In the intervening years, individual medical institutions have enacted stronger policies,²⁰ and a task force

report that called for the prohibition of all industry gifts to physicians was endorsed by the Association of American Medical Colleges.² The recent report by the American Medical Association's Council on Ethical and Judicial Affairs, which recommended against acceptance of any industry funding to support medical education,¹ was met with greater discussion and particular concern regarding the loss of funding. Most recently, the Institute of Medicine concluded that "... industry financial relationships do not benefit the educational missions of medical institutions in ways that offset the risks created."^{21(p123)} Despite such attention, a nationally representative description of the current landscape of pharmaceutical industry support to residency programs is not known. The attitudes and practices of program leadership could provide insight into the current momentum for change, the degree to which programs have already adopted new recommendations, and possible barriers to further implementation of policies.

The objectives of this study were to assess (1) the current attitudes of program directors regarding pharmaceutical industry support of internal medicine residency program activities, (2) the practices of internal medicine residency programs with regard to acceptance of industry support, and (3) potential associations between program characteristics and the acceptance of industry support.

METHODS

SURVEY

The Survey Committee of the Association of Program Directors in Internal Medicine is charged with developing questionnaires to track characteristics of internal medicine residency programs in the United States, as well as to address current issues facing residency programs and residency program directors. In November 2006, an e-mail notification with a program-specific hyperlink to a Web-based questionnaire was sent to each of the 381 member programs of the Association of Program Directors in Internal Medicine, representing 98.2% of the 388 US categorical internal medicine residency programs.²² Subsequent e-mail requests were sent in December 2006 and January 2007.

Residency program directors were asked whether their programs accept support of any kind from the pharmaceutical industry. Those who responded yes were asked to identify specific forms of support, including food for conferences, educational materials, office supplies, drug samples, and unrestricted educational funds, as well as types of industry involvement, such as direct contact with residents (off-site and on-site). Program directors were also asked why the residency program accepts pharmaceutical support. Data were collected on several variables hypothesized to have an association with acceptance of pharmaceutical support. Information regarding the residency programs included sponsor type, ownership of the primary teaching hospital, program size, number of hospital beds, employment of hospitalists, number of associate program directors, accreditation cycle length, presence of formal guidelines for industry interactions, existence of resident curriculum on appropriate interactions, percentage of faculty defined by primary academic appointment, and percentage of approved positions filled by international medical graduates. Program director characteristics included the number of years in their position, their academic rank, their salary, their sub-

specialty, whether they had the final decision regarding accepting support, and their opinion on accepting industry support. Before the program identities were blinded for analysis, the programs were assigned to a region based on US Census Bureau assignments,²³ and the ABIM 3-year rolling (ie, average) pass rate was obtained for each program from the ABIM Web site.²⁴ This study was approved by the Mayo Foundation Institutional Review Board.

DATA ANALYSIS

The survey included 4 categories of program director opinion, which were further grouped for analysis. The "never acceptable" group reflects those who answered that pharmaceutical industry support was "... not desirable and should not be accepted in any case," and the "acceptable" group included those who answered "... desirable and should be encouraged" or "... not desirable, but acceptable when other sources not available" or "other." Those who answered "other" were included in this second group because review of the additional comments indicated that all believed support was acceptable to varying degrees, with differing levels of oversight and restrictions. This dichotomous representation for opinion was used in the logistic regression models described in the next paragraph.

Both univariate (unadjusted) and multivariate (adjusted) logistic regression models were used to describe the relationship between the probability of accepting pharmaceutical industry support and the available covariates. Covariates with variance inflation factors greater than 2.5 were excluded from the adjusted model because of concerns regarding multicollinearity in logistic regression models.²⁵ The continuous variables included in the adjusted model were inspected for linearity in the logit using design variables.²⁶ Variables deemed to violate the linearity assumption were categorized before inclusion in the final adjusted model. All 2-way interactions between covariates were then assessed for significance.

