

Medical Schools' Industry Interaction Policies Not Associated With Trainees' Self-Reported Behavior as Residents: Results of a National Survey

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ABSTRACT

Background Medical students attending schools with policies limiting industry/student interactions report fewer relationships with pharmaceutical representatives.

Objective To investigate whether associations between students' medical school policies and their more limited industry interaction behaviors persist into residency.

Methods We randomly sampled 1800 third-year residents who graduated from 120 allopathic US-based medical schools, using the American Medical Association Physician Masterfile. We surveyed them in 2011 to determine self-reported behavior and preferences for brand-name prescriptions, and we calculated the strength of their medical schools' industry interaction policies using the 2008 American Medical Student Association and Institute on Medicine as a Profession databases. We used logistic regression to estimate the association between strength of school policies and residents' behaviors with adjustments for class size, postresidency career plan, and concern about medical school debt.

Results We achieved a 44% survey response rate ($n = 739$). Residents who graduated from schools with restrictive policies were no more or less likely to accept industry gifts or industry-sponsored meals, speak with marketing representative about drug products, attend industry-sponsored lectures, or prefer brand-name medications than residents who graduated from schools with less restrictive policies. Residents who correctly answered evidence-based prescription questions were about 30% less likely to have attended industry-sponsored lectures ($OR = 0.72$, 95% CI 0.56–0.98).

Conclusions Any effect that medical school industry interaction policies had on insulating students from pharmaceutical marketing did not persist in the behavior of residents in our sample. This suggests that residency training environments are important in influencing behavior.

Introduction

Many physicians and trainees report receiving free meals, gifts, or other inducements from the pharmaceutical industry.^{1,2} To varying degrees, these interactions may create a sense of obligation to use promoted products, reducing evidence-based prescribing, with physicians not always aware of the influence of biased information.^{3–11} Previous studies^{12–16} have suggested varying effects on prescribing behavior and attitudes toward the pharmaceutical industry among medical students and residents. Many medical schools have implemented policies for faculty to disclose industry relationships and have banned certain types of interactions (eg, speakers' bureaus). Organizations, such as the Institute on Medicine as a

Profession (IMAP) and the American Medical Student Association (AMSA), have conducted systematic evaluations of the strength of academic institutions' industry interaction policies in an effort to improve the regulation of industry interactions, with a particular focus on the effect on medical trainees.

Previous studies^{1,17} have demonstrated that students at medical schools with more restrictive policies were less likely to accept gifts and interact with the pharmaceutical sales representatives than those at schools with less restrictive policies. Since medical schools are the starting points of physicians' professional development, we used national survey data to identify whether behaviors and attitudes related to industry interactions persist into the residency period. We investigated the relationship between residents' reported industry interactions, as well as their prescribing choices in common clinical scenarios, and the strength of institutional industry interaction policies at the medical schools they attended.

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Editor's Note: The online version of this article contains the survey questions and clinical scenarios used in the study.

Methods

Study Administration and Study Population

We identified 1800 third-year residents randomly selected from 120 allopathic US-based medical schools (15 graduates from each school) eligible for mailed surveys: 101 were excluded due to an incorrect mailing address. A \$5 honorarium was included in the mailed survey. The survey was conducted between February and May 2011 and approved by the Institutional Review Boards at Brigham and Women's Hospital and Harvard Law School. Survey design and administration were previously discussed in detail.¹

Survey Content

In this analysis, we focused on questions that evaluated residents' interactions with the pharmaceutical industry, with topics such as speaking with marketing representatives about pharmaceutical products, accepting gifts and meals, and attending industry-sponsored educational events during the past 6 months. To assess residents' adherence to evidence-based prescribing principles, and preference for prescribing brand-name over generic drugs, we presented 4 commonly encountered medical scenarios relating to the management of diabetes, hyperlipidemia, hypertension, and insomnia that are frequently encountered in a primary care setting.^{18–20} Respondents answered multiple-choice questions, and we considered evidence-based answers to be those that are consistent with US evidence-based guidelines.^{21–25} If any of the answers contained medication only available as a brand-name product, we considered these answers to indicate a preference toward prescribing brand-name medications. The survey questions and clinical scenarios are provided as online supplemental material.

