

# The Effects of Public Disclosure of Industry Payments to Physicians on Patient Trust: A Randomized Experiment

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**BACKGROUND:** Financial ties between physicians and the pharmaceutical and medical device industry are common, but little is known about how patient trust is affected by these ties.

**OBJECTIVE:** The purpose of this study was to evaluate how viewing online public disclosure of industry payments affects patients' trust ratings for physicians, the medical profession, and the pharmaceutical and medical device industry.

**DESIGN:** This was a randomized experimental evaluation.

**PARTICIPANTS:** There were 278 English-speaking participants over age 18 who had seen a healthcare provider on an online disclosure database, viewed payments from industry to the physicians, and assigned trust ratings.

**INTERVENTIONS:** Participants searched for physicians on an online disclosure database, viewed payments from industry to the physicians, and assigned trust ratings. Participants were randomized to view physicians who received no payment (\$0), low payment (\$250–300), or high payment (>\$13,000) from industry, or to a control arm in which they did not view the disclosure website. They also were asked to search for and then rate trust in their own physician.

**MAIN MEASURES:** Primary outcomes were trust in individual physician, medical profession, and industry. These scales measure trust as a composite of honesty, fidelity, competence, and global trust.

**KEY RESULTS:** Compared to physicians who received no payments, physicians who received payments over \$13,000 received lower ratings for honesty [mean (SD): 3.36 (0.86) vs. 2.75 (0.95),  $p < 0.001$ ] and fidelity [3.19 (0.65) vs. 2.89 (0.68),  $p = 0.01$ ]. Among the 7.9% of participants who found their own physician on the website, ratings for honesty and fidelity decreased as the industry payment to the physician increased (honesty: Spearman's  $\rho = -0.52$ ,  $p = 0.02$ ; fidelity: Spearman's  $\rho = -0.55$ ,  $p = 0.01$ ). Viewing the disclosure website did not affect trust ratings for the medical profession or industry.

**CONCLUSIONS:** Disclosure of industry payments to physicians affected perceptions of individual physician honesty and fidelity, but not perceptions of competence. Disclosure did not affect trust ratings for the medical profession or the pharmaceutical and medical device industry.

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## INTRODUCTION

Financial ties between physicians and pharmaceutical and medical device manufacturers are common. In 2012, one-quarter of US doctors received payments from manufacturers, and nearly two-thirds of doctors accepted gifts of food.<sup>1</sup> But policymakers and healthcare leaders have raised concerns that financial ties to industry have the potential to create conflicts of interest that could change physicians' behavior and affect patient care.<sup>2–4</sup> For example, pharmaceutical company payments to doctors have been associated with differences in prescribing behavior and the medications that physicians request for hospital formularies.<sup>5–7</sup>

Disclosure has been proposed as a mechanism for addressing concerns regarding financial conflicts of interest.<sup>8</sup> Accordingly, in 2009, the Institute of Medicine published a report recommending disclosure as a form of public transparency in order to identify, limit, and manage potential conflicts.<sup>2</sup> In 2010, the journalism group ProPublica launched a website that assembled reports on manufacturer payments to physicians and hospitals into a single public database.<sup>9</sup> In 2014, a federal website, Open Payments, followed suit as a provision under the Affordable Care Act. This provision, known as the Physician Payments Sunshine Act, requires manufacturers of drugs, devices, biologics, and medical supplies covered by Medicare or Medicaid to report certain types of payments to the Centers for Medicare and Medicaid Services (CMS).<sup>10</sup> This includes payments or gifts (plus research funding and investments) over \$10 given to physicians and teaching hospitals. Although the Open Payments website has faced criticism about its usability, the intention is to promote transparency and help patients become better informed consumers.<sup>1,11</sup>

However, little is understood about how such disclosures affect patient trust and decision-making. Patient–doctor trust is important; patients who report trust in their physician are more likely to take medications regularly, request and receive needed services, and have higher levels of satisfaction with their care.<sup>12–19</sup> Thus far, studies examining patient responses to

disclosure of physician industry payments reveal contradictory findings, with some reporting that trust in physicians is increased, while others have shown reduced trust levels.<sup>20–24</sup>

The magnitude (hundreds vs. thousands of dollars) and category of payment (for example, research or speaking) may also affect patient trust. Patients tend to find gifts of large personal value, such as paid dinners and golf tournaments, less acceptable than those that could have a direct positive impact on patient care, like textbooks or free drug samples.<sup>25–27</sup>