Finally, 2 sets of odds ratio (OR) estimates, along with corresponding confidence intervals (CIs) and *P* values, were calculated using the unadjusted (univariate) models for each covariate separately as well as the final adjusted (multivariate) model, which included all covariates simultaneously. To account for multiple comparisons, a conservative α level of .01 was used to determine statistical significance throughout. All calculations were performed by one of us (A.J.H.) using SAS statistical software (version 9.1; SAS Institute Inc, Cary, North Carolina).

RESULTS

Surveys were returned by 236 programs (61.9%).²⁷ Among respondents, their geographic distribution, number of residents per program, and ABIM pass rates were similar to those seen nationally.^{23,24,28,29} One hundred thirty-two programs (55.9%) reported accepting some kind of support from the pharmaceutical industry. A summary of all the covariates considered and their association with accepting industry support is presented in **Table 1** and **Table 2**.

The forms of industry support and types of interactions allowed by programs accepting support are listed in **Table 3**. The most common forms of industry support included food for conferences (90.9%), educational materials (83.3%), office supplies (68.9%), and drug

Table 1. Qualitative Program Characteristics and Odds of Accepting Industry Support Among 236 Internal Medicine Residency Programs

Characteristic	No. (%) ^a	Accepting Support, %	Unadjusted		Adjusted ^b	
			OR	P Value	OR	P Value
ACGME cycle length						
≥4 y	123 (52.1)	50.4	0.66	.14	0.91	.86
<4 y ^c	98 (41.5)	61.2				
No answer	15 (6.4)	6.7				
Employment of hospitalists						
Yes	182 (77.1)	53.3	0.46	.03	0.65	.51
No ^c	49 (20.8)	69.4				
No answer	5 (2.1)	20.0				
Extra associate program directors ^d						
Yes	119 (50.4)	54.6	0.84	.53	1.98	.24
No ^c	96 (40.7)	58.3				
No answer	21 (8.9)	52.4				
Final decision on accepting support						
Program director	112 (47.5)	54.5	0.81	.46	0.53	.22
Other ^c	112 (47.5)	58.9				
No answer	12 (5.1)	41.7				
Formal guidelines for interactions						
Yes	153 (64.8)	56.9	0.96	.88	0.79	.71
No ^c	67 (28.4)	58.2				
No answer	16 (6.8)	37.5				
Geographic region						
West	30 (12.7)	63.3	2.29	.08	2.88	.26
South	59 (25.0)	72.9	3.88	<.001	8.45	.005
Midwest	54 (22.9)	44.4	0.96	.92	0.97	.96
Northeast ^c	76 (32.2)	47.4				
Unknown	17 (7.2)	58.8				
International medical graduates, %						
>35	48 (20.3)	56.3	1.22	.66	0.20	.10
>25 to ≤35	42 (17.8)	59.5	1.41	.45	0.69	.69
>10 to ≤25	41 (17.4)	61.0	1.61	.31	0.28	.15
>0 to ≤10	45 (19.1)	53.3	1.14	.77	0.46	.34
0 ^c	40 (16.9)	50.0				
No answer	20 (8.5)	55.0				
Ownership of primary teaching hospital						
University	33 (14.0)	51.5	0.84	.66	0.72	.68
State/municipal	29 (12.3)	58.6	1.14	.75	1.05	.95
Other	27 (11.4)	63.0	1.40	.45	0.68	.65
Private, nonprofit ^c	140 (59.3)	55.0				
No answer	7 (3.0)	57.1				
Primary sponsoring institution						
Medical school	63 (26.7)	60.3	1.19	.58	1.83	.36
Other	36 (15.3)	50.0	0.77	.48	2.08	.33
Hospital ^c	130 (55.1)	55.4				
No answer	7 (3.0)	57.1				
Program director opinion ^e						
Never acceptable	66 (28.0)	22.7	0.11	<.001	0.07	<.001
Acceptable ^c	158 (66.9)	69.6				
No answer	12 (5.1)	58.3				
Program director salary, \$						
≤175 000	92 (39.0)	62.0	1.48	.17	0.57	.31
>175 000 ^c	125 (53.0)	52.8				
No answer	19 (8.1)	47.4				
Program director subspecialty						
Traditional GIM	118 (50.0)	58.5	1.03	.92	1.20	.71
Other ^c	118 (50.0)	53.4				
Resident curriculum						
Yes	69 (29.2)	53.6	0.84	.55	0.50	.21
No ^c	153 (64.8)	58.8				
No answer	14 (5.9)	35.7				

Abbreviations: ACGME, Accreditation Council for Graduate Medical Education; GIM, general internal medicine; OR, odds ratio.

