The Opioid Crisis and Conflicts of Interest: Advocating Physicians' Roles as Responsible Agents

A Research Paper submitted to the Department of Engineering and Society

Presented to the Faculty of the School of Engineering and Applied Science

University of Virginia • Charlottesville, Virginia

In Partial Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

Nathan Barefoot

Spring 2020

On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

Advisor

Kathryn A. Neeley, Associate Professor of STS, Department of Engineering and Society

Introduction

The proliferation of the opioid crisis can be traced back to the mid-1990s, when manufacturers of opioids began marketing and promoting opioids as safe and non-addictive pain treatments. Since 1999, the number of opioid prescriptions in the US has quadrupled, over 200,000 deaths have been attributed to prescription opioid abuse, and rates of illicit opioid use have skyrocketed (CDC, 2019). Currently, an estimated 2 million Americans have opioid use disorder, which kills 130 Americans daily and costs $78.5 billion annually (SBG San Antonio Staff, 2020). But statistics do not tell the full story. The opioid crisis is a multifactorial problem, disrupting and destroying the lives of millions. While media coverage, awareness campaigns, and over 2,000 lawsuits have primarily sought to hold pharmaceutical companies and top executives accountable, physicians' roles in the opioid crisis have been less emphasized (Dyer, 2019).

Although some individuals have been jailed for blatantly overprescribing opioids, most physicians aim to uphold their professional and ethical responsibilities, suggesting that physicians' roles were primarily institutional in nature. Many physicians held financial relationships with manufacturers of opioids, establishing conflicts of interest that confounded self-interest with medical ethics. The Institute of Medicine (IOM) defines a conflict of interest as "circumstances that create a risk that professional judgements or actions regarding a primary interest will be unduly influenced by a secondary interest" (IOM, 2009). Primary interests include protecting research integrity, quality of medical education, and welfare of patients, while secondary interests are typically financial.

Companies like Purdue Pharma fueled these conflicts by sponsoring esteemed physicians to speak at seminars attended by practicing physicians. These industry-sponsored physicians

were funded millions to give lectures about the safety and non-addictive properties of opioids. Purdue paid practicing physicians to fly out to upscale resorts and attend these seminars, which ultimately influenced their opioid prescribing. Gale (2016) summarizes these complex financial relationships as "industry sponsored and physician led-physician driven."

This paper highlights the ways in which physicians contributed to the opioid crisis and how financial relationships with pharmaceutical companies influenced their judgements. The discourse framework from Neeley and Luegenbiehl (2008) illustrates how these physicians integrated themselves as part of the large-scale technological development of opioids, which removed their sense of individual ethical and professional responsibility. In this paper, I argue that physicians' roles in the opioid crisis illuminate the failures of conflict of interest policies, which implicates the need for a greater emphasis on individual moral responsibilities that can help physicians recognize biases that may influence their judgements.

Part 1: Physicians' Roles in the Opioid Crisis Highlight the Issues with Conflicts of Interest

During the promotion and marketing of OxyContin by Purdue Pharma in the 1990s and early 2000s, financial conflicts of interest permeated almost all facets of medicine. Between 1996 and 2001, OxyContin prescription rates increased 1800%, while the rates of other commonly prescribed opioids, such as hydrocodone and morphine, increased only 23% (United States Senate, 2002). Physicians' desire for financial gain often compromised the health and safety of their patients. In this section, the various roles physicians held in promoting the opioid crisis and the financial conflicts of interest they engaged in are defined.

Defining Physicians' Contributions to the Opioid Crisis

The spark that kindled the flame of the opioid crisis can be traced back to 1980 in a 101-word letter to the editor of *New England Journal of Medicine (NEJM)* by Dr. Heschel Jick, titled

"Addiction Rare in Patients Treated with Narcotics" (Porter & Jick, 1980). In this study, researchers found only 4 cases of addiction in 11,882 hospitalized patients treated with narcotics who did not previously have substance use disorders. Prior to the 1990s, physicians seldomly prescribed opioids to non-cancer patients over fears of addiction risks. In his book, *Dreamland: The True Tale of America's Opiate Epidemic*, Quinones (2015) argues that this era was an "epidemic" of "undertreated pain" (p. 125).