The American Medical Association (AMA), healthcare systems, and at least five states plus the District of Columbia have created guidelines as to what they deem acceptable payment amounts for physicians. The AMA Code of Medical Ethics states that gifts “in the general range of \$100 are permissible,” but the empirical basis for this guideline is lacking.<sup>28</sup> In contrast, the Kaiser Permanente healthcare system defines “significant financial interest” for clinical researchers as remuneration exceeding \$5000 in a 12-month period.<sup>29</sup> States such as Minnesota and Vermont have banned industry-sponsored meals or gifts, but not payments for research or speaking engagements.<sup>30,31</sup>

Our primary objective in this study was to evaluate differences in levels of trust in individual physicians, the medical profession, and industry after viewing, or not viewing, online public disclosures of varying industry payments to physicians across four study arms. Unlike previous studies that relied on hypothetical scenarios,<sup>27</sup> we used a live public disclosure website, allowing participants to view payments to physicians in the context of thousands of other physicians and teaching hospitals. Trust was measured using four dimensions: 1) fidelity, pursuing a patient’s best interests; 2) competence, avoiding mistakes and producing the best results; 3) honesty, telling the truth; and 4) global trust, a holistic aspect.<sup>32–35</sup> We hypothesized that transparency of financial ties to industry would lower patient perceptions of physician fidelity.<sup>36</sup> In contrast, we hypothesized that physicians who receive payments for consulting may be viewed as experts in their fields, and thus may be seen as more competent.<sup>37</sup> Therefore, we were interested not only in the aggregate trust score but also in the specific dimensions that comprise trust.

## METHODS

### Participants

The study took place in a behavioral research facility which maintains a participant pool of community members and university affiliates. Eligible participants were English-speaking adults over the age of 18 who had seen a doctor at least once in the 12 months preceding their participation in the study (since trust can differ between patients who are connected to the healthcare system and those who are not).<sup>19</sup> To avoid priming, participants were told they were in a study about the internet and health. The study took place between January and March 2014 and received exemption from the Harvard

Medical School Institutional Review Board (IRB). The full trial protocol can be accessed at [ClinicalTrials.gov](http://ClinicalTrials.gov).

Based on variance estimates from two previous studies using the same patient trust measures, to achieve 80% statistical power in detecting a 0.5-point difference on the five-point Likert trust scales with a two-tailed alpha level of 0.05, we needed a minimum of 148 participants across all four study arms (three Disclosure arms: No Payment, Low Payment, High Payment; one No Disclosure control arm).<sup>38,39</sup>

### Design and Interventions

This study was a randomized experimental evaluation to evaluate patient trust in physicians, the medical profession, and industry in the context of a live disclosure website. The non-profit group ProPublica’s searchable payment website (<http://www.propublica.org>) was chosen for its usability and completeness, compared to Open Payments, which was not fully functional at the time of study.<sup>40</sup>

There were four study arms. Participants were randomized using constrained randomization (in permuted blocks of 12, drawing numbers from a hat) to view physicians who received, in aggregate, 1) No Payment (\$0, which means the physician’s name was searched for, but did not appear, on the disclosure website), 2) Low Payment (\$250–300), or 3) High Payment (over \$13,000) from industry; or 4) to a No Disclosure (control) arm in which participants did not view the disclosure website (see online [Appendix A1](#) for study design).<sup>41</sup> In an effort to standardize other physician attributes as much as possible, physicians who were selected to be searched for were all senior male physicians practicing internal medicine in Massachusetts (due to evidence that patient trust can vary by physician gender).<sup>42,43</sup> Payment amounts were chosen based on previous research on average industry payments to physicians and on focus groups that we conducted with pilot participants.<sup>44</sup> Participants in the Low and High Payment arms were further divided into subgroups that viewed a physician who was paid for either research or speaking services. Information posted on the website included physician name, city and state, payment amount, payment date, company, and payment category (research or speaking).

Participants were given the name of the physician, asked to search for this individual, and then reported the amounts and types of industry payments received by this physician within the past year. The correct payment amounts and types were then displayed for the participant to ensure that they located and interpreted the information accurately. Participants subsequently completed a survey to measure the four dimensions of trust in the doctor they viewed, trust in the medical profession, and trust in the pharmaceutical industry. Finally, participants in the Disclosure arms looked up their own doctor on the website, reported any payments, and rated their trust in their own physician.