^aBecause of rounding, percentages may not total 100.

^bMultivariate logistic regression accounting for all variables in Tables 1 and 2.

^cOdds ratio reference group.

^dHaving more associate program directors than the ACGME requires for programs of their size.³⁰

^eThe 4 choices given on the survey were further grouped for analysis, with “never acceptable” reflecting those who answered “. . .not desirable and should not be accepted in any case,” and “acceptable” reflecting those who answered “. . .desirable and should be encouraged” or “. . .not desirable but acceptable when other sources not available” or “other.” Those who answered “other” added comments reflecting that support was acceptable to varying degrees, with differing levels of oversight and restrictions.

Table 2. Quantitative Program Characteristics and Odds of Accepting Industry Support Among 236 Internal Medicine Residency Programs

Characteristic	Median (Mean) [Range]	Unadjusted		Adjusted ^a	
		OR ^a	P Value	OR ^b	P Value
ABIM 2004-2006 rolling pass rate, %	94 (92.8) [68-100]	1.12	<.001	1.21	.002
ACGME-approved positions, No.	39 (50.7) [7-213]	1.01	.13	1.00	.87
Beds in teaching hospital, No.	489 (501.8) [57-1500]	1.00	.25	1.00	.65
Program director tenure, y	6 (7.2) [0-30]	0.97	.28	0.96	.32
Faculty with a primary academic appointment, %	80 (64.3) [0-100]	1.01	.16	1.00	.89

Abbreviations: ABIM, American Board of Internal Medicine; ACGME, Accreditation Council for Graduate Medical Education; OR, odds ratio.

^aMultivariate logistic regression accounting for all variables in Tables 1 and 2.

^bOdds ratio for a 1-unit decrease in the continuous variable.

Table 3. Forms of Industry Support and Interactions Among 132 Programs Accepting Support^a

	No. (%) Accepting
Support	
Food for conferences	120 (90.9)
Educational materials	110 (83.3)
Office supplies	91 (68.9)
Drug samples for clinics	76 (57.6)
Unrestricted education funds	72 (54.5)
Funds for food	37 (28.0)
Other funds	14 (10.6)
Interactions	
Direct contact, off-site	98 (74.2)
Direct contact, on-site	53 (40.2)
Access to contact information	2 (1.5)

^aOnly program directors who indicated that their program accepted support from the pharmaceutical industry were asked these follow-up questions. More than 1 form of support could be chosen by each respondent.

samples (57.6%). Among programs that accept industry support, many reported allowing direct off-site contact with residents (74.2%) and more than one-third reported direct on-site contact (40.2%).

Of the 132 programs that accepted industry support, 92 (69.7%) cited a lack of other funding sources as a reason for acceptance. Other reasons included popularity with residents (40.9%), important educational value other than financial support (28.0%), ease of attainment (26.5%), and being encouraged by the department chair or administration to accept the support (19.7%). Seventy-nine programs (59.8%) indicated more than 1 reason for accepting industry support.

One hundred seventy program directors (72.0%) reported an opinion that industry support was not desirable. The **Figure** displays the prevalence of industry support across the various program director opinions regarding it. The proportion accepting industry support was much lower among programs with a program director who believed it was unacceptable (22.7%) than among programs with a director who believed this support was desirable (72.7%) or not desirable but acceptable (71.2%). The significance of the relationship between program director opinion and acceptance is supported by a Pearson χ^2 test of independence ($P < .001$).