Evaluation of Strength of Institutional Industry Interaction Policies

We used 2008 scores from annually updated surveys conducted by IMAP and AMSA to determine the strength of medical schools' industry interaction policies. The year 2008 (3 years prior to the administration of the survey) corresponds to the time when the third-year residents who participated in our survey were fourth-year medical students. IMAP and AMSA evaluated each school on a number of policy domains (TABLE 1).²⁶ In IMAP's scoring algorithm, each domain was measured on a 0 (least restrictive) to 3 (most restrictive) scale, while AMSA used a 1 (least restrictive) to 3 (most restrictive) scale. We calculated

What was known and gap

Meals, gifts, and other inducements from pharmaceutical industry representatives may affect physician prescribing decisions.

What is new

Restrictive policies at the medical school level did not affect residents' likelihood of pharmaceutical industry interaction or prescribing practices.

Limitations

A response rate of 44% and potential respondent bias; responses to scenarios may not reflect real-life decision making.

Bottom line

Strong, consistent industry interaction policies are needed across the medical education continuum to influence learner understanding of industry practices and their possible biasing effects.

an overall IMAP score by averaging the domains scores measured by IMAP. AMSA assigns a letter grade (A to F) to each school based on the policy domain scores. We converted the letter grade to a numerical value (4 to 0). For IMAP and AMSA scores, a high score indicates a restrictive industry interaction policy and a low score reflects a less restrictive policy. We were able to determine the strength of the industry interaction policies for 82 schools, accounting for 426 of the residents in the survey, and used these data points in our analysis.

Statistical Analysis

We used logistic regression models to estimate the association between the strength of the residents' medical schools' industry interaction policies measured by the overall 2008 IMAP or AMSA score (predictor) and residents' behavior (outcome). We adjusted for medical school class size (in quartiles), residents' plans to enter primary care, their plans to conduct translational research, and residents' concern about their medical school loan debt (the latter 3 variables were obtained from the demographic section of the survey). Model standard errors were adjusted to account for the clustering of residents within medical schools. Identical models were used to estimate the association between the scores and residents' likelihood of giving evidence-based versus marketed drug answers to the prescribing questions. In these models, the outcome was a binary indicator of responding with an evidence-based answer to all 4 knowledge questions, or an indicator of giving at least 1 marketed drug answer to any question. Addition-

TABLE 1

Policy Domains Measured by AMSA and IMAP in Regulating Industry Interactions

Type of Interaction	Definition
Individual Industry Interactions	
Gifts	Acceptance of gifts of any value
Meals ^a	Acceptance of meals paid for by the industry
Consulting	Consulting relationships, excluding scientific research and speaking
Honoraria ^a	Financial compensations given for services provided that traditionally do not require compensation
Speaking bureaus	Financial compensation for speaking on behalf of companies at conferences and educational events
Disclosure ^b	Disclosure of financial relationships with the industry
Institutional Industry Interactions	
Marketing representative access	Interaction with a marketing representative
Samples	Receipt of drug samples or vouchers for patient use
Purchasing/formulary committee	Limitations on individuals with industry financial ties serving on purchasing or formulary committees
Educational Activities	
Travel compensation	Acceptance of industry financial support to attend meetings and educational events
CME ^a	Industry sponsorship of CME events
Onsite educational events ^b	Industry-sponsored events held onsite
Medical school curriculum ^b	Medical student training on conflict of interest policies
Scholarships	Industry earmarking or sponsoring training of a specific individual
Ghostwriting ^a	Published work that was written in part or in full by pharmaceutical industry or paid writers

Abbreviations: AMSA, American Medical Student Association; IMAP, Institute on Medicine as a Profession; CME, continuing medical education.

^a Not measured by AMSA.^b Not measured by IMAP.

TABLE 2

Demographics of Residents Who Completed the Survey

Characteristics	n (%)
Survey completion ^a	739 (44)
Age, y	32 ± 3.2
Male ^b	363 (53)
Training in a residency program considered primary care eligible ^c	324 (46)
Actual plan for a primary care career ^d	90 (28)
Career plan to conduct translational or bench research ^e	148 (21)
Very concerned over the level of medical school loans ^f	298 (41)

^a Out of the 1699 sampled residents with valid addresses.^b Out of 705 with complete demographic information.^c Internal medicine, family medicine, pediatrics.^d Of those in a primary care eligible residency training program, how many actually planned to enter primary care.^e Out of 702 respondents with completed answers.^f Out of 717 respondents with completed answers.