The first notable citation of Porter and Jick (1980) occurred six years later in a study published in *Pain* by Dr.'s Russell Portenoy and Kathleen Foley (Portenoy & Foley, 1986). Their study produced similar findings, leading them to conclude that opioids are a safe and effective treatment for non-malignant pain. Other studies existed with findings similar to Porter and Jick (1980), but none were cited as extensively. For example, defined as a "landmark study" by *Time*, Perry and Heidrich (1982) found no addiction among 10,000 burn victims treated with opioids (Boston, 2001). However, the problem with all of these studies is that they were solely based on hospitalized patients, where opioid administration was carefully controlled and monitored by doctors, and thus did not apply long-term to patients after they left the hospital.

Many other prominent physicians began publicizing Porter and Jick (1980), championing a new movement to treat non-malignant pain with opioids (Quinones, 2015, p. 108). These "thought leaders" were often members of esteemed pain societies like the American Pain Society (APS), which provided them with a platform to amplify their voices to a greater audience. For example, Portenoy and Foley were both leaders of the APS, and they used it as an advocacy group to support the expansion of opioid treatment protocol (deShazo et al., 2018).

These changing sentiments about prescribing opioids created an environment that allowed for the successful marketing of OxyContin by Purdue Pharma. Purdue expanded the

opioid treatment protocol from cancer-related pain to include all types of pain, notably chronic pain. Purdue held over 40 all-expenses-paid, pain-management symposia for medical professionals, where industry-sponsored physicians alleged that opioids are safe and non-addictive for treating non-cancer related pain (Quinones, 2015, p. 135; Van Zee, 2009).

Dr. Russell Portenoy was among these pain specialists speaking at Purdue's symposia. Dubbed by one magazine as the "King of Pain", Portenoy was an accredited pain-management expert (Gale, 2016). He argued that opioids should be destigmatized to rid doctors of "opioidophobia", frequently citing Porter and Jick (1980) as evidence (Catan & Perez, 2012; Gale, 2016). Purdue funded Portenoy millions of dollars, enabling him to expand his message and influence (Quinones, 2015, p. 136). Portenoy defended his financial ties to pharmaceutical companies: "they would benefit my educational mission, they benefit in my research mission, and to some extent, they can benefit my own pocketbook, without producing in me any tendency to engage in undue influence or misinformation" (Catan & Perez, 2012). In contrast, Quinones (2015) argues that Portenoy's influence would have been minor without Purdue's funding (p. 137).

By offering physician-led seminars as part of continuing medical education (CME), Purdue was able to selectively target primary care physicians, whose training in pain-management was typically limited (Quinones, 2015, p. 127; Van Zee, 2009). In fact, for many primary care doctors, these medical seminars were the sole source of their pain-management training. Even Portenoy later admitted that these doctors "may not have the skill set required to prescribe [opioids] responsibly" (Tough, 2001). Nevertheless, by 2003, primary care physicians became the most frequent prescribers of opioids (Van Zee, 2009). Quinones summarizes two potential reason for this:

> Primary care docs took the word of pain specialists, who pointed to Porter and Jick as evidence that opiates were far less addictive for chronic-pain patients than previously thought. Not that primary care doctors needed much encouragement. Chronic-pain patients, desperate for relief, could be insistent, rude, and abusive, and took a lot of time to diagnose and treat (Quinones, 2015, p. 108).
>
> These pills were billed as a boon to doctors -- a tool that all of a sudden [solved] all your problem with chronic pain. It actually ended up being a huge curse for doctors. It made them lazy sometimes. It made them corrupt. And all of a sudden [physicians] were violating laws that maybe you didn't think you were violating (Firth, 2016).

However, there are numerous explanations that provide insight into the ways practicing physicians were influenced. For example, although most doctors claim that industry gifts and all-expenses-paid symposia do not influence their prescribing, research demonstrates otherwise (Avorn et al., 1982; Orlowski & Wateska, 1992). This indicates that their prescribing was perhaps unconsciously and unintentionally biased, topics further discussed in Part III of this paper. Bottom line, the lack of empirical evidence quantifying these influences makes it impossible to attribute the influence on practicing physicians to a single source.