Participants in the control arm were not exposed to the disclosure website. Instead, they performed an online information-seeking task by looking up weather reports and recording findings on temperature. Therefore, they did not rate trust in individual physicians, but completed the trust

questions for the medical profession and pharmaceutical industry. All participants answered demographic questions. Thirty-six exit interviews were conducted with randomly selected participants to evaluate comprehension of the tasks.

### Pilot Study

The intervention and survey questions were refined through cognitive interviews, focus groups, and a pilot study. Pilot participants ( $n = 32$ ) searched for physicians on the disclosure website and reported any difficulties with completing tasks. Interviews ( $n = 11$ ) and focus groups ( $n = 32$ ) assessed readability and comprehension of instructions and questions. They were asked: 1) Were the instructions clear? 2) Were the questions clear? and 3) Were there any problems in understanding what kind of answers were expected or in providing answers to the questions posed? They were also asked whether there was a threshold payment amount that would be considered “unacceptable” for their physician to receive from industry. Based on the pilot, we revised the task instructions for the full study so that participants could reliably complete the tasks.

### Main Measures

The study used the ten-item Interpersonal Physician Trust Scale, the ten-item Patient Trust in the Medical Profession Scale, and an adapted nine-item scale for trust in pharmaceutical and medical device manufacturers (Trust in Industry; see online [Appendix A2](#) for scales).<sup>32–34</sup> The Physician and Medical Profession instruments have been formally validated and demonstrate excellent reliability (Cronbach’s alpha = 0.94).<sup>33,35</sup> The Trust in Industry scale was adapted from the Trust in Health Insurers scale.<sup>34</sup> Wording was modified to reference the pharmaceutical and medical device industry, and the adapted scale was evaluated for internal validation after the pilot (Cronbach’s alpha > 0.84). We also used a validated, abbreviated five-item Trust in Physicians scale, which consists of the four dimensions of trust (honesty, fidelity, competence, and global trust), for participants who found their own physician on the website.<sup>45</sup> Participants responded on a five-point Likert scale, with 5 indicating greatest agreement. We report the four dimensions of trust as well as total trust, an aggregate score.

### Statistical Analyses

The primary outcomes were trust ratings (honesty, fidelity, competence, global trust) for individual doctors, the medical profession, and industry. We analyzed participant characteristics using  $\chi^2$  tests for categorical variables and analysis of variance for continuous variables.

To evaluate physician trust, we conducted analyses of variance (ANOVAs) with trust ratings as the dependent variable and payment amount as the independent variable, followed by planned pairwise comparisons (using Tukey’s test) of trust ratings between payment amount arms. Since each trust dimension was a separate construct, Tukey’s multiple comparison adjustment was made within each dimension but not across dimensions. For trust in the medical profession and

industry, we conducted ANOVAs with trust ratings as the dependent variable and Disclosure condition (being exposed vs. not being exposed to the disclosure website) as the independent variable. For trust in one’s own physician, the Wilcoxon rank-sum test was used (for non-normal distribution) to evaluate correlations between payment amount and trust. We controlled for race in all analyses. Statistical analyses were performed using Stata (Stata Statistical Software, Release 14; StataCorp LP, College Station, TX).

## RESULTS

Table 1 shows the characteristics and number of participants by arm. The research facility invited a randomly selected portion (40%) of 1953 eligible study participants (Fig. 1). The first 369 people to enroll were scheduled into a study session; 91 failed to show up for the scheduled session, resulting in a 75% completion rate (278 participants). Participant characteristics did not differ significantly by study arm, except for race ( $\chi^2 = 13.49$ ,  $p = 0.04$ ). Controlling for race did not change the statistical significance of the outcome measures. There were no significant differences in trust ratings by payment type (research vs. speaking, all  $ps > 0.14$ ), so participants in these categories were grouped together in the analyses.

### Task Completion and Website Difficulty

All participants who began the study completed the tasks. Ten percent (24/240) of participants in the Disclosure arms did not find the correct answers when searching for payments. Exit interviews revealed that these individuals had difficulty using the website search function. All participants were shown the correct payment information before responding to trust measures.

### Trust in Individual Physicians, Medical Profession, and Industry

There was a significant effect of the amount of physician payments across the three Disclosure arms (No Payment, Low Payment, and High Payment) on average honesty, fidelity, and total trust ratings, where total trust is the composite score of the four dimensions (Table 2 and Fig. 2). Planned pairwise comparisons (using Tukey’s test adjusting for multiple comparisons) revealed that physicians who did not receive any payments were rated, on average, significantly higher in honesty, fidelity, and total trust than physicians who received high payments of \$13,000–15,000 (Table 3). There were no significant differences in trust for comparisons between physicians who received No Payment versus Low Payment (\$250–300), or between physicians who received High Payment (\$13,000–15,000) versus Low Payment. There were also no significant differences in ratings for competence or global trust between any payment amounts.