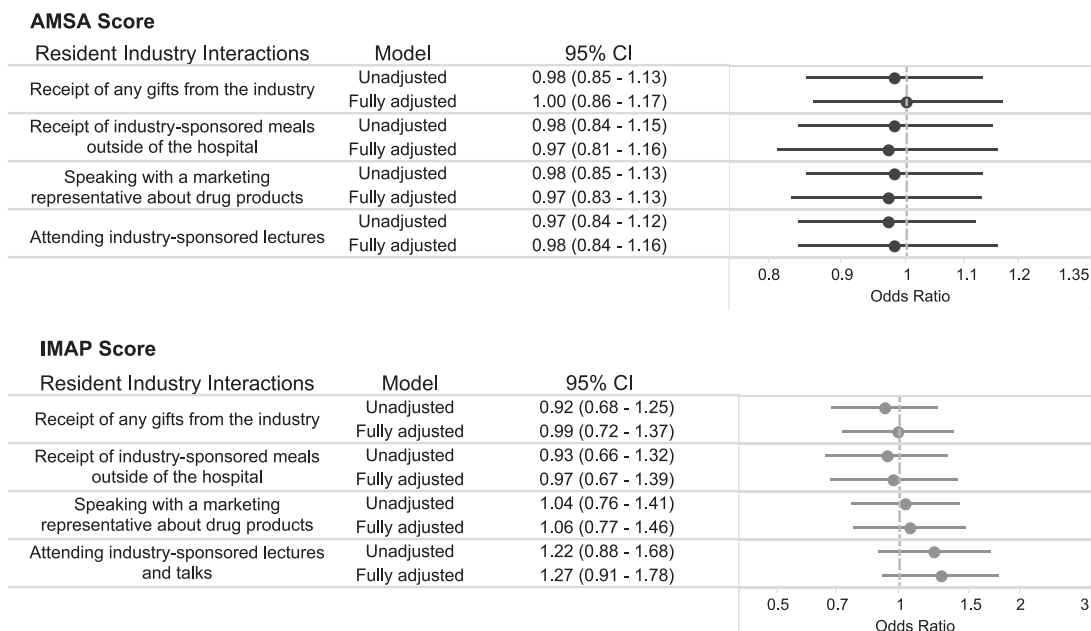
ally, we calculated the crude associations among reported behaviors and answers to brand-name medication preference and evidence-based prescription questions, measured as relative risks with 95% CIs. All analyses were performed using R version 3.0.0 (The R Foundation).

Results

The demographics of residents who completed the survey are shown in TABLE 2.

Resident-Industry Interactions

Residents who reported interacting with a marketing representative were more likely to accept an industry-sponsored meal (OR = 8.03; 95% CI 5.30–12.18; $P < .001$) or receive an industry-sponsored meal when attending an industry-sponsored lecture (OR = 11.46; 95% CI 7.74–16.98; $P < .001$). Residents who attend these lectures were about 10 times as

**FIGURE 1****Association Between Residents' Behaviors and Their Medical Schools' Industry Interaction Policies**

For every unit of increase in the strength of the medical school industry interaction policy, the residents' odds of interactions with the industry are listed. The unadjusted model includes only the covariate of either the American Medical Student Association (AMSA) or the Institute on Medicine as a Profession (IMAP) score. The AMSA and IMAP scores are a measure of the strength of a medical school's industry interaction policy. Fully adjusted models include the AMSA or IMAP score, the size of the medical school (in quartiles), the plan to enter primary care, the plan to conduct translational research, and the concern about medical school loan level.