Physicians' Engagement in Financial Conflicts of Interest

While the scope and depth of physicians' relationships with manufacturers of opioids are extensive, they can be generalized into three main conflict of interest categories. These include financial conflicts of interest in research, medical practice, and clinical practice guidelines. Although the U.S. Public Health Service set regulations on conflicts of interest in 1995, the extent to which institutions implemented them, if at all, is unknown (IOM, 2009). Many governments and professional organizations have since expanded their policies, but there still

lacks a universally accepted approach. Further analysis of physicians' moral responsibilities and the variety of ways they failed to uphold them during the opioid crisis helps illuminate the problems with conflicts of interest on a more fundamental level.

Part II: Neeley and Luegenbiehl's Discourse Framework Can Be Applied to Physicians

This section utilizes the framework from Neeley and Luegenbiehl (2008) to illustrate how the opioid crisis reflects a discourse of inevitability, where physicians failed to ethically reflect and accept individual responsibility. A discourse of inevitability implies that "technology is the primary or sole driver of social evolution and that control over designs or outcomes is either difficult or impossible" (Neeley & Luegenbiehl, 2008, p. 249). Although intended for engineers in the design process, this framework can reasonably be applied to physicians. The framework emphasizes the importance of engineers' individual responsibilities in design, which are analogous to that of physicians in drug development and marketing.

Throughout the paper, Neeley and Luegenbiehl (2008) contrast the language of "technological development" to "design." The discourse of technological development perpetuates a notion of inevitability, which dominates large-scale technological development and causes engineers to lose their sense of individual ethical and professional responsibilities (p. 247). In contrast, a discourse of design fosters notions of openness and choice, which are "more conducive to ethical awareness, reflection, and responsibility" (p. 248). Although technological development and design both refer to a team-based process, design is more associated with the ideas of individuality and responsibility, which are at the core of ethics. Technological development typically neglects these ethical ideals, narrowing its focus to the technology alone and how well it performs its intended function. This can be seen in **Table 1**, where the language of technological development refers to a more general trend, emphasizing progress and

efficiency, while the terminology of design refers to something more specific, prioritizing individuality and the societal impacts of design choices.

Table 1: The contrasting discourse tendencies of design and technological development (Neeley & Luegenbiehl, 2008, p. 251).

Design	Technological Development
Specific Innovation	General Trend
Originality	Process
Change	Progress
Imagination	Production
Aesthetic Considerations	Efficiency
Individual	Team
Credit	Anonymity
Inventor	Corporation
People	Technology
Iteration	Linear

The paper points to van Gorp and van de Poel (2001), who highlight two central features of the design process: "the formulation of design requirements and criteria, and the acceptance of tradeoffs between different design criteria." Tradeoffs include those between safety and economic criteria, as well as the realization that because design problems are typically ill-defined, there is no optimal solution. Realizing these core features creates opportunities for ethical reflection and awareness of individual responsibility (Neeley & Luegenbiehl, 2008, p. 253).

Applying Neeley and Luegenbiehl's Framework to Physicians

This framework can have profound implications when applied to medicine. Neeley and Luegenbiehl (2008) broadly define engineering ethics to include "considerations for the impact of design on public and its safety", which relates to common issues in medical ethics, including conflicts of interests (p. 253). The production and marketing of opioids is an example of large-scale technological development, where the ill-defined problem was how to properly treat pain and the proposed solution was often OxyContin. Purdue's marketing of OxyContin illustrates

how the discourse of inevitability can be used as a marketing strategy, a way of "selling what's new and next" (p. 249).

Neeley and Luegenbiehl (2008) argue that professionals have a harder time feeling responsible for, or even recognizing the ethical issues associated with large-scale technologies developed by groups and organizations (p. 247). Physicians' roles in the opioid crisis epitomize this problem. As mentioned, protecting the integrity of research is an important part of physicians' ethical responsibilities. However, many physicians failed to do so when misinterpreting studies as evidence that opioids are non-addictive; of the 608 citations of Porter and Jick (1980), 72.2% used it as evidence that addiction was rare in patients treated with opioids, and 80.8% failed to note that the findings only applied to hospitalized patient (Leung et al., 2017). By failing to critically analyze the findings from Porter and Jick (1980), many physicians lost their sense of individual moral responsibilities as they integrated themselves into a larger movement championing the safety of opioids. This is similarly seen in "thought leaders" such as Portenoy who spoke at industry-sponsored symposia. Although his judgements were likely blinded by his financial ties, Portenoy "sincerely believed that these were miracle drugs for chronic pain" (Quinones, 2015, p. 136). By insisting that "chronic pain was frequently best treated with long-lasting opioid painkillers", Portenoy failed to uphold his sworn ethos to protect research integrity (Quinones, 2015, p. 136).