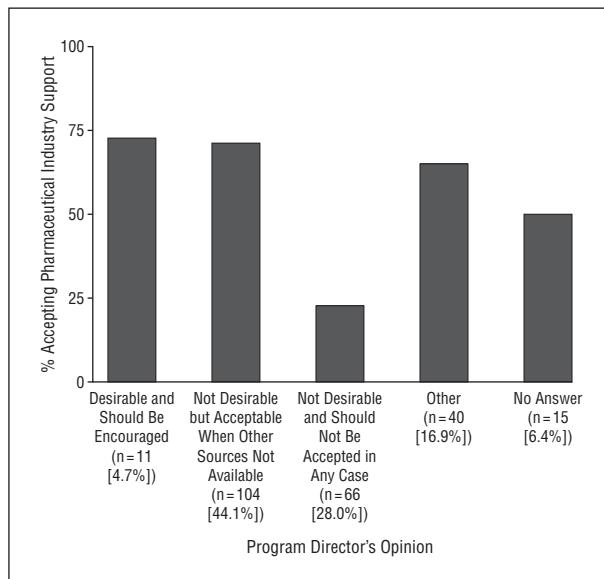


Figure. Internal medicine residency program acceptance of pharmaceutical industry support according to the opinions of 236 program directors. Because of rounding, program director opinion group percentages may not total 100.

The final decision to accept support was left to the program director's discretion 50% of the time. Other final decision makers included the chair of medicine, the hospital administrator, or an institutional oversight committee. To address potential influence from the pharmaceutical industry, 153 programs (64.8%) had established formal written guidelines, whereas only 69 (29.2%) had implemented a specific curriculum to educate residents on these interactions.

Separate univariate logistic regression models for acceptance of industry support and each program variable indicated 3 covariates associated with acceptance: ABIM rolling pass rate, program director opinion, and geographic region. When we included all variables under consideration (as listed in Tables 1 and 2) in a multivariate logistic regression model, the adjusted ORs for these 3 covariates remained significant (all $P \leq .005$). Program director academic rank was excluded from the final adjusted model because of a high variance inflation factor. The percentage of approved positions filled by international medical graduates appeared to be nonlinear in the logit; thus,

it was categorized into 5 groups by quintiles before inclusion in the final adjusted model. None of the 2-way interactions were found to be statistically significant. For each 1% decrease in the ABIM pass rate, the odds of accepting support increased by 21% (OR, 1.21; 95% CI, 1.07-1.36). As anticipated, residency programs were far less likely to receive pharmaceutical support when the program director held the opinion that industry support was “never acceptable” (OR, 0.07; 95% CI, 0.02-0.22). Programs located in the southern United States were more likely to accept pharmaceutical support (OR, 8.45; 95% CI, 1.95-36.57) compared with those in the northeastern United States.

COMMENT

Most internal medicine residency program directors do not find acceptance of support from the pharmaceutical industry desirable. At the same time, more than half of the program directors oversaw residency programs that accepted pharmaceutical industry funding. Acceptance of support from the pharmaceutical industry remains common among internal medicine residency programs but has decreased substantially. At a time when concern about pharmaceutical involvement in training programs was just gaining momentum, 88.6% of internal medicine program directors surveyed in 1990 reported industry support of some kind³¹ compared with 55.9% of the current programs. Even in the extremely unlikely case that all nonresponding programs in our study accepted industry support, the percentage of the 381 programs accepting it would be just 72.7%, still a 16.3% decrease since the 1990 study by Lichstein et al,³¹ indicating that our finding of decreased acceptance of pharmaceutical support is real. This change in practice may have resulted from the additional guidelines and publicity that have surrounded this topic in the intervening years.^{3,19,20,32}

In earlier studies, the majority of residency program leadership indicated that the benefits of pharmaceutical company representatives outweighed any negative results.^{31,33} Our survey found that only 15.7% of all responding program directors reported acceptance of industry support because of its nonfinancial educational value. This low number may be due to the increasing evidence of pharmaceutical industry influence on physician practices and a concomitantly growing skepticism among program directors regarding the objectivity of information from pharmaceutical representatives.^{9,11-13} The ACGME has recognized that industry interactions can conflict with the educational goals set forward by the 6 general competencies,⁵ and the Association of American Medical Colleges recently proposed that academic medical centers prohibit acceptance of all gifts and restrict access by pharmaceutical representatives.² The discrepancy between the number of program directors who accept industry support (55.9%) and the number who believe it is of educational value (15.7%) identifies a gap that is worthy of further study.