TABLE 3

Effect of Medical School Loan Debt Concern on Association of Strength of Medical School Industry Interaction Policies and Resident Behavior

Type of Industry Interaction	Relative OR ^a	95% CI	P Value
Receipt of Gifts			
AMSA score	0.95	0.70–1.30	.77
IMAP score	1.34	0.67–2.67	.39
Receipt of Industry-Sponsored Meals Outside of the Hospital			
AMSA score	0.79	0.55–1.13	.20
IMAP score	0.62	0.28–1.36	.23
Speaking With a Marketing Representative About Drug Products			
AMSA score	1.37	1.00–1.88	.05
IMAP score	1.40	0.70–2.80	.33
Attending Industry-Sponsored Lectures			
AMSA score	1.03	0.74–1.44	.85
IMAP score	0.78	0.38–1.62	.52

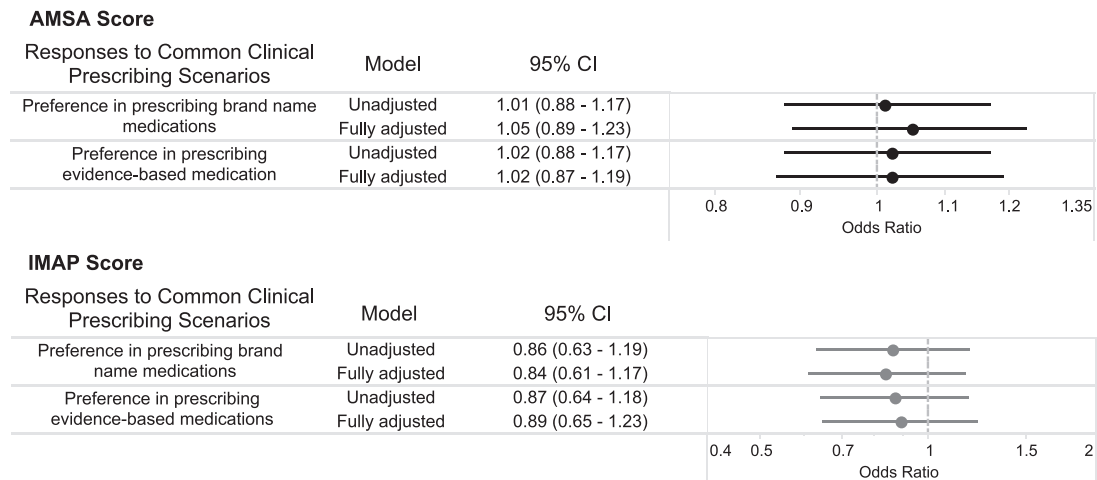
Abbreviations: AMSA, American Medical Student Association; IMAP, Institute on Medicine as a Profession.

^a The relative ORs listed compare the effect industry interaction policies among residents with and without concerns for medical school loan debts.

likely to interact with a sales representative to discuss medical products (OR = 10.40; 95% CI 7.10–15.23; $P < .001$).

Impact of Restrictive Interaction Policies

Residents who graduated from medical schools with restrictive industry interaction policies were no more or no less likely than residents who graduated from medical schools with less restrictive industry interaction policies to (1) accept gifts and free meals sponsored by the industry outside of the hospital, (2) speak with a marketing representative about drug products, and (3) attend industry-sponsored lectures (FIGURE 1). These results did not change significantly when the models were adjusted for medical school size, plans to enter primary care or to conduct translational research, and concerns about medical school loan debt. Residents' report of concern about medical school loan debt did not significantly modify the relationship between the strength of the industry interaction policy and resident behaviors, receipt of meals, conversation with a marketing representative about drug products, or attendance at industry-sponsored lectures (TABLE 3).

**FIGURE 2**

Associations Between Residents' Prescribing Preferences and Their Medical Schools' Industry Interaction Policies

For every unit of increase in the strength of the medical school industry interaction policy, the residents' odds of interactions with the industry are listed. The unadjusted model includes only the covariate of either the American Medical Student Association (AMSA) or the Institute on Medicine as a Profession (IMAP) score. The AMSA and IMAP scores are a measure of the strength of a medical school's industry interaction policy. Fully adjusted models include the AMSA or IMAP score, the size of the medical school (in quartiles), the plan to enter primary care, the plan to conduct translational research, and the concern about medical school loan level.

Evidence-Based Prescribing and Preference for Brand-Name Drugs

Residents who graduated from medical schools with restrictive industry interaction policies were no more or no less likely to prefer prescribing brand-name medications in these scenarios or to correctly identify evidence-based prescribing choices than residents who graduated from medical schools with less restrictive industry interaction policies (FIGURE 2). Again the outcomes did not change significantly with adjustments for medical school size, plans to enter primary care, plans to conduct translational research, and concerns about medical school debt.