Practicing physicians influenced by Purdue's marketing to prescribe OxyContin similarly blended themselves in the large-scale technological development. Analogous to the idea of voter apathy, in which voters perceive their individual vote as insignificant to the overall election outcome, it was likely difficult for many physicians to perceive how their individual prescribing contributed to the skyrocketing rates of OxyContin prescriptions and the growing opioid crisis.

Furthermore, having all-expenses-paid symposia in upscale resort towns with "dinners, golf outings, and spa treatments" count towards continuing medical education (CME) was certainly alluring for practicing physicians (Quinones, 2015, p. 135). However, physicians must be aware of the influence these secondary interests may have on their primary responsibility to patient care. Some argue that physicians should boycott such events counting towards CME, while others suggest that physicians must be skeptical and hyper-critical of any findings or recommendations these symposia present (Fava, 2016; Gale, 2016). Regardless, both of these opinions align with arguments from Neeley and Luegenbiehl (2008), implicating a need for greater ethical awareness and responsibility.

Although their depth of involvement varies, physicians lost their sense of individual moral responsibility when immersing themselves in the large-scale promotion and marketing of OxyContin. Secondary financial incentives superseded medicine's primary interests of protecting patient welfare and research integrity, often in insidious ways. As shown in the next section, this framework has profound implications on how to approach the ongoing problems with conflict of interest policies.

Part III: Approaching Conflicts of Interest on a Fundamental Level

Although regulations on conflicts of interest are continuously evolving, there is yet to be a universal, nuanced, and effective policy. The extent and impact of the policy is continuously debated. This section illustrates the past and current failures of conflict of interest policies, which indicates the problem needs to be approached from a different angle. Similar to Neeley and Luegenbiehl (2008), Martin and Schinzinger (1996) highlight the need for increased individual moral responsibilities, which can help physicians become more aware of their positions in conflicts of interest. That said, a number of studies suggest physicians may still be unknowingly

biased. While there lacks empirical evidence on these biases in conflicts of interest, they may assist physicians in recognizing sources of bias that aren't readily apparent.

Problems with Conflict of Interest Policy Reform

In 2010, the US government passed the Physician Payments Sunshine Act, which requires drug companies to publicly disclose any payments to physicians over $10 (Pham-Kanter et al., 2012). However, it has been well documented that policies mandating simple disclosure do not work (IOM, 2009, p. 8; Rodwin, 1989). Furthermore, following implementation of the Sunshine Act, many physicians still fail to properly disclose their conflicts (DeJong & Steinbrook, 2018). Additionally, many patients don't know how to interpret the physicians' financial ties; they believe that these financial ties "do not affect what is most important in medicine – the doctor-patient relationship" (Rodwin, 2011, p. 20).

Some fear that a highly detailed and extensive policy is burdensome for physicians and deters the benefits that industry finances generate, such as bringing new drugs to market. An estimated 42% of physicians' time is spent on administrative tasks, which would likely rise with increased policy mandates (Lichter et al., 2012). In the article, "Understanding Bias – the Careful Case for Study", Rosenbaum (2015) criticizes the extensive policy recommendations from the Institute of Medicine's (IOM) 2009 report. She argues that many of the IOM's recommendations are "suggestive" rather than "definitive" due to a lack of empirical evidence. In addition, she indicates that a financial conflict of interest, by definition, suggests that the physicians' professional judgement might be compromised, not that it will be. While she is not against the idea of policy reform, she highlights an opposing viewpoint that is often overlooked by policymakers and institutions.

Physicians as Responsible Agents

In the third chapter of *Ethics in Engineering*, Martin and Schinzinger (1996) provide greater insight into the conflict of interest policy issue by outlining the problems with laws and regulations in technological development. Continuously updating policy with further specifications can not only be overburdening, but it may encourage minimal compliance (Martin & Schinzinger, 1996, p. 100). Minimal compliance perpetuates a "handbook mentality", where professionals substitute decisions on ethical issues to an interpretation of law. This is indicative of the limited success of institutional conflict of interest policy reforms and recommendations, which suggests the problem needs to be approached differently.