**Table 1 Participant Characteristics by Study Arm**

Variable	No Disclosure (n = 38)	No Payment (n = 80)	Low Payment (n = 80)	High Payment (n = 80)	p value
Women, no. (%)	23 (61)	41 (52)	45 (56)	40 (50)	0.69
Age, mean (±SD), years	34.6 (15.2)	33.5 (15.5)	34.4 (15.1)	34.7 (17.3)	0.97
White only, non-Hispanic, no. (%)	17 (45)	46 (58)	53 (67)	56 (70)	0.04
Less than college education, no. (%)	17 (45)	41 (51)	37 (46)	41 (51)	0.84
Full-time employment, no. (%)	12 (32)	13 (16)	17 (21)	16 (20)	0.31
Income under \$15,000, no. (%)	12 (32)	29 (36)	29 (36)	32 (40)	0.85
Self-reported health, mean (±SD)*	3.97 (0.79)	3.94 (0.88)	3.85 (1.02)	3.96 (0.91)	0.85
Self-reported mental health, mean (±SD)	3.87 (0.99)	3.71(1.06)	3.71 (1.01)	3.74 (1.06)	0.87

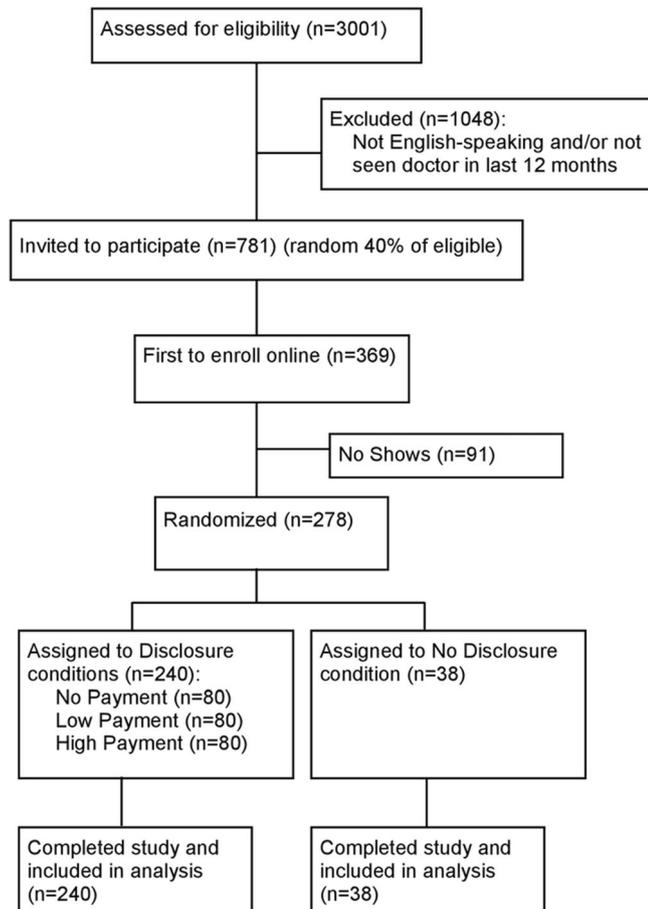
Note: Not all participants answered all demographics questions, so the denominator may vary in some categories. \*For self-reported health and mental health: 1 = poor; 5 = excellent

For trust in the medical profession and industry, planned comparisons between the three Disclosure arms (No Payment, Low Payment, and High Payment) revealed no significant differences based on payment amount ( $p > 0.20$ ). We also compared all three Disclosure arms together to the No Disclosure arm to examine whether simple exposure to the disclosure website would influence participants' trust in the medical profession and industry compared to no exposure to the website. There were no significant differences between Disclosure and No Disclosure arms for any trust dimensions for the medical profession or industry. Average total trust ratings (±SD) for the medical profession were 2.96 (0.68) by

participants exposed to the disclosure website versus 3.09 (0.56) by participants not exposed to disclosure (No Disclosure;  $df = 2$ ,  $F = 1.13$ ,  $p = 0.29$ ). For the pharmaceutical and medical device industry, average total trust ratings were 2.48 (0.63) for exposure to disclosure versus 2.68 (0.68) for No Disclosure ( $df = 2$ ,  $F = 2.89$ ,  $p = 0.09$ ).