Correlation of Reported Behavior and Prescription Preferences

Residents who correctly answered evidence-based prescription questions were about 30% less likely to have attended industry-sponsored lectures (OR = 0.72; 95% CI 0.52–0.98; $P = .04$). However, there was no association between preference for brand-name medications and attendance of industry-sponsored lectures, preference for brand-name medications and interactions with a sales representative, or with receiving industry-sponsored meals ($P = .23$ to $P = .39$). Providing evidence-based answers to prescribing knowledge questions was not associated with interaction with a sales representative or with receipt of industry-sponsored meals ($P = .27$ to $P = .29$).

Discussion

We found that residents' behaviors relating to pharmaceutical industry interactions were not significantly associated with the strength of the industry interaction policies of the medical school they had attended. Residents who attended schools with restrictive industry interaction policies were as likely to accept industry-sponsored gifts and meals, interact with a sales representative to discuss medical products, and attend industry sponsored lectures as residents who attended schools with less restrictive industry interaction policies.

A number of reasons may explain the attenuation of the protective effect of industry interaction policies. Previous studies^{27,28} have demonstrated that trainees rationalize the acceptance of gifts from marketing representatives because of the hard work and sacrifices they have made to become physicians. Therefore, it is possible that residents may feel greater justification for interacting with the pharmaceutical industry during the long and stressful hours of residency. Another explanation may be the modeling of these behaviors by attending physicians and the importance of residency environment imprinting on behaviors. The learning environment during residency training includes unscripted interpersonal interactions between the trainees and the faculty (eg, informal curriculum) and institutional cultures and policies (eg, hidden curriculum).^{29,30} Each is a factor that shapes residents' intrinsic and extrinsic motivations for

ethical behaviors. As much of what residents learn occurs at the level of experiential learning from individual supervisors and mentors, these processes can impart significant influences on resident knowledge and ethical development.^{31–35} The pervasiveness of industry sponsorship at the residency level also may convey implicit messages to residents about the acceptability of pharmaceutical industry interactions.³⁶

Several prior studies have demonstrated the importance of the training environment on physicians' and medical trainees' behavior. One study³⁷ compared psychiatrists who had graduated from residency programs in 2001 when the programs had no industry interaction policies to trainees who had been exposed to such a policy exposure in 2008. The rates of heavily promoted and brand-name antidepressants prescribing were inversely associated with exposure to industry interaction regulation policies during residency.³⁷ Another study¹⁶ showed that residents' interactions with the pharmaceutical industry and their perceptions toward acceptance of gifts may be affected by the institutional policy and educational intervention. In a third study,³⁸ physicians' exposure to industry interaction policies during medical school after 2004 was associated with a reduced subsequent prescribing of certain brand-name psychotropic medications.

Our survey has several limitations. We did not directly measure the impact of residency training on residents' behavior by evaluating the strength of the industry interaction policy for respondents' training programs. This is because at the time of survey administration, there was no systematic evaluation of industry interaction policies implemented at the hospital level (eg, the current training environment for the residents). We also did not assess the industry policies at the level of medical school affiliated with the residency program, as not all residencies have a medical school affiliation. Organizations are currently in the process of evaluating the strength of industry interaction policies at teaching hospitals.^{39,40} In addition, our results may not apply to the current training environment at any 1 particular medical school in this study, as policies may have changed since the time of survey administration. Although we surveyed a nationally representative sample of residents and achieved a 44% response rate, our study may lack sufficient power to detect small differences in industry interaction behaviors and prescription knowledge. Survey respondents and nonrespondents were similar in many ways, but they may have differed in unmeasured confounders,¹ and our results may be affected by selection bias. We also did not differen-

tiate residents based on the type of residencies, and thus may have missed differential effects of specialties on the outcomes we assessed.^{41–43} Finally, the clinical scenario questions have limited validity evidence and the questions may not have been interpreted by the respondents as intended.

Conclusion

Any effect that medical schools' industry interaction policies may have had on insulating graduates from pharmaceutical marketing did not persist in the behavior of residents in our study. Thus, an important way of regulating ethical behavior may be to create strong and consistent industry interaction policies across the continuum of medical education and the different training environments that contribute to the formation of professional norms. Medical schools and residency programs both should continue to pay close attention to managing industry interactions throughout medical training, while also being mindful of the learning environment and the institutional culture that may undermine the strength of such policies.

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