Martin and Schinzinger (1996) argue that clear and effective laws are important, but an equal emphasis needs to be placed on the individual's moral responsibilities. Physicians must act as responsible agents, which involves the following features:

> (1) conscientious commitment to live by moral values, (2) a disposition to maintain a comprehensive perspective on the context and possible consequences of one's actions, (3) autonomous, personal involvement in one's activities, and (4) an acceptance of accountability for the results of one's conduct (Martin & Schinzinger, 1996, p. 103).

One significant threat to responsible agency reflected in the opioid crisis is the tendency to divorce oneself from one's actions by placing responsibility on an authority. Physicians could avoid personal accountability by ultimately placing most of the blame on pharmaceutical companies. This process of diffusing accountability is illustrated below in **Figure 1**.

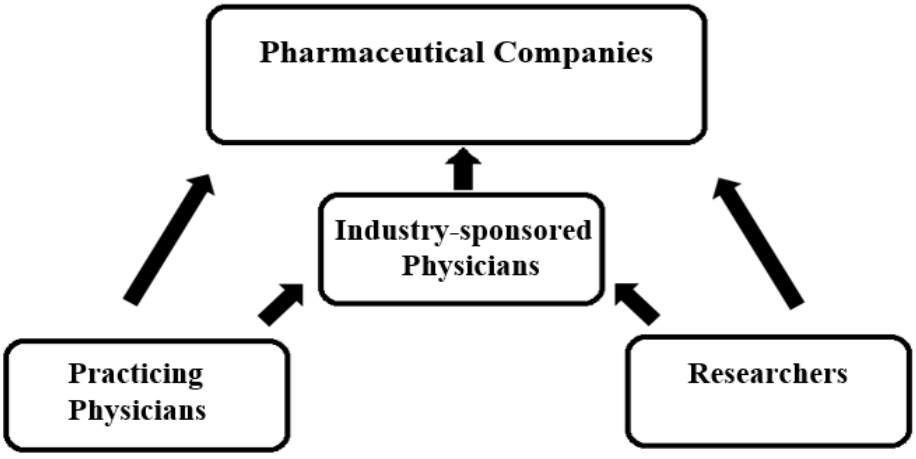

Figure 1: How physicians blamed authority in the opioid crisis. Practicing physicians and researchers placed accountability on the industry and sponsored physicians for misinterpreting research findings and spreading false information, while industry-sponsored physicians blamed the industry for financing the crisis. (Created by author).

In an interview with *NPR*, Heschel Jick stated that many of the citations to his study "grossly misinterpreted the conclusions", and that none of the companies who used the study to advertise opioids talked to him about it (Haney, 2017). Practicing physicians could similarly blame authority for spreading misinformation about opioids. Although an extreme example, Dr. Barry Schultz, who was sentenced to 157 years in prison in September 2018, attempted to avoid personal accountability by claiming he was influenced to prescribe high doses of opioids after attending one of Portenoy's lectures (Whitaker, 2015). Portenoy appeared to accept a level of accountability in a 2011 interview: "I gave innumerable lectures in the late 1980s and '90s about addiction that weren't true" (Catan & Perez, 2012). However, in April 2019, he agreed to testify against Purdue in their upcoming case in order to obtain impunity from potential charges (Frey, 2019). Had physicians not avoided accountability and alternatively emphasized the moral values of responsible agency, they might have recognized the ethical dilemmas they were involved in and thus prevented some of opioid crisis's tragedies.

Studies That Can Inform Physicians of Their Potential Biases

While recognizing their individual ethical responsibilities is of paramount importance for physicians when making treatment decisions, studies on cognitive biases elucidate the influences that may still impact their judgment. In Appendix D of the IOM's 2009 report on conflicts of interest, Jason Dana extensively covers a body of psychological research that suggests physicians may be unconsciously and unintentionally biased. Dana highlights a number of studies implicating that we tend to engage in "self-serving bias", where individuals take credit for good outcomes and blame bad outcomes on external sources, unintentionally behaving in ways that favor themselves.

In a study from Loewenstein et al. (1993), subjects were randomly assigned the role of a plaintiff or defendant, presented with case materials from a lawsuit, and asked to agree on a settlement in the form of a payment from the defendant to the plaintiff. Given a monetary endowment to finance the settlement, subjects were told that they would bring home the amount settled upon. The longer they took to settle, the greater the penalty as the endowment would decrease; if they could not settle, a neutral judge made the decision. Prior to the study, the plaintiffs and defendants were asked how they thought the neutral judge would rule. On average, the plaintiffs' predictions of their reward from the neutral judge were significantly higher than the defendants'. The larger this discrepancy, the less likely a settlement was reached. The results illustrate the unintentional nature of self-serving bias; although it was in their best interest to settle, participants were unable to avoid being biased.