Pharmaceutical industry support is accepted by some residency programs with a program director who did not consider this practice desirable. Several reasons may account for this disconnect. Programs may find industry support a readily available funding source for specific activities. For example, the most commonly cited use of industry funding was for provision of food at conferences or educational activities, a strategy that has been shown to boost conference attendance.³⁴ In addition, residency program practices may not always reflect the opinion of the program director because directors had the final say regarding acceptance of industry support at only 50% of the institutions. Nonetheless, the opinion of the program director regarding the appropriateness of industry support was the strongest indicator of actual acceptance, suggesting that program leadership may have the best opportunity to further define appropriate industry-residency interactions.

Despite the attention around conflict of interest with pharmaceutical support, we were surprised to find that only 29.2% of the responding program directors reported a specific curriculum to instruct residents about interactions with the pharmaceutical industry. We found no statistically significant association between residency acceptance of pharmaceutical support and the presence of a formal curriculum to educate residents about appropriate interactions. In 2002, the ACGME recommended curricula to educate residents regarding the policies of their specific institutions and published guidelines. Nonetheless, trainees are often unaware of the position of their own institution.^{14,35} We found that the number of institutions with a formal policy regarding appropriate interactions has nearly doubled from 35.3% in 1990³¹ to 64.8% in the current survey. We did not find a significant association between the presence of a policy statement and program refusal of industry support, suggesting that these policies stop short of restricting all interaction but rather set boundaries for what the individual institutions believe are appropriate. Future study of the different guidelines of individual programs may elucidate how policies influence practices.

Our finding of an inverse relationship between a program's ABIM pass rate and acceptance of pharmaceutical funding supports an earlier observation. Wolfsthal et al³⁶ identified this same association when looking at benchmarks of residency program financial support and their correlation with quality measures. The ABIM pass rate is one indicator of program quality. The need or desire for pharmaceutical support could be a marker for lower institutional support for the educational mission. The association of ABIM pass rate and pharmaceutical support is worthy of further study because ABIM pass rates have been associated with other ACGME competencies. For instance, higher performance on the ABIM certification examination has been associated with markers of professionalism.³⁷ Because potential conflicts of interest that arise with pharmaceutical support may reflect on components of professionalism, further study into the relationships between professionalism, ABIM pass rates,

and training environments where pharmaceutical support is accepted warrant further investigation.

We recognize specific limitations to our study as well as opportunities for future work. Responses were obtained through a volunteer survey, and it is possible that the residency programs of respondents differ from those who did not complete the survey. However, among respondents, their geographic distribution, the number of residents per program, and the program's ABIM pass rates were similar to those seen nationally.^{23,24,29} Although we identified the prevalence of accepting pharmaceutical support among internal medicine residency programs, the degree to which programs rely on pharmaceutical funding for residency activities requires clarification. The evolving attitudes, policies, and practices of internal medicine residency programs should be tracked in the face of new and more restrictive recommendations from various medical societies. Although we observed an association between higher ABIM pass rates and not accepting industry support, our study was not designed to demonstrate a causal relationship and warrants further investigation as already noted. Finally, the significant association between geographic region and acceptance of pharmaceutical support is not well understood and provides an opportunity for further exploration.

In addition to the important influence of program directors, residency program practices are likely affected by institutional history, available financial support, and the culture within individual academic environments. The influence of pharmaceutical industry support on medical education warrants further investigation. Although all of the underlying reasons are not yet fully elucidated, it is clear that, in the face of attention around conflict of interest with pharmaceutical support, internal medicine residency program directors have taken a less permissive stance and acceptance of industry funding has declined. Nevertheless, more than half of the residency programs surveyed continue to accept some form of industry support.

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