**Trust in One's Own Doctor**

Nineteen participants in the Disclosure arms (19/240 = 7.9%) found their own doctors listed on the disclosure website. This subgroup of participants did not differ significantly in distribution from the rest of the participants based on study arm assignment ( $Z = -1.86$ ,  $p = 0.06$ ), race ( $Z = -0.27$ ,  $p = 0.79$ ), gender ( $Z = -0.19$ ,  $p = 0.85$ ), education ( $Z = -0.29$ ,  $p = 0.77$ ), or income ( $Z = -0.08$ ,  $p = 0.94$ ). Payments for these doctors ranged from \$11 to \$59,880 (median payment \$250, interquartile range \$1900). There was a negative correlation between payment amount received by the physician and the honesty rating given to that physician (Spearman's  $\rho$ ,  $-0.52$ ;  $p = 0.02$ ), payment amount and fidelity (Spearman's  $\rho$ ,  $-0.55$ ;  $p = 0.01$ ), and payment amount and total trust (Spearman's  $\rho$ ,

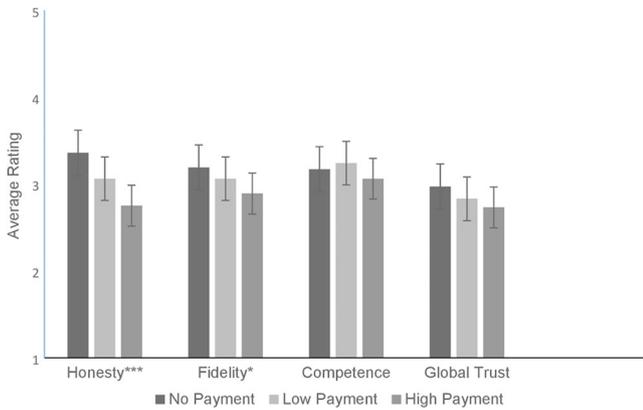


**Figure 1 CONSORT study flow diagram**

**Table 2 Mean (SD) and Analysis of Variance for Trust in Individual Physicians**

Dimensions of trust	No Payment	Low Payment	High Payment	Statistic
Honesty	3.36 (0.86)	3.06 (0.93)	2.75 (0.95)	$df = 2$ , $F = 8.49$ , $p = 0.0003$
Fidelity	3.19 (0.65)	3.06 (0.63)	2.89 (0.68)	$df = 2$ , $F = 4.33$ , $p = 0.01$
Competence	3.17 (0.59)	3.24 (0.68)	3.06 (0.64)	$df = 2$ , $F = 1.54$ , $p = 0.22$
Global trust	2.97 (0.69)	2.83 (0.79)	2.73 (0.86)	$df = 2$ , $F = 1.83$ , $p = 0.16$
Total trust	3.13 (0.58)	3.05 (0.60)	2.88 (0.65)	$df = 2$ , $F = 3.54$ , $p = 0.03$

Scores are averages for ratings on five-point Likert scale, with 1 as lowest and 5 as highest trust rating. Total trust score is the aggregate of the four dimensions. Statistic is for analysis of variance controlling for race of participants. Participants who did not view the disclosure website (No Disclosure) are not included here, as they did not search for or rate trust in an individual physician.



**Figure 2 Average trust ratings for individual physicians. Ratings are based on five-point Likert scale (1 = lowest trust, 5 = highest trust). Whiskers represent standard error. Significance indicates that analysis of variance results found differences in trust ratings across payment conditions. \* $p < 0.05$ , \*\*\* $p < 0.001$ . All analyses controlled for race.**

-0.51;  $p = 0.03$ ). There were no significant correlations between the payment amount and competence or global trust ( $p > 0.16$ ). Based on the median payment for this group ( $n = 19$ ), we split the payments into “low” payment ( $\leq \$250$ ) and “high” payment ( $> \$250$ ). The average total trust rating for the “high” payment physician group (3.27, SD: 0.95) was significantly lower than that for the “low” payment physician group (4.16, SD: 0.67; Wilcoxon rank-sum:  $z, 2.26$ ;  $\text{prob} > |z| = 0.02$ ). Fidelity ratings were also lower for doctors receiving payments over \$250 versus \$250 or less (Wilcoxon rank-sum:

**Table 3 Comparisons of Trust Ratings for Individual Physicians Based on Payment Amount**

Dimension of Trust	Comparison	Mean difference	Standard error	$p$ value
Honesty	No Payment > High Payment	0.60	0.15	< 0.001
	No Payment > Low Payment	0.29	0.15	0.11
	Low Payment > High Payment	0.31	0.14	0.09
Fidelity	No Payment > High Payment	0.92	0.31	0.01
	No Payment > Low Payment	0.40	0.31	0.41
	Low Payment > High Payment	0.52	0.31	0.21
Total trust	No Payment > High Payment	0.25	0.10	0.03
	No Payment > Low Payment	0.09	0.10	0.63
	Low Payment > High Payment	0.17	0.10	0.20

Pairwise comparisons using Tukey’s test were performed for trust dimensions with statistically significant ( $p < 0.05$ ) ANOVA results. All comparisons controlled for race.

$z, 2.10$ ;  $\text{prob} > |z| = 0.04$ ). The  $t$ -tests for lower honesty ratings did not quite reach statistical significance (Wilcoxon rank-sum:  $z, -1.92$ ;  $\text{prob} > |z| = 0.055$ ).

## DISCUSSION

This study provides a demonstration of the potential consequences of a national live physician payment disclosure website with regard to patient trust in individual doctors, the medical profession, and industry. Similar to previous studies that used hypothetical scenarios (rather than actual disclosure websites) we found that the higher the payment a physician received from industry, the lower the ratings for certain aspects of trust. In our study, physicians who received high payments were perceived to be less honest and less committed to the best interests of patients than physicians who received no payments. In contrast to other experimental work, competence ratings were not affected by viewing payment disclosure.<sup>27</sup> Interestingly, out of 240 participants, only 7.9% of those who searched for their own physicians found them. However, viewing their own physicians on the disclosure website was associated with a decrease in fidelity and honesty ratings as the amount of payments received by their physicians increased. Yet there was no significant effect of payment disclosure on trust in the medical profession or in the pharmaceutical and medical device industry, suggesting that participants may hold individual physicians most accountable for accepting industry payments.

While payment magnitude appeared to affect trust ratings for physicians, the category of payment (research vs. speaking) did not. However, more specific and varied categories may reveal differences, as previous research has found that physicians who received in-kind payments in the form of free drug samples were viewed as favorably as physicians who received no payments.<sup>27</sup>

One limitation of our study was that only a small number of participants found their own physicians on the website (about 8%). The Open Payments website incorporates payment information from a greater number of companies than the ProPublica website, so more patients may find their physicians on that website. But difficulty in website use was also an issue, with 10% of our participants unable to complete the search task, and the ProPublica website has been reported as being more user-friendly than the Open Payments website.<sup>1</sup> This finding suggests that patients may struggle to obtain accurate information about their providers. In addition, our study does not address the question of whether the public will use the website as intended to obtain information about healthcare providers.

Our respondents were well-educated and living in the northeastern United States, which may limit the generalizability of our findings. However, these participants could also represent the subpopulation of patients who would be interested in accessing disclosure databases to act as informed consumers.

Other data on providers, such as quality ratings and training, may also inform a patient's level of trust. We also note that despite randomization, there was a difference in distribution of participant race across study arms, though controlling for race did not change our results. Finally, whether the differences in trust ratings found in our study will lead to clinically meaningful outcomes remains to be seen.

While arguments in favor of payment disclosure have focused on the value of transparency and informing consumers of health services, it is unclear how many patients will actively use the website.<sup>10,46–48</sup> Disclosure may, however, cause physicians to change their behavior. Physicians may be reluctant to accept industry payments if they learn that patient awareness of and access to payment information can have a negative impact on their patients' trust.<sup>49,50</sup> This deterrent effect could be the primary means of reducing potential financial conflicts of interest through disclosure.

Collaborations between industry and medicine have the potential to advance patient care and public health. The challenge is in determining how the medical profession can promote innovation without creating undue influence or bias, and while maintaining public trust in physicians. Further research is needed to assess the complex relationship among industry payments to physicians, patient–doctor trust, and clinical outcomes.

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#### Compliance with Ethical Standards:

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**Conflict of Interest:** The authors declare that they do not have a conflict of interest. The content of this article is solely the responsibility of the authors and does not represent the official views of the Veterans Health Administration, the National Center for Ethics in Health Care, the U.S. government, Harvard Catalyst, Harvard University and its affiliated academic healthcare centers, or the National Institutes of Health.

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