Following the same protocol, Babcock et al. (1995) attempted to reduce bias by educating the subjects on the biases that led to disagreement. However, this intervention did not improve settlement rates. Subjects were better at detecting bias, but mostly in their opponent rather than

in themselves. Those who recognized their own biases tended to drastically underestimate their severity. This tendency to see bias in others, while being blind to it in ourselves is known as the bias blind spot. In addition, these findings suggest that self-serving bias is not only unconscious, but also that conscious attention alone cannot remove the bias.

These studies implicate that physicians' judgements may be influenced by unintentional and unconscious biases, even when acting as responsible agents. In fact, many of findings from medical research on conflicts of interest correspond well with the psychological research on bias. For example, Steinman et al. (2001) found that 61% of medical residents denied that industry promotions influenced their prescribing, but only 16% believed other physicians were similarly unaffected, which is indicative of the bias blind spot. While most physicians similarly deny the influence of industry promotions, many studies demonstrate otherwise.

For example, Avorn et al. (1982) surveyed physicians about their beliefs on two classes of drugs, for which information about their efficacy from scientific literature markedly differed from commercial sources. This allowed the researchers to determine which sources of information influenced the participants' beliefs. Although the majority of subjects claimed their prescribing is predominately influenced by scientific sources relative to commercial sources, their beliefs about the effectiveness of the two drugs displayed an opposite trend. This discrepancy suggests that physicians were perhaps unaware of the influence of commercial sources, and were thus unconsciously biased. A study from Orlowski & Wateska (1992) investigated the influences of all-expenses-paid trips to pharmaceutical symposia on physicians. Prior to the symposia, the physicians were interviewed and asked how likely they believed the seminars would influence their prescribing. All but one physician denied the possibility of influence. However, their prescription rates of the advertised drug significantly increased

compared to the national average. The prior interviews should have made the physicians more aware of potential biases, yet the seminars still influenced their prescribing, which suggests they were unconsciously and unintentionally biased.

Despite a lack of empirical evidence on the impacts of unconscious and unintentional bias in conflicts of interest in medicine, the results of these studies suggest that these biases influence treatment decision-making. These studies, along with the biases they address and their key findings are summarized below in **Table 2**. Acting as responsible agents can illuminate the problems with secondary financial influences, but judgements may still be biased in a self-serving manner. Future research should seek to quantify the effects of self-serving bias in conflicts of interest in medicine, and investigate mechanisms to increase physicians' awareness about them and how they can overcome them.

Table 2: Summary of the studies presented and the types of bias they address.

Study	Type(s) of Bias	Key Findings
Loewenstein et al. (1993)	Self-serving bias	Self-serving biases are unintentional. People are unable to avoid being biased, even when it is in their best interest to do so.
Babcock et al. (1995)	Self-serving bias, bias blind spot	Self-serving biases are unconscious. Educating subjects about biases can make them better at detecting them, but it does not eliminate their influence. Bias blind spot: people are better at detecting biases in others rather than in themselves.
Orlowski and Wateska (1992)	Self-serving bias	All-expenses-paid symposia may unintentionally and unconsciously influence physicians to prescribe the advertised drug.
Steinman et al. (2001)	Bias blind spot	Most medical residents believe that pharmaceutical gifts influence other's prescribing, but not themselves.
Avorn et al. (1982)	Self-serving bias	Physicians are influenced by commercial sources to prescribe a drug, despite believing otherwise.

Conclusion

While it might be expected that professionals learn from past ethical mistakes, this is frequently not the case, which leads to a repetition of these past mistakes (Martin & Schnizinger, 1996, p. 66). This problem is manifested throughout the opioid crisis, where physicians immersed themselves as part of the large-scale marketing of OxyContin, which removed their sense of moral responsibility and personal accountability. By emphasizing their roles as responsible agents, physicians can increase their awareness of the ethical dilemmas arising from conflicts of interest, and subsequently avoid making decisions biased by financial interests. That said, this fails to completely eliminate the influences from unintentional and unconscious biases, which is an area for future research. Nevertheless, an approach that stresses the importance of responsible agency tackles the ongoing problems with conflicts of interest on a more fundamental level, contrasting from most conventional efforts aimed at policy reform. Since policy inevitably lags change, perhaps this emphasis on physicians' individual responsibilities can ultimately help guide the development of a clear and effective conflict of interest policy.

References

Avorn, J., Chen, M., & Hartley, R. (1982). Scientific versus commercial sources of influence on the prescribing behavior of physicians. *The American Journal of Medicine*, *73*(1), 4–8. https://doi.org/10.1016/0002-9343(82)90911-1

Babcock, L., Loewenstein, G., Issacharoff, S., & Camerer, C. (1995). Biased Judgments of Fairness in Bargaining. *The American Economic Review*, *85*(5), 1337–1343. JSTOR.

Boston, S. A. (2001, June 24). Less Pain, More Gain. *Time*. http://content.time.com/time/magazine/article/0,9171,158154,00.html

Catan, C., & Perez, E. (2012, December 17). A Pain-Drug Champion Has Second Thoughts. *Wall Street Journal*. https://www.wsj.com/articles/SB10001424127887324478304578173342657044604

CDC. (2019, July 24). Understanding the Epidemic. *CDC Injury Center*. https://www.cdc.gov/drugoverdose/epidemic/index.html

DeJong, C., & Steinbrook, R. (2018). Continuing Problems With Financial Conflicts of Interest and Clinical Practice Guidelines. *JAMA Internal Medicine*, *178*(12), 1715–1715. https://doi.org/10.1001/jamainternmed.2018.4974

deShazo, R. D., Johnson, M., Eriator, I., & Rodenmeyer, K. (2018). Backstories on the US Opioid Epidemic. Good Intentions Gone Bad, an Industry Gone Rogue, and Watch Dogs Gone to Sleep. *The American Journal of Medicine*, *131*(6), 595–601. https://doi.org/10.1016/j.amjmed.2017.12.045

Dyer, O. (2019). Johnson and Johnson ordered to pay $572m in landmark opioid liability case. *BMJ*, *366*, l5319. https://doi.org/10.1136/bmj.l5319

Fava, G. A. (2016). The Hidden Costs of Financial Conflicts of Interest in Medicine. *Psychotherapy and Psychosomatics*, *85*(2), 65–70. https://doi.org/10.1159/000442694

Firth, S. (2016, November 26). "Dreamland" Author Takes an Opioid Epidemic Trip. *Medpage Today*. https://www.medpagetoday.com/psychiatry/addictions/61691

Frey, G. (2019, April 8). Pain-care specialist agrees to testify against Purdue and other Opioid drugmakers. *CNBC*. https://www.cnbc.com/2019/04/08/physician-agrees-to-testify-against-purdue-and-other-opioid-drugmakers.html

Gale, A. H. (2016). Drug Company Compensated Physicians Role in Causing America's Deadly Opioid Epidemic: When Will We Learn? *Missouri Medicine*, *113*(4), 244–246.

Haney, T. (2017). Doctor Who Wrote 1980 Letter On Painkillers Regrets That It Fed The Opioid Crisis. *NPR*. https://www.npr.org/sections/health-shots/2017/06/16/533060031/doctor-who-wrote-1980-letter-on-painkillers-regrets-that-it-fed-the-opioid-crisi

IOM. (2009). *Conflict of Interest in Medical Research, Education, and Practice.* National Academies Press (US). https://www.ncbi.nlm.nih.gov/books/NBK22926/

Leung, P. T. M., Macdonald, E. M., Stanbrook, M. B., Dhalla, I. A., & Juurlink, D. N. (2017). A 1980 Letter on the Risk of Opioid Addiction. *New England Journal of Medicine*, *376*(22), 2194–2195. https://doi.org/10.1056/NEJMc1700150

Lichter, A., McKinney, R., Anderson, T., Breese, E., Brennan, N., Butler, D., Campbell, E., Chimonas, S., Chisolm, G., Clark, C., Corn, M., Coukell, A., Dean, D., Eringhaus, S., Fontanarosa, P., Frankel, M., Hutchinson, R., Jost, T., Kahn, N., … Kohorn, I. V. (2012). Harmonizing Reporting on Potential Conflicts of Interest: A Common Disclosure Process for Health Care and Life Sciences. *NAM Perspectives*. https://doi.org/10.31478/201211b

Loewenstein, G., Issacharoff, S., Camerer, C., & Babcock, L. (1993). Self-Serving Assessments of Fairness and Pretrial Bargaining. *The Journal of Legal Studies*, *22*(1), 135–159. JSTOR.

Martin, M. W., & Schinzinger, R. (1996). *Ethics in Engineering*. McGraw-Hill.

Neeley, K. A., & Luegenbiehl, H. C. (2008). Beyond Inevitability: Emphasizing the Role of Intention and Ethical Responsibility in Engineering Design. In P. Kroes, P. E. Vermaas, A. Light, & S. A. Moore (Eds.), *Philosophy and Design: From Engineering to Architecture* (pp. 247–257). https://doi.org/10.1007/978-1-4020-6591-0_19

Orlowski, J. P., & Wateska, L. (1992). The effects of pharmaceutical firm enticements on physician prescribing patterns. There's no such thing as a free lunch. *Chest*, *102*(1), 270–273. https://doi.org/10.1378/chest.102.1.270

Perry, S., & Heidrich, G. (1982). Management of pain during debridement: A survey of U.S. burn units. *Pain*, *13*(3), 267–280. https://doi.org/10.1016/0304-3959(82)90016-1

Pham-Kanter, G., Alexander, G. C., & Nair, K. (2012). EFFECT OF PHYSICIAN PAYMENT DISCLOSURE LAWS ON PRESCRIBING. *Archives of Internal Medicine*, *172*(10), 819–821. https://doi.org/10.1001/archinternmed.2012.1210

Portenoy, R. K., & Foley, K. M. (1986). Chronic use of opioid analgesics in non-malignant pain: Report of 38 cases. *Pain*, *25*(2), 171–186. https://doi.org/10.1016/0304-3959(86)90091-6

Porter, J., & Jick, H. (1980). Addiction rare in patients treated with narcotics. *The New England Journal of Medicine*, *302*(2), 123. https://doi.org/10.1056/nejm198001103020221

Quinones, S. (2015). *Dreamland: The True Tale of America's Opiate Epidemic*. Bloomsbury Publishing.

Rodwin, M. A. (1989). Physicians' conflicts of interest. The limitations of disclosure. *The New England Journal of Medicine, 321*(20), 1405–1408. https://doi.org/10.1056/NEJM198911163212010

Rodwin, M. A. (2011). *Conflicts of Interest and the Future of Medicine: The United States, France, and Japan*. Oxford University Press. Rosenbaum, L. (2015). Understanding Bias—The Case for Careful Study. *NEJM*. https://www.nejm.org/doi/10.1056/NEJMms1502497

SBG San Antonio Staff. (2020, February 4). Doctor using unique drug to fight opioid crisis. *NEWS4SA*. https://news4sanantonio.com/news/stop-the-stigma/doctor-using-unique-drug-to-fight-opioid-crisis

Steinman, M. A., Shlipak, M. G., & McPhee, S. J. (2001). Of principles and pens: Attitudes and practices of medicine housestaff toward pharmaceutical industry promotions. *The American Journal of Medicine, 110*(7), 551–557. https://doi.org/10.1016/s0002-9343(01)00660-x

Tough, P. (2001, July 29). The Alchemy of OxyContin. *The New York Times*. https://www.nytimes.com/2001/07/29/magazine/the-alchemy-of-oxycontin.html

United States Senate. (2002). OxyContin: Balancing Risks and Benefits. https://www.govinfo.gov/content/pkg/CHRG-107shrg77770/html/CHRG-107shrg77770.htm

van Gorp, A., & van de Poel, I. (2001). Ethical considerations in engineering design processes. *IEEE Technology and Society Magazine, 20*(3), 15–22. https://doi.org/10.1109/44.952761

Van Zee, A. (2009). The Promotion and Marketing of OxyContin: Commercial Triumph, Public Health Tragedy. *American Journal of Public Health, 99*(2), 221–227. https://doi.org/10.2105/AJPH.2007.131714

Whitaker, B. (2015). Who's responsible for the opioid epidemic? Doctors or pharmaceutical companies? *CBC News.* https://www.cbsnews.com/news/jailed-doctor-barry-schultz-interview-opioid-epidemic-60-minutes-2019-08-25/